IMPLEMENTATION PLAN
FOR
HUBLER RUN

CLEARFIELD COUNTY, PENNSYLVANIA

Prepared for:

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TABLE OF CONTENTS

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TABLE OF CONTENTS (CONTINUED)

LIST OF APPENDICES

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EXECUTIVE SUMMARY

This implementation plan has been developed for the restoration of Hubler Run, located in Graham Township, Clearfield County, Pennsylvania. Extensive mining activities have occurred in the watershed, and the stream is impacted by abandoned mine drainage (AMD). Consequently, Hubler Run contributes pollutant loadings, mainly acidity and metals, to its receiving waters, Alder Run.

The Hubler Run Watershed has been included in three recent studies of the Alder Run Watershed. The stream was studied in detail for the *Upper Alder Run Assessment and Restoration Plan* completed by Alder Run Engineering in fall of 2006. The *Alder Run Operation Scarlift Report*, developed by Skelly and Loy in 1970 for the Pennsylvania Department of Environmental Resources, included historic watershed information and a history of mining activities in the watershed. Finally, the Pennsylvania Department of Environmental Protection (PA DEP) has developed Total Maximum Daily Loads (TMDLs) for the Alder Run Watershed, to which Hubler Run is a tributary. These three documents serve as the basis for this plan.

The primary pollutant source in the watershed is AMD that originates from former surface mine areas. Erosion and stream encroachment concerns exist in the upper and middle reaches of the stream, but these concerns are secondary to water quality impairment due to AMD. Two AMD pollutant sources have been addressed by the Hubler Run #1 and #2 Treatment Systems, and two additional water quality impairments due to AMD must be addressed in the watershed before the watershed can be restored and meet its designated use.

This implementation plan discusses the remaining pollutant sources in the watershed and discusses required reductions in pollutant loadings to meet the TMDLs established for the stream. The status of the ongoing restoration projects is also provided. Best management practices (BMPs) required to meet prescribed load reductions and the impacts of the BMPs on the downstream receiving waters are addressed. The technical assistance needed to implement the necessary BMPs and an implementation schedule for addressing the remaining pollutant

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sources are also detailed. Plans for water quality monitoring, evaluation of the success of restoration measures, and remedial actions in the event of problems with restoration measures have been addressed.

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1.0 BACKGROUND

The Hubler Run Watershed is located in central Pennsylvania in Graham Township, Clearfield County. A watershed location map is provided as Figure 1 of Appendix A. The watershed is located a short distance north of Interstate 80 and west of the town of Kylertown, Pennsylvania. The watershed is roughly bounded by local roads to the west and north: Deer Creek Road to the west and Palestine Road to the north.

The Hubler Run Watershed is impaired by abandoned mine drainage (AMD). The AMD sources in the watershed consist of both discrete AMD discharges and AMD and groundwater seepage into the stream channel which does not have a discrete location. The AMD discharges display depressed pH and elevated metals concentrations, and the quality of the AMD is such that aquatic life in the stream is impaired. Water quality throughout the watershed ranges from fair to poor. Some portions of the main stem near the West Branch Sportsman's Association (WBSA) Clubhouse have been reported to support fish.

Hubler Run is listed on Pennsylvania's 2006 Integrated List of All Waters which includes the Section 303(d) List of Impaired Waters. The stream is listed because of impairments due to AMD, including acidity and metals such as iron, manganese, and aluminum.

This Implementation Plan has been developed for the restoration of Hubler Run. Although limited mining activities have occurred in the watershed, the stream is impacted by abandoned mine drainage (AMD). AMD concerns in the area are so significant that the adjacent watershed, the Big Run Watershed, has been declared as unsuitable for mining. As a result of mining activities, Hubler Run contributes pollutant loadings, mainly acidity and metals, to its receiving waters, Alder Run.

This Implementation Plan prioritizes activities relating to the four major pollutant sources in the watershed, and discusses required reductions in pollutant loadings to meet the TMDLs established for the stream. Best management practices (BMPs) required to meet prescribed load

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reductions and the impacts of the BMPs on the downstream receiving waters are addressed. The technical assistance needed to implement the necessary BMPs and an implementation schedule for addressing the remaining pollutant sources are also provided. Plans for water quality monitoring, evaluation of the success of restoration measures, and remedial actions in the event of problems with restoration measures have been developed.

The following sections of this narrative provide a brief overview of the watershed characteristics, mining activities, and other studies that have included the Hubler Run Watershed. The *Alder Run Operation Scarlift Report* and the *Alder Run Watershed TMDL* provide more detail about the physical characteristics of the watershed.

1.1 Watershed Characteristics

The Hubler Run Watershed encompasses a drainage area of 1.05 square miles. A watershed boundary map is provided as Figure 2 in Appendix A. The centroid of the watershed is located at 41º01’06” north latitude and 78º12’44” west longitude.

1.1.1 Topography and Land Use

According to the USGS 7.5 minute topographic quadrangle maps of Philipsburg, Pennsylvania and Frenchville, Pennsylvania, elevations across the watershed range from 1,720 feet to 1,390 feet above mean sea level. Site topography is provided on Figure 2 in Appendix A. The majority of the watershed has moderate to steep slopes, although there are some areas with more mild slopes along the south side of the stream.

The majority of the watershed is forested lands that are used for recreational purposes. Three large farms are found in the western portion of the watershed, and they include both tilled lands with row crops, pasture areas, and fallow areas. Some portions of these farms are enrolled in farmland conservation programs. Other land uses in the watershed include previously-mined areas (partially reclaimed areas) and a small number rural residential properties located along the

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local roadways. The rural communities of Pinchatouley and Palestine form the population centers in the watershed.

1.1.2 Geology

The Hubler Run Watershed is located in the Appalachian Plateau Physiographic Province. The basin is underlain by gently-folded sedimentary rocks. The geologic strata consist mostly of strata belonging to the Pennsylvania Group and the Mississippian Group. Six coal seams are present in the watershed: the Clarion/Brookville; the Upper, Middle, and Lower Kittanning; and the Lower and Upper Freeport Seams. Most of the coal mining in the watershed occurred on the Lower Kittanning or B Seam.

1.1.3 Surface Water Resources and Wetlands

Hubler Run flows in an easterly direction from just west of the Deer Creek Road to its confluence with Alder Run for a distance of approximately 1.5 miles. The main stem of Hubler Run receives drainage from one intermittent, unnamed tributary approximately 3100 feet in length which enters the stream from the north.

Wetland complexes are located along the much of the length of Hubler Run. The source of hydrology to these wetlands is seasonal hillside seepages with water quality that ranges from good to poor. Several other ponds and wetlands are present in the watershed, including farm ponds and constructed recreational ponds.

1.2 Mining History

Mining in the watershed was confined to the western portion of the watershed. Along the north side of Hubler Run, numerous informal drift mine openings exist. The openings appear to have been used to obtain coal for household use. No dates are available for these drift mines. Some of the drifts experience discharges during periods of high flow.

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In the 1960s, the area south of the headwaters was surface mined. Partial reclamation of this area has occurred, and the site is partially-vegetated. Homes have been constructed on portions of this site. There is no active mining in the watershed at this time.

1.3 Prior Studies

An Operation Scarlift Report was prepared by Skelly and Loy for the Pennsylvania Department of Environmental Resources (DER) in 1977 for the Alder Run Watershed. This report included water quality sampling and the identification of priority areas for restoration in the watershed. Notable facts about this report are the documentation of a fish population in Hubler Run and the water quality data which indicate a decline in water quality from the 1970s to the present time.

A watershed assessment was completed for the Upper Alder Run Watershed by Alder Run Engineering, LLC. This assessment includes extensive sampling data and a restoration plan for the Alder Run Watershed down to the confluence with Mons Run. Proposed conceptual treatment designs and cost estimates are included in this report.

The Hubler Run Watershed was included in the Total Maximum Daily Load (TMDL) study developed for the Alder Run Watershed. The *Alder Run Watershed* TMDL developed by the Pennsylvania Department of Environmental Protection (DEP) and approved by the Environmental Protection Agency (EPA) in 2006, included specific pollutant loading reductions for Hubler Run. The TMDLs for Hubler Run are discussed in detail in this Implementation Plan. The *Alder Run TMDL* document, the *Alder Run Operation Scarlift Report*, and the *Upper Alder Run Assessment* serve as the basis for this Implementation Plan.

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2.0 IDENTIFICATION OF POLLUTION SOURCES

Pollutant sources in the Hubler Run Watershed were identified and described in the *Upper Alder Run Assessment*. Staff from Alder Run Engineering visited each of the identified pollutant sources in the fall of 2005 and summer of 2006, and have periodically visited the watershed to track current conditions. The pollutant sources in the watershed were sampled as part of the *Upper Alder Run Assessment*, and sampling efforts were completed in July of 2006. The total maximum daily loads (TMDLs) and other watershed problems, applicable water quality standards, and prioritization of pollutant sources are described in the following paragraphs.

2.1 Total Maximum Daily Loads and Other Watershed Problems

The Hubler Run Watershed is impaired by abandoned mine drainage (AMD), a legacy from the past mining activities that have occurred in the watershed. AMD is the primary source of impairment in the watershed, and other major sources of impairment such as sediment and nutrients are not present in the watershed. Impairments to the watershed include acidity (pH) and metals.

Total maximum daily loads (TMDLs) for the Hubler Run Watershed were developed as part of the *Draft Alder Run Watershed TMDL* prepared by the PA DEP and dated 2006. TMDL criteria for the watershed are provided in Section 3 of this narrative. The TMDL study divided Hubler Run into reaches based on water quality data at two sample points on the main stem of Hubler Run. Excerpts from the TMDL study are provided as Appendix C. Water quality data from the TMDL study are included with the data provided in Appendix F.

Water quality in the watershed ranges from only slightly impaired to moderately impaired in the main stem. Fish populations were present in the stream in the late 1970s, but recent sampling data indicate that water quality has deteriorated since the 1970s. The primary tributary (HR02) has impaired water quality water due to AMD impacts. A discussion of the water quality and level of impairment by stream reach is provided in the following paragraphs. The discussion references water quality data provided by the DEP for the TMDL study and from the *Upper*

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Alder Run Assessment. Water quality data are provided as Appendix F. Figure 4 of Appendix A shows the sample points that are referenced in the following paragraphs. Figure 3 of Appendix A shows the location of specific mine discharges and proposed treatment systems.

Stream quality classifications for Hubler Run as discussed in the following paragraphs were based on water quality data. A summary of the classification criteria is provided in Table 2.1.

TABLE 2.1 CLASSIFICATION CRITERIA FOR STREAM QUALITY CLASSIFICATION

CLASSIFICATION	CRITERIA
Good	pH > 6.0 acidity < alkalinity low metals
Fair	pH > 5.0 acidity < alkalinity low metals
Poor	pH > 4.5 acidity > alkalinity moderate metals
Very Poor	pH < 4.5 acidity > alkalinity high metals

Sample point HR03 is the furthest upstream sample point on Hubler Run in terms of the TMDL study. Other sample locations were included in the other studies of the stream in order to obtain detailed data for the design of treatment systems, but point HR03 is the furthest upstream point for which a TMDL endpoint was developed. The point is located at approximately the midpoint of the stream. This segment of stream has very poor quality from the headwaters downstream to HR03.

Sample point HR03 (Hubler above HR03—Reach Code 02050201000656--0.79 miles impaired) conveys an average flow of 400 gallons per minute (gpm) with measured flows ranging from 102 gpm to 783 gpm. The pH in this segment ranges from 4.1 to 4.4. Other average chemical parameters for this reach include acidity of 71 milligrams per liter (mg/l), alkalinity of 4.4 mg/l,

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Osceola Mills, PA 16666
Phone (814) 339-6998
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total iron of 0.46 mg/l, total manganese of 6 mg/l, total aluminum of 3.3 mg/l, and total sulfate of 177 mg/l. Loadings are presented in Section 4.

Two mine drainage discharges flow into Hubler Run in this section. Flow from the Hubler Run 16 discharges enters the stream from the south after being treated in the Hubler Run 1 AMD Treatment System. The HB 17/18/19 seeps enter Hubler Run from the north, contributing iron and other metals to the stream. Several seasonal seeps and intermittent stormwater flow channels conveying fair to good quality flow enter the stream in this reach on occasion.

Samples collected during the *Upper Alder Run Assessment* were used to examine the quality of Hubler Run above the existing Hubler Run 1 treatment system and also below the system to determine the impacts that the existing system has on the stream. Sample point AH is located upstream of the system and the HB 17/18/19 seeps, sample point AI is the system outfall to Hubler Run, and sample point AJ is Hubler Run approximately 1500 feet downstream of the Hubler Run 1 system discharge. These data indicate that the system is having a somewhat of a positive impact on water quality in Hubler Run, despite malfunctioning, as discussed later in this narrative. Water quality above the system displays pH ranging from 3.3 to 4.0 with iron concentrations between 1.7 mg/l and 9.3 mg/l and aluminum concentrations between 0.8 mg/l and 4.0 mg/l. This equates to loadings of 5.4 pounds per day (lb/day) of iron, 2.4 lb/day of aluminum, 11.0 lb/day of manganese, and 53.9 lb/day of acidity. Below the treatment system at point AJ, the stream displays pH ranging from 3.6 to 4.5 with iron concentrations between 0.8 mg/l and 4.3 mg/l and aluminum concentrations between 0.9 mg/l and 6.7 mg/l, despite receiving additional pollutants from the HB 17/18/19 seeps. This equates to loadings of 4.0 lb/day of iron, 5.9 lb/day of aluminum, 19.8 lb/day of manganese, and 78.4 lb/day of acidity.

Sample point HR01 is located at the mouth of Hubler Run before it enters Alder Run (Hubler above HR01—Reach Code 02050201000656--0.61 miles impaired). This point conveys an average flow of 480 gpm, with measured flows ranging from 224 gpm to 717 gpm. The pH in this segment ranges from 4.1 to 5.7. Other average chemical parameters for this reach include acidity of 18 mg/l, alkalinity of 6 mg/l, total iron of 0.4 mg/l, total manganese of 3.1 mg/l, total

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aluminum of 1.4 mg/l, and total sulfate of 117 mg/l. The water quality in this segment is classified as fair to poor. Sample point HR01 receives flow from an unnamed tributary (HR02) near Palestine. Loadings are provided in Section 4.

TMDLs were established for one unnamed tributary to Hubler Run, unnamed tributary No. 2 (HR02) (unnamed tributary—Reach Code 02050201001686--0.56 miles impaired). HR02 originates near Palestine and flow south-southeast to Hubler Run. There are no known AMD discharges to this tributary, and flow in the tributary is intermittent. Sample point HR02 represents the mouth of the unnamed tributary upstream of its confluence with Hubler Run.

Stream flows at HR02 range from 0 to 75 gpm with an average flow of 62 gpm. Pollutant concentrations for average 0.7 mg/L of iron, 0.13 mg/l of manganese, 0.5 mg/l for aluminum, and 26 mg/l for sulfate. Acidity averages 4 mg/l, while alkalinity averages 13 mg/l. Sample data at point UNT7.0 show pH ranging from 6.2 to 6.7. This unnamed tributary is classified as having good water quality. Despite having good water quality, water quality improvements are necessary in order to meet the TMDLs for this reach. Loadings are presented in Section 4.

2.2 Applicable Water Quality Standards

Hubler Run is listed as having a protected use of Cold Water Fishes (CWF) in Title 25, Chapter 93 of the Pennsylvania Code. The stream is included in Drainage List L for the Susquehanna River Basin. In addition to the TMDLs for iron, manganese, aluminum, and acidity that were established by the DEP for the watershed, specific and state-wide water quality criteria for the stream are provided in Title 25, Chapter 93 of the Pennsylvania Code.

Tables 3 and 4 of 25 PA Code §93.7 provide specific water quality criteria for critical uses including CWF, as Hubler Run is classified. Specific criteria for CWF include dissolved oxygen and temperature. Water quality criteria for CWF uses are summarized in Table 2.2.

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TABLE 2.2 WATER QUALITY CRITERIA FOR CWF

PARAMETER	CRITERIA
Alkalinity	Minimum 20 mg/l as $CaCO_3$ except where natural conditions are less;
Dissolved Oxygen	6.0 mg/l minimum daily averagefor flowing waters 5.0 mg/l minimum
Dissolved Iron	0.3 mg/l
Osmotic Pressure	50 milliosmoles per kilogram
Temperature	Ranges from 38 to 66 degrees, maximum, depending on the month
Total Dissolved Solids	500 mg/l monthly average value 750 mg/l maximum
Total Residual Chlorine	0.011 mg/l 4-day average 0.019 hourly average

Values have also been established for average recoverable iron and pH but they duplicate the values for these parameters established by the TMDLs for the stream and were included with the TMDLs.

The TMDLs for the Alder Run Watershed were developed to meet water quality endpoints or goals as provided in Table 2.3.

TABLE 2.3 WATER QUALITY ENDPOINTS FOR THE ALDER RUN WATERSHED

PARAMETER	ENDPOINT
Aluminum, Total Recoverable	0.75 mg/l
Manganese, Total Recoverable	1.00 mg/l
Iron, 30-day Average Recoverable	1.50 mg/l
pH	6.0-9.0 S.U.

These endpoints were selected as they should allow the waters to achieve their designated uses. The required reductions were designed to be protective of the water quality criterion for each specific parameter 99 percent of the time. Additional information about specific TMDL limits and reductions for points in the Hubler Run Watershed is provided in Section 3 of this narrative.

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2.3 Identification and Prioritization of Pollution Sources

Pollutant sources in the Hubler Run Watershed were identified as part of this Implementation Plan, and the prioritization of pollutant sources was determined. During the development of this Implementation Plan, Alder Run Engineering personnel visited the watershed and the identified pollutant sources to verify the current conditions and any restoration work that has occurred in the watershed. A discussion of existing pollution sources and their priority with respect to restoration of the Hubler Run Watershed is provided in the following paragraphs. Location maps showing the pollution sources are provided as Figure 3 in Appendix A. Photographs of the pollution sources are provided in Appendix E. Water quality data for the mine drainage discharges were obtained from the *Alder Run TMDL*, the *Upper Alder Run Assessment,* and previous sampling by the West Branch Sportsman's Association (WBSA) and DEP.

Two areas where AMD discharges should be treated were identified. These areas include the existing Hubler Run 1 Treatment System, which is in need of rehabilitation and treats the HB16 discharge, and the HB 17/18/19 AMD seeps, which will be treated in the Hubler Run 2 treatment system. The treatment areas shown as Hubler Run 3 and 4 do not represent discrete AMD discharges. For those two areas, flow in the stream is degraded by groundwater seepage into the stream channel and by runoff, so treatment of the stream itself will be necessary. This prioritization was based on an upstream-to-downstream progression giving the first priority to the completion of ongoing projects. Table 2.4 provides the prioritization of restoration projects in the Hubler Run Watershed.

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TABLE 2.4 PRIORITIZATION OF RESTORATION PROJECTS IN THE HUBLER RUN WATERSHED

PROJECT	IMPLEMENTATION PLAN PRIORITY RANKING
Hubler Run 1 Treatment System Rehabilitation	1
Hubler Run 2 Treatment System	2
Hubler Run 3 Treatment System	3
Hubler Run 4 Treatment System	4

Previous concepts for the restoration of Hubler Run ended with the construction of the Hubler Run 2 Treatment System as all of the AMD discharges in the watershed would be addressed by the Hubler Run 1 and 2 systems. However, the previous concepts did not account for groundwater flow into the stream channel and for runoff. Although all of the discharges in the watershed will be treated by Hubler Run 1 and 2, the flow in the headwaters of the stream above Hubler Run 1 and the flow in the unnamed tributary to Hubler Run (HR02) near Palestine are degraded although there are no visible discharges to those reaches. Two additional treatment systems, Hubler Run 3 and Hubler Run 4, are necessary in order to meet the TMDLs and the restoration goals for Hubler Run.

2.3.1 Hubler Run 1 AMD Treatment System

The first priority in the Hubler Run Restoration is the completion of the ongoing Hubler Run 1 Treatment System Rehabilitation. This existing treatment system was constructed in 2000. The system consists of two limestone cells followed by two shared settling basins to collect and treat seepage from a former surface mine area. This system is located a short distance east of Deer Creek Road at the end of Baughman Lane. This system was designed by Skelly and Loy, Inc.

Water quality data for the system outflow are presented in Appendix F as Sample Point AI. When the system was first constructed, the system performed well, generating pH above 6.0 and aluminum less than 1 mg/L. The performance of the system has declined over time, and outflow

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water quality data display decreasing pH and increasing aluminum and manganese concentrations. The performance declines are believed to relate to worsening inflow water quality. The system discharge is inadequate to support aquatic life during periods of moderate to high flows and cold weather.

The system was designed to treat the HB 12, 15, and 16 AMD discharges which originate from a formerly surface-mined area. Due to the nature of the system that was constructed, measurement of current inflows and water quality is difficult due to the presence of the limestone drains installed to capture the discharges. Tables 2.5.A and 2.5.B provide the water quality chemistry and calculated loadings for the inflow to the Hubler Run 1 treatment system. The water quality and flow data presented in Table 2.5.A were collected prior to the construction of the treatment system and were the data used as the basis for the design of the system. Table 2.6 provides the typical outflow characteristics for the system between August 2005 and August 2006, Loadings cannot be calculated from this data as flow values represent instantaneous outflows dependent on the flushing cycles of the system and not average flow data. The HB 12, 15, and 16 discharges contribute the majority of the aluminum loading to Hubler Run.

TABLE 2.5.A AVERAGE FLOW AND WATER QUALITY FOR THE HB 12, HB 15, and HB16 DISCHARGES (Discharge to 02050201000656—Hubler above HR03)

PARAMETER	HB 12	HB 15	HB 16
Average flow, gpm	17.4	11	8
Maximum flow, gpm	45	30	15
Acidity, mg/l	78	120	109
Iron, mg/l	2.3	<1	<1
Aluminum, mg/l	6.0	18.4	15.1

TABLE 2.5.B AVERAGE POLLUTANT LOADINGS PRODUCED BY THE HB 12, HB 15, and HB16 DISCHARGES

PARAMETER	HB 12	HB 15	HB 16
Acidity, lb/day	16.3	15.8	10.5

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Phone (814) 339-6998
Fax: (814) 339-6266

PARAMETER	HB 12	HB 15	HB 16
Iron, lb/day	0.5	<0.1	<0.1
Aluminum, lb/day	1.3	2.4	1.4

TABLE 2.6. AVERAGE WATER QUALITY FOR THE HUBLER RUN 1 TREATMENT SYSTEM OUTFALL (SAMPLE POINT AI) 2005-2006 (Discharge to 02050201000656—Hubler above HR03)

PARAMETER	AVERAGE VALUE
Flow	Varies depending on inflow
pH	4.5 to 6.7
Acidity	-13 to 49
Alkalinity	4 to 25
Aluminum	0.08 to 9.5
Iron	0.13 to 0.75
Manganese	3.98 to 9.81
Sulfate	214 to 428

All values in mg/l unless otherwise noted. pH values provided in SU.

2.3.2 Hubler Run 2 AMD Treatment System

The Hubler Run 2 AMD Treatment System is proposed to collect and treat flow from three small seepage areas along the north bank of Hubler Run identified as HB17, HB18, and HB19. These seeps appear to originate from former deep mines as the north side of the stream has numerous, very old drift openings where coal was mined for household use. A design for this treatment system was completed by Skelly and Loy, Inc. based on the following water quality data provided in Table 2.7.A.

TABLE 2.7.A AVERAGE FLOW AND WATER QUALITY FOR THE HB 17, HB 18, AND HB 19 SEEPS (Discharge to 02050201000656—Hubler above HR03)

PARAMETER	HB 17	HB 18	HB 19
Average flow, gpm	3.2	1.3	2.3
Maximum flow, gpm	7.5	2.0	6.0

Alder Run Engineering
107 Coal Street
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Phone (814) 339-6998
Fax: (814) 339-6266

PARAMETER	HB 17	HB 18	HB 19
Acidity, mg/l	88	83	65
Iron, mg/l	18	13	6
Aluminum, mg/l	2.1	<1	2.4

TABLE 2.7.B AVERAGE POLLUTANT LOADINGS PRODUCED BY THE HB 17, HB 18, AND HB 19 SEEPS

PARAMETER	HB 17	HB 18	HB 19
Acidity, mg/l	88	83	65
Iron, mg/l	18	13	6
Aluminum, mg/l	2.1	<1	2.4

While those three seeps have relatively low flows, the acidity and iron concentrations are relatively high, and the discharges contribute a fair portion of the loading to the stream at this point. These discharges are the only remaining discrete discharges to the stream that can be treated.

2.3.3 Hubler Run 3 Treatment System (Hubler Run Headwaters)

The Hubler Run 3 Treatment System is proposed in the headwaters of Hubler Run. There is no discrete pollutant source to be treated at this location. The stream is impaired due to stormwater runoff, groundwater and interflow that are degraded by AMD. The degraded groundwater and interflow contributions enter the channel of Hubler Run. This impairment in water quality is evidenced by the samples collected at sample point AH which is collected upstream of any AMD discharges. The water quality at this point is discussed in Section 2.1 of this narrative, and data are provided in Appendix F. In order for the TMDL at HR03 to be met, treatment of the headwaters is necessary. Since there are no additional discrete discharges to be treated, the treatment will have to occur on the stream itself to treat the stream flow. This proposed system would be located in segment 02050201000656—Hubler above HR03.

2.3.4 Hubler Run 4 Treatment System (Unnamed Tributary to Hubler Run)

The Hubler Run 4 Treatment System is proposed on the unnamed tributary to Hubler Run (HR02). This scenario is very similar to the Hubler Run 3 scenario as there are no discrete AMD discharges that could be collected and treated. The stream flow itself is degraded as the groundwater leaves the ground and flows up into the stream bed, so on-stream treatment will also be necessary to achieve the TMDLs for this segment. The water quality at this point is discussed in Section 2.1 of this narrative, and data are provided in Appendix F. This proposed system would be located in segment 02050201001686—unnamed tributary.

2.3.5 Other Sources

Other pollution sources in the watershed include two areas of stream encroachment in need of stream restoration activities on the north bank of Hubler Run. The first occurs approximately 1500 feet upstream of HR02 and the second approximately 1000 feet downstream of HR02. In both situations, private landowners have constructed unpermitted impoundments either in or along Hubler Run. In both cases, the areas are poorly-vegetated and contribute sediment to the stream. The stream has been forced out of its original channel into man-made configurations which constrict the stream and create high flow velocities. If the fishery of Hubler Run were restored, these areas, especially the eastern area, would pose a great impediment to the movement of fish and other aquatic life. However, since the major impairments to the stream are AMD-related and these areas have little impact on water quality, restoration of these areas was not determined to be absolutely necessary for the restoration of Hubler Run, and thus these areas were not assigned a priority value.

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3.0 POLLUTANT LOAD REDUCTIONS REQUIRED TO MEET TMDLS

Total Maximum Daily Loads (TMDLs) for Hubler Run were included in the *Alder Run TMDL* prepared by the PA DEP and approved by the EPA in 2006. Excerpts from the TMDL relating to the Hubler Run Watershed are provided in Appendix C. This section is based on the limits established by and published in the *Alder Run TMDL*.

The TMDLs for Hubler Run were developed for depressed pH and high levels of metals due to acid mine drainage from abandoned coal mines. The TMDL addresses pH and the three primary metals associated with AMD (iron, manganese, and aluminum). No other categories of impairment were listed for the Hubler Run Watershed. The required pollutant reductions specified in the TMDL and the impacts to downstream waters from the required reductions are discussed in the following paragraphs.

3.1 Required Reductions

The TMDLs for Hubler Run were developed for specific reaches of the stream and are provided in reference to several points in the watershed, including the following: Hubler Run above sample point HR03; an unnamed tributary to Hubler Run (sample point HR02), and Hubler Run above sample point HR01. Figures showing the locations of each of the sample points are provided as Figure 4 in Appendix A.

The TMDLs were developed to meet water quality criterion values of 0.75 milligrams per liter (mg/l) of total recoverable aluminum, 1.00 mg/l of total recoverable manganese, 1.50 mg/l of 30-day average total recoverable iron, and a pH between 6.0 and 9.0 The pollutant reductions needed to meet the water quality criteria are described in detail below for each stream segment. The required reductions were designed to be protective of the water quality criterion for each specific parameter 99 percent of the time.

The water quality data for the TMDL study were collected after the Hubler Run 1 treatment system was constructed and functional. Therefore, the required pollutant reductions reflect

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reductions that must occur in addition to any reductions experienced due to treatment of AMD in the existing Hubler Run 1 treatment system.

Hubler Run Above Point HR03 (Reach Code 02050201000656—0.79 miles impaired)

TMDLs have been developed for aluminum, manganese, and acidity for this segment above sample point HR03. Sample point HR03 is located on Hubler Run upstream of the confluence with unnamed tributary HR02. This segment contains roughly the upper half of the main stem of the stream including the headwaters. The mining activities that have occurred in the watershed have occurred in this segment. The pH of this segment ranges from 4.1 to 4.7, and pH was included in the TMDL for the segment due to mining impacts. Table 3.1 provides the measured sample values and required pollutant reductions for this segment of Hubler Run.

TABLE 3.1 REQUIRED POLLUTANT REDUCTIONS FOR HUBLER RUN ABOVE SAMPLE POINT HR03 (02050201000656)

SAMPLE POINT HR03	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION
	Conc. (mg/l)	Load (lb/day)	Conc. (mg/l)	Load (lb/day)	Percent
Iron	0.58	2.8	0.58	2.8	0
Manganese	5.29	26.0	0.45	2.2	91
Aluminum	2.96	14.5	0.27	1.4	91
Acidity	64.05	314.8	3.03	14.9	95
Alkalinity	5.10	25.1			

No reductions in iron concentrations or loadings have been specified for this reach. Manganese concentrations must be reduced from 5.29 mg/l to 0.45 ml/l for the long-term average daily concentration, with a corresponding reduction in loading from 26.0 lb/day to 2.2 lb/day. Aluminum concentrations must be reduced from 2.96 mg/l to 0.27 mg/l for the long-term average daily concentration, with a corresponding reduction in loading from 14.5 lb/day to 1.4 lb/day. Acidity concentrations must be reduced from 64.05 mg/l to 3.03 mg/l, with a corresponding reduction in loading from 314.8 lb/day to 14.9 lb/day. The reduction percentages identified are 91 percent for manganese and aluminum and 95 percent for acidity.

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Unnamed Tributary to Hubler Run at HR02 (Reach Code 02050201001686—0.56 miles impaired)

TMDLs have been developed for iron, manganese, aluminum, and acidity for the unnamed tributary to Hubler Run that originates near Palestine and flows south into Hubler Run. Sample point HR02 is located at the mouth of the unnamed tributary. While the pH in this segment ranges between 6.3 and 6.7, pH values were included in the TMDL for the segment due to mining impacts. Table 3.2 provides the measured sample values and required pollutant reductions for this segment of the unnamed tributary to Hubler Run.

TABLE 3.2 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO HUBLER RUN ABOVE SAMPLE POINT HR02 (02050201001686)

SAMPLE POINT HR02	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	Conc. (mg/l)	Load (lb/day)	Percent
Iron	1.37	1.8	0.28	0.4	80
Manganese	0.43	0.5	0.30	0.4	30
Aluminum	0.82	1.1	0.11	0.1	87
Acidity	9.30	12.0	3.17	4.1	66
Alkalinity	17.60	22.7			

Iron concentrations for this segment must be reduced from 1.37 mg/l to 0.28 mg/l, with reductions in iron load from 1.8 lb/day to 0.4 lb/day. Manganese concentrations must be reduced from 0.43 mg/l to 0.30 mg/l, with a corresponding reduction in loading from 0.5 lb/day to 0.4 lb/day. Aluminum concentrations in this segment must be reduced from a long-term average daily value of 0.82 mg/l to 0.11 mg/l, while aluminum loading must be reduced from 1.1 lb/day to 0.1 lb/day. Acidity must be reduced from 9.30 to 3.17 mg/l for the long-term average daily concentration. The corresponding reduction in acidity is a reduction from 12.0 lb/day of acidity to 4.1 lb/day. The reduction percentages identified are 80 percent for iron, 30 percent for manganese, 87 percent for aluminum, and 66 percent for acidity.

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Hubler Run Between HR03 and HR01 (Reach Code 02050201000656—0.61 miles impaired)

This segment of the main stem of Hubler Run is located upstream of the mouth of Hubler Run. Sample point HR01 is located near Schoonover Road at the WBSA Clubhouse. Hubler Run between HR03 and HR01 receives drainage from the unnamed tributary (HR02) that originates near Palestine. Point HR01 represents the mouth of Hubler Run prior to its discharge into Alder Run.

The load reductions for this segment consist of reductions in aluminum, manganese, and acidity. The pH in this segment ranges between 4.6 and 5.1, and pH is addressed as part of the TMDL due to mining impacts in this segment. The *Alder Run TMDL* developed load allocations for sample point HR01. These allocations are provided in Table 3.3.

TABLE 3.3 LOAD ALLOCATIONS FOR HUBLER RUN BETWEEN SAMPLE POINTS HR03 AND HR01 (02050201000656)

SAMPLE POINT HR01	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	Conc. (mg/l)	Load (lb/day)
Iron	ND	ND	NA	NA
Manganese	3.40	18.7	0.47	2.6
Aluminum	1.50	8.3	0.25	1.4
Acidity	41.65	229.8	3.82	21.1
Alkalinity	7.45	41.1		

Based on the data included in Table 3.3, reductions in aluminum, manganese, and acidity are necessary for this segment. However, reductions in pollutants for all points that contribute flow to HR01 must be accounted for. Sample points HR03 and HR02 are located upstream of HR01, and loading reductions for both of those upstream points were prescribed.

The TMDL plan accounted for loading reductions at points HR03 and HR02. For each pollutant, the total load to be removed upstream at HR03 and HR02 was subtracted from the existing load at point HR01, and the calculated value was compared to the allowable load at point HR01.

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Reductions for the segment HR03 to HR01 would be necessary for any pollutant parameter that exceeds the allowable load at HR01. The required reductions at point HR01 are shown in Table 3-4.

TABLE 3.4 POLLUTANT REDUCTIONS NECESSARY AT POINT HR01 (02050201000656)

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at HR01	0	18.7	8.3	229.8
Difference in Existing Load between HR03, HR02, and HR01	-4.6	-7.8	-7.3	-97.0
Load tracked from HR03 and HR02 (upstream loads)	3.2	2.6	1.5	19.0
Percent lost due to instream processes	100	29	47	30
Percent load tracked from HR03, HR02, and HR01	0	71	53	70
Total load tracked between points HR03, HR02, and HR01	0.0	1.8	0.8	13.4
Allowable Load at HR01 = TMDL	0	2.6	1.4	21.1
Load Reduction	0.0	0.0	0.0	0.0
% Reduction Segment	0%	0%	0%	0%

Provided that the specified reductions at HR03 and HR02 are met, no reductions are needed at point HR01. The loadings for iron, manganese, aluminum, and acidity will be below the allowable loads at HR01.

3.2 Impacts to Downstream Waters

Hubler Run discharges to Alder Run along Schoonover Road near Kylertown at the WBSA Clubhouse. Alder Run is very severely impacted by AMD. Due to the water quality of Alder Run and the percentage of flow contribution from Hubler Run to Alder Run, restoration activities in the Hubler Run Watershed will not produce any significant improvements in the Alder Run main stem as long as larger upstream AMD sources such as the deep mine discharges near the town of Morrisdale remain.

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The restoration of Hubler Run through the implementation of BMPs in four areas of the Hubler Run Watershed will result in a reduction in pollutant loadings in Alder Run. However, the reduction in loadings from activities on Hubler Run alone will not be sufficient to restore Alder Run below its confluence with Hubler Run. Prior to the confluence with Hubler Run, Alder Run receives significant pollutant loadings from deep mine discharges and from Flat Run. Below Hubler Run, Alder Run receives additional degraded flows from the highly-polluted Mons and Browns Runs.

The TMDL plan for Alder Run contained a summary of all loads affecting sample points AR05, Alder Run upstream of Hubler and Mons Runs, and AR02, Alder Run upstream of Browns Run, and reductions necessary at these points. In order for the TMDL for the Alder Run to be met at sample point AR02 loading reductions of 1081.0 lb/day of iron, 199.4 lb/day of manganese, 182.6 lb/day of aluminum, and 3504.8 lb/day of acidity are required. The TMDL assumes load reductions in Mons Run and various other upstream tributaries to Alder Run as well as reductions in the main stem of Alder Run. Even if all pollutant loadings of iron, manganese, aluminum, and acidity were somehow removed from Hubler Run, the reduction in loadings in the receiving waters of Alder Run would not be sufficient to realize a significant impact to the water quality in Alder Run or to achieve the TMDL reductions for Alder Run due to efforts in the Hubler Run Watershed alone.

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4.0 MANAGEMENT MEASURES REQUIRED TO ACHIEVE PRESCRIBED LOAD REDUCTIONS

Water quality and flow data were collected were studied during the preparation of this Implementation Plan and as part of the *Upper Alder Run Assessment*. Four areas in the watershed where management measures are needed to achieve the prescribed load reductions and meet the TMDLs for Hubler Run were identified. Field investigations were conducted in the fall of 2005 and summer of 2006 to verify the existing conditions and to ensure that that a need for best management practices was still present. Existing best management practices (or BMPs), areas designated for additional controls, and appropriate best management practices and their anticipated performance are described in the following paragraphs.

4.1 Existing Best Management Practices

Existing BMPs relating to impairments from AMD in the Hubler Run Watershed include the Hubler Run 1 passive treatment system. No other BMPs or reclamation activities are present in the watershed. Other BMPs such as the passive treatment systems on Cold Stream are present within a 20-mile radius of the watershed boundary.

The existing Hubler Run 1 passive treatment system is located in the headwaters of Hubler Run. This system was constructed to treat discharges from abandoned surface coal mine areas that are partially reclaimed. Precipitation percolates through acidic overburden layers until it encounters an impermeable clay layer, after which flow moves laterally and discharges to Hubler Run. The Hubler Run 1 system intercepts this water and treats it in limestone cells followed by settling basins.

The effectiveness and experiences with the existing Hubler Run 1 system can be applied to passive treatment practices in the remainder of the watershed. The existing system was designed to treat for acidity and aluminum, and the system has experienced some problems with high flows in the recent past. The system contains limestone cells with automatic dosing siphons for flushing. All flow was originally designed to pass through the treatment components and no

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high-flow bypass was provided. This configuration led to problems with the functionality of the treatment cells due to excessive flows, with flows receiving inadequate treatment during periods of high flow. To complicate this matter, the design was based on flows obtained during dry years, and the actual normal inflows into the system are roughly double the intended design flows. The precipitation received during the design period should be carefully examined to ensure that design flows accurately represent typical rates.

A second issue relating to the functionality of the limestone cells is problems with the underdrain piping. Insufficient piping was included in the design, so the flushing siphon cannot receive enough flow to flush properly. Only partial flushing occurs during the flushing cycles, and flush volumes are estimated to be as low as 10 percent of the total cell volumes based on calculated flush times. Future systems in the watershed should give careful consideration to the use of flushing siphons and the amount of underdrain piping feeding the siphons.

4.2 Areas Designated for Additional Controls

The available water quality data were used to identify areas where additional controls are needed. Four areas within the watershed have been designated as having a need for BMPs to control pollutants resulting from AMD, including the necessary repairs to the Hubler Run 1 system. The proposed controls are located at the two AMD discharge areas and at two on-stream locations where controls are needed to achieve the TMDLs. Approximately 1.4 miles of stream could benefit from this work. The areas where controls are proposed include the following:

- Hubler Run 1 Treatment System
- Hubler Run 2 Treatment System
- Hubler Run 3 Treatment System
- Hubler Run 4 Treatment System

The location of each of these areas is provided on Figure 3 in Appendix A. Each area is described in detail in the following paragraphs. Conceptual designs and cost estimates are included as Appendix D. Photographs of each area are provided in Appendix E. The Hubler

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Run 1 Treatment System is included in this section of this narrative as it is in need of repair and because rehabilitation of the system will result in improvements to a portion of Hubler Run.

4.2.1 Hubler Run 1 Treatment System

This system includes limestone cells and settling basins to remove acidity and aluminum from surface mine discharges. As discussed previously, the water discharged from the system cannot support aquatic life due to depressed pH and elevated aluminum levels.

An investigation of this system was performed in 2005 and 2006, and portions of the system were excavated to determine the cause of the performance problems. A corrective action plan will be submitted to DEP in February of 2007 identifying the problems with the system, which include insufficient treatment capacity for the actual flows resulting from design based on flow data from dry years and insufficient piping in the limestone cells to allow for adequate automatic flushing. The corrective actions include the following: installation of additional piping in the existing limestone cells to improve flushing characteristics and ensure proper functioning of the flushing siphons; construction of an additional limestone cell to increase treatment capacity; construction of an additional settling basin to increase treatment capacity; and construction of a compost wetland for final polishing and to reduce manganese concentrations. Since reductions in manganese are needed in this segment, the compost wetland is proposed as it will provide a means for reduction in manganese since iron concentrations are low. These proposed improvements will be presented for DEP's approval prior to implementation.

4.2.2 Hubler Run 2 Treatment System

The Hubler Run 2 Treatment System was designed by Skelly and Loy. The system includes a series of three anoxic limestone drains for the three mine discharges. The discharges will be conveyed to a settling basin and a final polishing wetland. These anoxic limestone drains will serve to remove iron from the discharges and increase alkalinity.

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4.2.3 Hubler Run 3 Treatment System

The Hubler Run 3 Treatment System has not yet been designed. This system will need to be some type of on-stream system as the flow in the stream must be treated. In this segment, manganese, aluminum, and acidity must be reduced.

Active treatment is a consideration for this reach of stream due to an uncooperative landowner. This system must be located upstream of the Hubler Run 1 system to maximize the length of stream restored by the system. However, space in this location is limited due to the existing system, property boundaries, and existing forested wetlands. Installing active treatment such as a lime doser at this location would cause metals precipitates to drop out into the stream near the Hubler Run 1 and 2 treatment systems. The precipitates would be unsightly and would prevent the landowners who donated the land for both the Hubler Run 1 and 2 systems from receiving any benefit from the Hubler Run restoration activities as their reaches of stream would still be affected due to smothering by precipitates. Due to this fact, it is still hoped that some sort of agreement will be reached with the uncooperative property owner or that the property will be sold and a passive treatment system can be constructed upstream of Hubler Run 1 and 2. As an alternate, limestone sand dosing could be considered.

Since manganese, aluminum, and acidity must be reduced, a passive treatment system is currently proposed for Hubler Run 3. Additional water quality and flow data must be collected prior to final design. At this stage, treatment components consisting of a compost wetland and manganese removal bed are proposed to reduce manganese and aluminum concentrations. A limestone channel is also proposed to provide alkalinity, reduce acidity, and to facilitate the precipitation of metals by raising the pH. Because iron levels are greater than 1 mg/l, care must be taken to ensure that iron coating of the limestone does not occur. Settling basins are proposed to follow the manganese removal bed and the limestone channel or cell to provide retention for the settling of precipitates. Sizing calculations are provided in Appendix D.

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4.2.4 Hubler Run 4 Treatment System

The Hubler Run 4 Treatment System has not yet been designed. This system will also need to be some type of on-stream system as the flow in the stream must be treated. In this segment, iron, manganese, aluminum, and acidity must be reduced.

As with the proposed Hubler Run 3 treatment system, the treatment concept for Hubler Run 4 consists of contacting water with limestone or other method to increase alkalinity. As alkalinity increases, acidity decreases and metals come out of solution and precipitate, thus reducing metals concentrations. Settling basins will be provided to allow for particle settling and removal of metals.

The treatment concept for this system includes contacting the flows with limestone to increase alkalinity in a limestone channel or cell. Because the concentrations of iron and aluminum are low, compost is not needed as used in vertical flow systems as iron coating is not a concern. Aluminum plugging of the limestone should not be a concern as well. A series of a compost wetlands, manganese removal beds, and settling basins are proposed to treat this discharge. Since manganese reduction can be difficult in passive treatment systems, a manganese removal bed is included in this design. Design calculations are provided in Appendix D.

4.3 Appropriate Best Management Practices

Appropriate BMPs have been determined for each of the four areas that must be addressed. The BMPs were selected based on the nature and magnitude of the pollutant sources, flow data, the location of the pollutant source, availability of treatment area, engineering feasibility, permitting feasibility, and cost effectiveness. The BMPs selected for each area were discussed in the proceeding paragraphs.

The selection of appropriate BMPs in the Hubler Run watershed presents some challenges as the AMD to be treated often has very high levels of aluminum, which tends to clog passive treatment

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systems if concentrations are above certain levels. Current passive treatment technologies have limitations with respect to discharge of pollutants, and reductions in concentrations of metals below 1 mg/l are often difficult to achieve. At best, both passive and active treatment systems can be expected to discharge waters with aluminum concentrations of 0.25 mg/l and iron and manganese concentrations of 0.5 mg/l. However, discharges concentrations in the range of 0.5 to 1.0 mg/l may be expected, and these discharge levels are higher than the TMDLs established for the stream. An estimated 20 mg/l of alkalinity can be expected to be generated based on performance data for the existing system, although the earlier designs by Skelly and Loy for Hubler Run 1 and 2 assumed alkalinity generation of 200 mg/l ,which may not be realistic for the watershed. The Hubler Run TMDLs for metals are mostly less than 0.5 mg/l, which is difficult to achieve using current technologies.

4.4 Performance of Best Management Practices

The anticipated performance of the appropriate BMPs has been estimated based on current reclamation and treatment technology and the expected performance of passive treatment systems treating water of similar quality. Load reductions at HR03 include reductions in manganese, aluminum, and acidity. BMPs are proposed at the Hubler Run 1, Hubler Run 2, and Hubler Run 3 sites, and these three sites will remove pollutants upstream of sampling point HR03.

A manganese removal bed has been proposed at Hubler Run 3 to achieve the manganese reduction goals for this segment. Aluminum enters Hubler Run primarily though the discharges influent to Hubler Run 1. This system has demonstrated that it can achieve the required reductions in aluminum when functioning properly. Hubler Run 1, 2, and 3 combined should achieve the required reduction in acidity at HR03. Reductions in iron concentrations will be achieved in the Hubler Run 2 treatment system, although reductions in iron are not specified for this segment.

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Table 4.1. provides a summary of the average influent water quality and anticipated effluent water quality for each of the three BMPs proposed upstream of HR03. Table 4.2 presents the same estimated BMP performance in terms of loadings. Table 4.3 presents loading information for the stream segment and anticipated loadings removed by the proposed BMPs and compares the anticipated load reductions to the TMDLs for the segment of Hubler Run upstream of HR03.

TABLE 4.1 SUMMARY OF EXISTING AND PROJECTED WATER QUALITY DATA FOLLOWING IMPLEMENTATION OF BMPs UPSTREAM OF HR03

TREATMENT SYSTEM	EXISTING CONDITIONS		ANTICIPATED (TREATED) CONDITIONS	
Hubler Run 1	pH	6.4 dry 4.5 wet 5.4 average	pH	> 6.5
	Acidity	0 dry 35 wet 19 average	Acidity	0
	Alkalinity	22 dry 5 wet 11 average	Alkalinity	20
	Aluminum	<0.1 dry 4.5 wet 2.9 average	Aluminum	0.30
	Iron	0.5	Iron	0.50
	Manganese	7.5	Manganese	0.50
Hubler Run 2	pH	NA**	pH	NA**
	Acidity	79.3	Acidity	0
	Alkalinity	NA**	Alkalinity	NA**
	Aluminum	2.0	Aluminum	0.3
	Iron	13.0	Iron	0.5
	Manganese	NA**	Manganese	NA**
Hubler Run 3	pH	3.6	pH	> 6.00
	Acidity	45.5	Acidity	0
	Alkalinity	0	Alkalinity	20
	Aluminum	2.0	Aluminum	0.30
	Iron	4.6	Iron	0.50
	Manganese	9.3	Manganese	0.50

*pH in S.U. All other values in mg/l.
**Data not included in original project design report
(Existing conditions reflect effluent from existing Hubler Run 1 treatment system.)

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TABLE 4.2 SUMMARY OF EXISTING AND PROJECTED LOADING DATA FOLLOWING IMPLEMENTATION OF BMPs UPSTREAM OF HR03

TREATMENT SYSTEM	EXISTING CONDITIONS		ANTICIPATED (TREATED) CONDITIONS	
Hubler Run 1	Acidity	40.9	Acidity	0
	Aluminum	6.2	Aluminum	0.6
	Iron	1.1	Iron	1.1
	Manganese	16.1	Manganese	1.1
Hubler Run 2	Acidity	6.4	Acidity	0.0
	Aluminum	0.2	Aluminum	<0.1
	Iron	1.0	Iron	<0.1
	Manganese	NA	Manganese	NA
Hubler Run 3	Acidity	53.9	Acidity	0
	Aluminum	2.4	Aluminum	0.4
	Iron	5.4	Iron	0.6
	Manganese	11.0	Manganese	0.6

*All values in lb/day.

(Existing condition values at HR03 reflect the effluent of the Hubler Run 1 treatment system)

The data for the Hubler Run 1 treatment system were presented in Table 4.1 in terms of concentrations during dry periods and wet periods as there is a drastic difference in water quality discharging from the system in those two conditions for all parameters except iron and manganese. Average values were also provided, and loadings provided in Table 4.2 were based on average concentration values. Flows for the Hubler Run 1 treatment system were assumed to be 180 gallons per minute, average, based on observed inflow. Existing conditions represent the existing outflow from the functioning system. Current inflow parameters cannot be determined due to inflow through buried, underground drains, and as such the system data were presented in terms of effluent rather than influent.

The data in Tables 4.1 and 4.2 for the Hubler Run 3 treatment system were based on data collected in 2005 and 2006. The stream water quality in the stream length above the Hubler Run

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1 treatment system was declined since 2000, so the older DEP data collected in previous years was not used. The decline in water quality is thought to be related to the subdivision of abandoned mine lands and subsequent residential construction which has been disturbing poorly-vegetated, acidic spoil material. The load calculations assume all stream flow will be treated.

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TABLE 4.3 SUMMARY OF EXISTING POLLUTANT LOADS AND PROJECTED REDUCTIONS FROM IMPLEMENTATION OF BMPS FOR HUBLER RUN (CODE 02050201000656 (0.79 miles) ABOVE SAMPLE POINT HR03

BEST MANAGEMENT PRACTICE OR STREAM SECTION	POLLUTANT	INITIAL STREAM LOAD (LB/DAY)	ESTIMATED LOAD REDUCTION FROM BMP (LB/DAY)	PREDICTED LOAD BELOW BMPS (LB/DAY)	TMDL ALLOWABLE VALUE FOR SEGMENT (LB/DAY)	LOAD REDUCT -ION AT HR03 (%)	TARGET REDUCT-ION AT HR03 (%)
Hubler Run Above HR03	Iron	2.8	---	0.0	2.8	100	0
	Manganese	26.0	---	0.5	2.2	98	91
	Aluminum	14.5	---	6.8	1.4	53	91
	Acidity	314.8	---	213.6	14.9	32	95
Passive Treatment System Hubler Run 1	Iron	---	0.0	---	---	---	---
	Manganese	---	15.1	---	---	---	---
	Aluminum	---	5.6	---	---	---	---
	Acidity	---	40.9	---	---	---	---
Passive Treatment System Hubler Run 2	Iron	---	1.0	---	---	---	---
	Manganese	---	NA	---	---	---	---
	Aluminum	---	0.1	---	---	---	---
	Acidity	---	6.4	---	---	---	---
Passive Treatment System Hubler Run 3	Iron	---	4.8	---	---	---	---
	Manganese	---	10.4	---	---	---	---
	Aluminum	---	2.0	---	---	---	---
	Acidity	---	53.9	---	---	---	---

Loadings based on average stream flow of 400 gpm (0.89 cfs) and water quality chemistry as provided in Table 3.1 for sample point HR03. Loadings based on an average discharge of 0.4 cfs for the Hubler Run 1 Project, 0.24 cfs for the Hubler Run 2 project, and 0.22 cfs for the Hubler Run 3 Project. Water quality data for all three projects provided in Sections 2 and 3.

Initial load based on current effluent from Hubler Run 1 AMD treatment system.)

**indicates TMDL water quality will not be achieved

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Table 4.3 indicates that the TMDLs for aluminum and acidity for the stream reach will not be met. BMPs are proposed for flow inputs to the reach, including the two mine drainage discharges and the stream itself.

Load reductions at HR02 include reductions in iron, manganese, aluminum, and acidity. The endpoints for this segment include concentrations for these metals below 0.5 mg/l, which are below the typical concentrations that can be achieved in passive treatment effluent. The initial metals concentrations for aluminum and manganese are fairly low, which will make removal of these metals using passive technology more difficult. There is already some alkalinity in the water, which will cause the limestone in the passive system to dissolve more slowly that it would if no alkalinity were to be present. In order to achieve the TMDLs, a compost wetland system is proposed, plus a manganese removal bed, as Hubler Run 4 to achieve the small reductions in concentrations necessary. The proposed treatment should achieve the TMDL goals provided a system of sufficient size is constructed.

Tables 4.4 and 4.5 provide a summary of the existing and projected water quality data and loadings following the implementation of BMPs upstream of HR02, which includes proposed passive treatment at Hubler Run 4. Table 4.6 provides a summary of existing and anticipated loadings and load reductions for this stream segment.

TABLE 4.4 SUMMARY OF EXISTING AND PROJECTED WATER QUALITY DATA FOLLOWING IMPLEMENTATION OF BMPs UPSTREAM OF HR02

TREATMENT SYSTEM/BMP	EXISTING CONDITIONS		ANTICIPATED (TREATED) CONDITIONS	
Hubler Run 4	pH	6.5	pH	6.5
	Acidity	9.30	Acidity	0
	Alkalinity	17.60	Alkalinity	20
	Aluminum	0.82	Aluminum	0.30
	Iron	1.37	Iron	0.50
	Manganese	0.43	Manganese	0.40

*pH in S.U. All other values in mg/l.

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TABLE 4.5 SUMMARY OF EXISTING AND PROJECTED LOADING DATA FOLLOWING IMPLEMENTATION OF BMPs UPSTREAM OF HR02

TREATMENT SYSTEM/BMP	EXISTING CONDITIONS		ANTICIPATED (TREATED) CONDITIONS	
Hubler Run 4	Acidity	12.0	Acidity	0
	Aluminum	1.1	Aluminum	0.4
	Iron	1.8	Iron	0.6
	Manganese	0.56	Manganese	0.52

*All values in lb/day.

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TABLE 4.6 SUMMARY OF EXISTING POLLUTANT LOADS AND PROJECTED REDUCTIONS FROM IMPLEMENTATION OF BMPS FOR HUBLER RUN (CODE 02050201001686 (0.56 miles)) ABOVE SAMPLE POINT HR02

BEST MANAGEMENT PRACTICE OR STREAM SECTION	POLLUTANT	INITIAL STREAM LOAD (LB/DAY)	ESTIMATED LOAD REDUCTION FROM BMP (LB/DAY)	PREDICTED LOAD BELOW BMPS (LB/DAY)	TMDL ALLOWABLE VALUE FOR SEGMENT (LB/DAY)	LOAD REDUCT -ION AT HR02 (%)	TARGET REDUCT-ION AT HR02 (%)
Hubler Run Above HR02	Iron	1.8	---	0.7	0.4	61	80
	Manganese	0.5	---	0.5	0.4	<1	30
	Aluminum	1.1	---	0.4	0.1	64	87
	Acidity	12.0	---	0.0	4.1	100	66
Passive Treatment System Hubler Run 4	Iron	---	1.1	---	---	---	---
	Manganese	---	0.04	---	---	---	---
	Aluminum	---	0.7	---	---	---	---
	Acidity	---	12.0	---	---	---	---

Loadings based on average stream flow of 0.24 cfs and water quality chemistry as provided in Table 3.2 for sample point HR02. Loadings based on an average flow of 0.24 cfs and chemistry as provided in Table 3.2 for the Hubler Run 4 treatment system assuming the entire flow in the stream channel will be treated due to the absence of any discharges.

**indicates TMDL water quality will not be achieved

Table 4.6 indicates that the TMDLs for iron, manganese, and aluminum for this segment will not be met even with the implementation of BMPs. Sample point HR02 is located at the mouth of the unnamed tributary (also known as the Palestine tributary) to Hubler Run. No mine drainage discharges flow into this stream reach, and flow in the stream is intermittent. As indicated in Table 4.5, the initial concentrations of metals are low in this reach, and the stream displays an average pH of 6.5, making this unnamed tributary one of the better quality tributaries in the area. The use of current passive treatment technologies cannot guarantee the specified concentration and load reductions given the initial pollutant concentrations. Some sort of active treatment, which is not practical given the small flow of this

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tributary and the intermittent nature of the flow, would be needed to achieve the TMDLs for this segment, as some of the allowable concentration values are lower than the secondary maximum contaminant levels for safe drinking water.

The small allowable concentrations specified in the TMDL are not necessary for the establishment of aquatic life in this tributary. Aquatic life is limited by the intermittent nature of the flow, as the stream is usually dry for several months in the summer and fall. Despite not achieving the TMDLs in this reach, the Hubler Run 4 treatment system will benefit Hubler Run. Anticipated pollutant concentrations will be sufficiently low that the goal of restoring aquatic life to this segment of the unnamed tributary will be achieved to the extent allowed by the intermittent nature of the stream flow. The Hubler Run 4 treatment system will provide additional alkalinity to the main stem of Hubler Run below the HR02 tributary. The main stem of Hubler Run below the HR02 tributary will be able to be removed from the List of Impaired Waters/Integrated List of All Waters for impairment by acidity and metals due to AMD. If stream recovery is based on biology rather than on chemistry and achievement of TMDLs, then the unnamed tributary (and Hubler Run, as discussed in the following section) will have fully recovered following implementation of all four identified BMPs.

No additional BMPs are proposed in the Hubler Run watershed, so no additional pollutant reductions will occur between the confluence of the HR02 tributary and sample point HR01 other than reductions that occur due to natural processes. Table 4.7 provides a summary of existing and anticipated loadings and load reductions for this stream segment.

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TABLE 4.7 SUMMARY OF EXISTING POLLUTANT LOADS AND PROJECTED REDUCTIONS FROM IMPLEMENTATION OF BMPS FOR HUBLER RUN (CODE 02050201000656 (0.61 miles)) ABOVE SAMPLE POINT HR01

BEST MANAGEMENT PRACTICE OR STREAM SECTION	POLLUTANT	INITIAL STREAM LOAD (LB/DAY)	ESTIMATED LOAD REDUCTION FROM BMP (LB/DAY)	PREDICTED LOAD BELOW BMPS (LB/DAY)	TMDL ALLOWABLE VALUE FOR SEGMENT (LB/DAY)	LOAD REDUCT -ION AT HR01 (%)	TARGET REDUCT-ION AT HR01 (%)
Hubler Run Above HR01	Iron	ND	---	0.0	NA	0	0
	Manganese	18.7	---	0.0	2.6	100	86
	Aluminum	8.3	---	0.0	1.4	100	83
	Acidity	229.8	---	116.6	21.1	36	91
Reductions from Upstream BMPs	Iron	---	6.9	---	---	---	---
	Manganese	---	25.5	---	---	---	---
	Aluminum	---	8.4	---	---	---	---
	Acidity	---	113.2	---	---	---	---

Loadings based on average stream flow of 457 gpm (1.02 cfs) and water quality chemistry as provided in Table 3.3 for sample point HR01.

**indicates TMDL water quality will not be achieved

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The data in Tables 4.3, 4.6 and 4.7 indicate that even under the best conditions when the anticipated water quality is achieved following installation of the proposed BMPs, the TMDLs established for Hubler Run will not be met in some cases. None of the three segments listed (Hubler above HR03, HR02, or Hubler above HR01) will meet all of the TMDL goals. Hubler Run above HR03 (Reach code 02050201000656, 0.79 miles) will meet TMDL goals for iron and manganese but not for aluminum and acidity. The unnamed tributary (HR02) (Reach code 02050201001686, 0.56 miles) will meet the TMDL goals for acidity but not for iron, manganese, or aluminum. Hubler Run above HR01 (Reach code 02050201000656, 0.61 miles) will meet the TMDL goals for iron, manganese, and aluminum, but not for acidity.

Although all of the TMDLs will not be met at HR03, HR02, and HR03, the anticipated pollutant concentrations are sufficiently low that the goal of restoring aquatic life to Hubler Run will be achieved. Following implementation of the identified BMPs, Hubler Run will be able to be removed from the List of Impaired Waters/Integrated List of All Waters for impairment by acidity and metals due to AMD. If stream recovery is based on biology rather than on chemistry and achievement of TMDLs, then Hubler Run will have fully recovered following implementation of all four identified BMPs. Pollutant concentrations will no longer prevent healthy populations of aquatic life in Hubler Run. In terms of miles of impaired stream segments restored, 0.79 miles of Hubler Run above HR03 (Reach code 02050201000656) and 0.61 miles of Hubler Run above HR 01 (Reach code 02050201000656) will be restored. A total of 1.4 miles of the 1.96 impaired miles of stream will be restored. The 0.56 miles of unnamed tributary (Reach code 02050201001686) will not be restored as the proposed treatment system will be located at the mouth of the unnamed tributary.

The inability of the proposed BMPs to meet all of the TMDLs for Hubler Run should also be considered in terms of the specified loadings and concentrations, which require reductions in concentrations and loadings that are very small. As presented in Section 3 of this narrative, the allowable loads are based on concentrations less than 1 mg/l and reductions involving tenths of mg/l. In some segments, the concentration endpoints are below the limits established for Secondary Contaminant Levels for safe drinking water, which is not necessary to allow the

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survival of aquatic life. The achievement of the TMDLs is not necessary to restore aquatic life to Hubler Run, and Hubler Run will be restored although the TMDLs will not be achieved.

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5.0 TECHNICAL AND FINANCIAL ASSISTANCE NEEDED TO IMPLEMENT BMPS

The West Branch Sportsman's Association (WBSA) has been working to restore Hubler Run and the Alder Run Watershed. The efforts of this organization are discussed later in this narrative. The organization is comprised of volunteers, and the group has limited technical and financial resources. The Emigh Run/Lakeside Watershed Association, Inc. (ERLWA) has been assisting the WBSA with project administration and oversight for restoration projects in the Hubler Run Watershed, but the ERLWA is also a volunteer organization that is unable to provide significant amounts of funding for the restoration of Hubler Run. Therefore, the WBSA will need technical and financial assistance to implement the BMPs needed to restore the Hubler Run Watershed. The technical and financial assistance needed for design, installation, and maintenance and potential funding sources and shortfalls are described in the following paragraphs.

5.1 Design, Installation, and Maintenance Costs

This Implementation Plan has identified four areas where BMPs are currently being installed or will need to be installed to remediate the water quality problems in the Hubler Run Watershed in order for the TMDLs for the stream to be met. A listing of the four areas and the activities for which future funding will be required is provided in the following table.

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TABLE 5.1 PROJECTS AND PROJECT TASKS REQUIRING FUTURE FUNDING

PROJECT	DESIGN AND PERMITTING FUNDS NEEDED	CONSTRUCTION FUNDS NEEDED	OPERATION AND MAINTENANCE FUNDS NEEDED
Hubler Run 1 Treatment System Rehabilitation	NO Task Ongoing. Funds Provided by the 319 Program	NO Task Ongoing. Funds Provided by the 319 Program	YES
Hubler Run 2 Treatment System	NO Design funded by Growing Greener. Permitting funded by Canaan Valley Institute and matching funds	NO Task Ongoing. Funds Provided by the 319 Program	YES
Hubler Run 3 Treatment System	YES	YES	YES
Hubler Run 4 Treatment System	YES	YES	YES

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5.1.1 Overall Watershed Restoration Costs

Construction and operation and maintenance costs for the future treatment sites in the Hubler Run Watershed are addressed in the following paragraphs. Construction and maintenance costs for future projects were developed using the Office of Surface Mine's AMD Treat Computer Program. Preliminary design and cost estimate information is provided in Appendix D. The following paragraphs provide information relating to cost estimates in terms of projects already implemented, proposed treatment alternatives selected, and funding needs.

5.1.2 Hubler Run 1 Treatment System Rehabilitation

Future funding will be needed for the operation and maintenance of the Hubler Run 1 passive treatment system. A project for the rehabilitation of the system, including design and construction, is underway. Design, permitting, and construction funding in the amount of $122,337 was provided by the Section 319 program.

Future funding needs will include operation and maintenance costs. Long-term operation costs will be minimal due to the nature of the passive treatment system which includes automatic flushing values triggered by hydraulic head. Periodic manual flushing is performed by volunteers from the WBSA and the property owner.

Long-term maintenance costs will include the eventual cleanout of the settling basins to maintain the necessary settling volume. The second component of long-term maintenance will be the replenishment of the limestone in the limestone cells, plus potential replacement of the outlet piping concurrent with the replenishment of limestone should the limestone and/or piping become clogged with aluminum. The original design specified as 20-year design life, but that design is being revised. A new 20-year design life is again proposed for the limestone. The settling basins are accumulating larger-than-expected amounts of aluminum, so basin cleanout is anticipated on a 10-year frequency. In light of the need for limestone replenishment during or around 2026, anticipated limestone costs and basin clean-out costs were included for long-term maintenance costs assuming limestone replacement around year 20. Maintenance of the treatment basins, to include cleanout of the basins and disposal of aluminum precipitates, was

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estimated at $15,000 for 20-year total maintenance costs. The combined maintenance of limestone replenishment of 3200 tons of limestone at an estimated future cost of $30/ton is $96,000. Annualized maintenance costs for the next 20 years are $5550 per year for limestone replacement and settling basin maintenance.

5.1.3 Hubler Run 2 Treatment System

Future funding will be needed for the operation and maintenance of the Hubler Run 2 passive treatment system. A project for the construction of the system is underway. Construction funding in the amount of $99,000 was provided by the Section 319 program.

Future funding needs will include operation and maintenance costs. Long-term operation costs will be minimal due to the nature of the passive treatment system but periodic manual flushing must be performed by volunteers from the WBSA and/or the property owner.

Long-term maintenance costs will include the eventual cleanout of the settling basin to maintain the necessary settling volume. The settling basin was designed to fit the available space, so cleanout must occur more frequently than for typical passive systems. The second component of long-term maintenance will be the replenishment of the limestone in the anoxic limestone cells, The original design specified as 25-year design life, but limestone replacement at year 20 may be more realistic based on recent flow data. In light of the need for limestone replenishment during or around 2031, anticipated limestone costs and basin clean-out costs were included for long-term maintenance costs. Maintenance of the treatment basins, to include cleanout of the basins and disposal of aluminum precipitates, was estimated at $20,000 for 20-year total maintenance costs. The combined maintenance of limestone replenishment of 500 tons of limestone at an estimated future cost of $30/ton is $15,000. Annualized maintenance costs for the next 20 years are $1750 per year for limestone replacement and settling basin maintenance.

5.1.4 Hubler Run 3 Treatment System

A passive treatment system is proposed for the Hubler Run 3 system. Costs for site design and permitting, including site surveying, for a typical passive treatment system are estimated to be $50,000 for the Hubler Run 3 system. The estimated design and permitting cost is at the high

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end of the range of typical passive treatment designs, but is at the high end of the range because of wetland permitting issues that will arise at the site and the potential need for wetland mitigation. The project will also likely require a full Joint Permit from the PA DEP and the U.S. Army Corps of Engineers for wetland and stream impacts associated with the project.

Although active treatment was considered for this system, the WBSA remains hopeful that landowner issues will be resolved to allow for passive treatment. Due to funding constraints, labor requirements, and the increased costs for operation and maintenance of an active treatment system, the WBSA prefers to utilize a passive treatment system for this discharge at this time. The costs for construction of the proposed treatment system at Hubler Run 3 are approximately $445,000. Annualized operation and maintenance costs for the cleanout of settling basins, replacement of limestone, etc., are estimated at $2500 per year.

5.1.5 Hubler Run 4 Treatment System

A passive treatment system is proposed for the Hubler Run 4 system. Costs for site design and permitting, including site surveying, for a typical passive treatment system are estimated to be $45,000 for the Hubler Run 4 system. The project will likely require a full Joint Permit from the PA DEP and the U.S. Army Corps of Engineers for wetland and stream impacts associated with the project.

The costs for construction of the proposed treatment system at Hubler Run 4 are estimated as approximately $105,000 in today's dollars. Annualized operation and maintenance costs for the cleanout of settling basins, replacement of limestone, etc., are estimated at $2200 per year.

5.1.6 Other Areas

This Implementation Plan identified two additional stream encroachment areas that would benefit from restoration activities in the Hubler Run Watershed. No major water quality impacts result from these areas, and the reclamation of these areas will not have a significant positive impact on water quality in Hubler Run. The restoration of the additional areas is not essential to achieve the water quality objectives of this plan, so costs for the restoration of these areas have not been developed.

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5.2 Cost Summary

A summary of the costs provided in Section 5.1 is provided in the following table. Detailed construction and operation cost information is provided in Appendix D.

TABLE 5.2 COST SUMMARY FOR THE HUBLER RUN IMPLEMENTATION PLAN

PROJECT	DESIGN AND PERMITTING	CONSTRUCTION COST	OPERATION AND MAINTENANCE COST (ANNUALIZED)	TOTAL COST FOR NEXT 20 YEARS
Hubler Run 1 System Rehabilitation	Not Needed	Not Needed	<$100/Year Operation $5550/Year Annualized Maintenance	$111,000
Hubler Run 2 System	Not Needed	Not Needed	$1750/Year Annualized Operation and Maintenance	$35,000
Hubler Run 3 System	$50,000	$445,000	$2500/Year Annualized Operation and Maintenance	$545,000
Hubler Run 4 System	$45,000	$105,000	$2500/Year Annualized Operation and Maintenance	$200,000

Funding in the amount of $645,000 for remaining design and construction efforts will address all pollutant sources in Hubler Run. A total of $891,000 will be needed over the next 20 years to provide for design, construction, and operation and maintenance of these systems.

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5.3 Sources of Funding for Plan Implementation

Several potential sources of funding have been identified for the remaining restoration efforts in the Hubler Run Watershed. These funding sources include Pennsylvania's Growing Greener Program (both the Growing Greener I and II Programs) and the Federal Section 319 Program. The WBSA has been successful in obtaining Section 319 and Growing Greener funding for projects in the area in the past. Other potential sources of funding include Federal Funding available through the Office of Surface Mines and/or assistance from the DEP BAMR.

Other smaller potential sources of funding in the form of matching funds and volunteer funds have also been identified. These include funding provided by project consultants, who typically provide some services at no charge as a form of matching funds and volunteer labor for the collection of water samples. Potential other sources include volunteer labor for planting and other small projects.

Operation and maintenance costs will require long-term and ongoing funding. The WBSA will explore all avenues for long-term operation and maintenance, including the potential for re-use or sale of precipitates, such as iron and aluminum, recovered from their treatment facilities. If current research into the recovery and reuse of metals precipitates from treatment systems results in a market for these materials, these precipitates will be sold, donated to research, etc. in a manner which either generates funds that could be used for operation and maintenance costs or that minimizes the costs of disposal of materials for the WBSA.

5.4 Funding Shortfalls

At the present time, it is believed that the current funding sources are sufficient to provide for the design and construction of remediation projects for the restoration of the watershed. A known funding shortfall for treatment system operation, maintenance, and replacement currently exists for all projects to be implemented. Prior to the 2006 Growing Greener Grant Application Round, funding was not available for the operation and ongoing maintenance of treatment systems. Although some grant funding is now available for operation and maintenance, these funds are limited. While the WBSA can provide varying amounts of volunteer labor for operation and

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maintenance activities, the group will be in need of funds for future maintenance activities, such as replacement of limestone in passive treatment systems.

5.5 Technical Assistance Required

The WBSA is comprised of volunteers, and has limited technical and financial resources. The organization will be in need of technical assistance for these projects to be implemented in the Hubler Run Watershed. The needed technical assistance will include, but will not be limited to, engineering and design services such as site design, development of erosion and sediment control plans, and development of operation and maintenance plans, and permitting assistance such as obtaining stream encroachment permits. The organization has established a relationship with an engineering consultant who has been assisting them with watershed restoration activities for a number of years.

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6.0 PUBLIC INFORMATION AND PARTICIPATION

The *Upper Alder Run Assessment* for the Alder Run Watershed and the *Alder Run TMDL* identified stakeholders for restoration of Alder Run and its tributaries, which include Hubler Run. This section summarizes the information presented in those documents and provides more detailed information specific to the Hubler Run Watershed regarding stakeholders, a watershed advisory group, and information strategy.

6.1 Stakeholder Identification

Stakeholders for restoration activities in the Hubler Run Watershed include the following: the West Branch Sportsman's Association (WBSA); Emigh Run/Lakeside Watershed Association (ERLWA); Clearfield County Conservation District (CCCD); West Branch Junior-Senior High School; Graham Township; Clearfield County Planning Commission; Clearfield County Recreation and Tourism Authority (CCRTA); PA DEP Bureau of Mining and Reclamation (BMR); PA DEP Bureau of Abandoned Mine Reclamation (BAMR); Canaan Valley Institute (CVI); Headwaters Charitable Trust; Susquehanna River Basin Commission (SRBC); U.S. Office of Surface Mining (OSM); U.S. Army Corps of Engineers (ACOE); U.S. Environmental Protection Agency (EPA); U.S. Department of Agriculture-Natural Resource Conservation Service (NRCS); private consultants; other government interests; and other local watershed organizations such as the Moshannon Creek Watershed Coalition (MCWC). Other stakeholders include residents and property owners in the watershed, including a number of absentee property owners who reside elsewhere but own property in the Hubler Run Watershed for recreational purposes such as hunting and camping, several of whom have expressed an interest in restoring the watershed. Additional stakeholders include residents of the Baughman Subdivision located in the headwaters of Hubler Run along the south side of the stream.

These stakeholders were identified as potential partners for implementation of projects in the Alder Run and Hubler Run Watersheds, and each of these parties has a vested interest in restoration activities in the watershed. As with all grass-roots stream restoration activities, solid, long-term partnerships between local stakeholders and other entities is crucial to ensure successful efforts.

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The WBSA has been working to restore Hubler Run since the late 1990s. Their club building is located at the confluence of Hubler Run and Alder Run with frontage on both streams, and as such they have been actively pursuing restoration opportunities on both streams. Their efforts began on Hubler Run, and have expanded into the entire Alder Run Watershed as the Hubler Run restoration approaches completion. The WBSA is responsible for the construction of the Hubler Run 1 and 2 passive treatment systems. The group wishes to continue restoration efforts until the entire lengths of Hubler Run and ultimately Upper Alder Run are restored.

The ERLWA has provided ongoing support for the WBSA's restoration activities in the Hubler Run Watershed, although Hubler Run is not located within the Emigh Run Watershed. The ERLWA provides fiscal administration for the WBSA's grants, as the WBSA does not have 501(c)(3) status. The ERLWA also provides matching funds in the form of project administration costs and shares their project and technical experience with similar AMD treatment projects in the region with the WBSA. The WBSA is fortunate to have the support of local, like-minded watershed organizations such as the ERLWA.

The MCWC, another local watershed organization, has provided project support for the WBSA. Alder Run is a tributary to the Susquehanna River and as such is not located within the Moshannon Creek Watershed. However, the Alder Run and Moshannon Creek Watersheds are adjacent to each other. MCWC has supported the WBSA's efforts to restore Hubler Run in the past through letters of support for local restoration activities which meet the mission and goals of the MCWC.

The list of stakeholders includes Graham Township and residents and property owners of the communities of Pinchatouley, Fairview, and Palestine (Morrisdale RD). Hubler Run flows through these communities. Improved water quality in the stream would result in improved quality of living in these areas, increased property values, and increased recreational opportunities. Graham Township has served as a project sponsor for Hubler Run projects in the past. Restoration of Hubler Run would achieve a goal of Graham Township's Comprehensive Plan, and the Board of Supervisors has been supportive of the WBSA's past efforts.

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Residents of Baughman Subdivision located along the south side of the headwaters of Hubler Run, should be considered stakeholders as well. Since construction began in this subdivision, water quality had declined in Hubler Run, as discussed elsewhere in this narrative. While other factors may contribute to the decline in water quality, the earth disturbance and sewage disposal activities associated with this subdivision are believed to play a substantial role in the decline in water quality. These homes are constructed on poorly-vegetated, acidic strip mine spoil, and earth disturbance activities associated with residential construction disturbs the mine spoils and create additional opportunities for generation of acidity from the spoil materials. The residents should be considered stakeholders as the implementation of best management practices during construction such as limiting the area of disturbance and establishing vegetation in their yards rather than allowing yards to remain unvegetated, acidic spoil would be a great help in preventing further decline in the water quality in Hubler Run.

The homes in the Baughman Subdivision were recently connected to public water service, but sewage disposal in the subdivision is on-lot, individual disposal consisting of conventional in-ground systems and/or sand mound systems. The sewage disposal method introduces additional inflow directly down into the spoil material. Assuming a low wastewater generation rate of 400 gallons per day (gpd), 10 homes would contribute an additional 4000 gpd of flow input into the spoil (not accounting for storage in holding tanks, etc.), which represents 4000 gpd of flow in the spoil that did not occur 5-10 years ago. In the short-term, educational efforts to this group of stakeholders may help to encourage water conservation and lessen flows into the spoil. In the long term, a public sewage disposal and collection system may be necessary to prevent discharges into the spoil and further decline of Hubler Run. Regardless of the solution to this issue, these residents should be considered stakeholders as their support and participation is necessary for the restoration of Hubler Run.

Past projects in the Hubler Run Watershed have included an informal assessment and restoration plan, construction of the Hubler Run 1 Treatment System, the Upper Alder Run Assessment, and design of the Hubler Run 2 Treatment System. Numerous organizations assisted with these projects through laboratory analysis of samples, surveying, project management, technical

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assistance, permitting assistance, and funding. These organizations include the DEP, CCCD, CVI, Headwaters Charitable Trust, SRBC, OSM, ACOE, EPA, and NRCS.

6.2 Sources of Information and Influence in the Watershed

Sources of information and influence in the watershed include newspapers, websites, and local gathering places. The Clearfield Progress is the local daily newspaper and the primary source of printed information in the watershed. The Progress is available online at www.theprogressnews.com. The Philipsburg Journal is a weekly newspaper distributed free of charge throughout the Moshannon Valley and surrounding communities on Friday of each week. Both papers include community, human interest, and outdoor-related news in addition to regular news and would be appropriate for publication of watershed-related activities. Both publications have been extremely cooperative with publicizing environmental events and/or projects in the past provided they were given advance notice of events.

The CCRTA maintains a website that publicizes community and recreational events for Clearfield County. This site could potentially be used to publicize information relating to watershed issues and restoration of Hubler Run. This website can be located at www.visitclearfieldcounty.org. The site includes a community calendar that publicizes community events and includes links to recreational opportunities such as fishable streams in Pennsylvania.

Other websites that could potentially be used to publicize watershed restoration activities are the WBSA's website and the West Branch School District's website. The WBSA website is not currently maintained due to recent unexpected changes in club leadership, but it could be used as a source of information in the future. Students in the West Branch School District's Environmental Education classes have been extensively involved in restoration activities in the Emigh Run Watershed and have published their activities on their website, which could potentially be used to provide information about the Hubler Run restoration. Hubler Run lies within the school district's boundaries, and the school staff has expressed interested in continuing the relationships with environmental organizations and activities.

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The Hubler Run Watershed is located in Graham Township, and there are no major villages or towns located within the watershed. Small rural communities such as Palestine are located along rural roadways. Consequently, there are limited public, social, and commercial locations. Events and news relating to Hubler Run could be posted in the Morrisdale or Kylertown Post Offices and the WBSA's building along Schoonover Road near Kylertown. Additional public places for the distribution of information could include the community bulletin boards at the Kylertown Marketplace, H&B Hardware, Graham Township Building, Larry's Saw Shop on the Allport Cutoff, and the Key Largo's and Pumpkin House restaurants in Allport.

6.3 Watershed Advisory Group

Several watershed stakeholders have been designated from the list of identified stakeholders to form a Watershed Advisory Group. The Watershed Advisory Group members will be involved with sponsoring projects, reviewing and planning projects, setting watershed priorities, gaining landowner cooperation, and secure funding for implementation of projects.

The Watershed Advisory Group is to consist of the following members: WBSA with the support of the ERLWA; the CCCD Watershed Specialist; and the PA DEP Bureau of Mining and Reclamation (BMR) Project Advisors for specific projects plus the Watershed Manager from the Moshannon District Office. The CCCD Watershed Specialist has been included to ensure coordination of projects from a county-wide restoration point-of-view as well as a project permitting standpoint. Finally, the DEP Project Advisors for the existing projects and the Watershed Manager have been included to keep the DEP apprised of current activities in the watershed.

The Watershed Advisory Group will meet at least once per year, preferably in January of each year. The meeting in January will allow for coordination of project funding applications, which are typically made in early spring of each year. This meeting can be held at the WBSA building near Kylertown, which is centrally-located between Kylertown and Pinchatouley in Graham Township, and the WBSA will provide the meeting space. The agenda of the annual meeting will address the planning of future projects, the review of ongoing and completed projects, and address the water quality monitoring, evaluation, and remediation actions described in Sections 8

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and 9 of this narrative. The meeting of the Watershed Advisory Group is to be coordinated by the WBSA.

6.4 Information Strategy

Local citizens will be informed about current watershed issues in the Hubler Run Watershed, and their involvement will be solicited during implementation of restoration projects in the watershed. Two primary mechanisms will be utilized to disseminate information: public presentations to be held during meetings of the WBSA and press releases to local websites and newspapers identified previously in this narrative.

The WBSA meets on a monthly basis, and these meetings are typically attended by approximately 10-15 local residents. These meetings will provide a setting for distribution of watershed information, and the meetings have traditionally been the means for distribution of information about prior projects in Hubler and Alder Runs. The meetings allow for dialog with local citizens and provide an opportunity for citizens to provide input on the project and restoration plans. The local newspapers and websites will also provide a means of distributing information to the general public.

Public distribution of planning and project information shall occur at three key points for the remaining projects in the watershed: 1) Prior to the application for funding for design and for construction; 2) Prior to commencement of construction; and 3) Following completion of construction. A project status report will be provided at a WBSA meeting for each of the three key points. A press release will also be distributed to the newspapers and websites listed previously prior to the commencement of construction activities.

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7.0 IMPLEMENTATION SCHEDULE AND EVALUATION

This Implementation Plan has identified four areas where BMPs are currently being installed or will need to be installed to remediate the water quality problems in the Hubler Run Watershed in order for the TMDLs for the stream to be met. In two of the four areas, design and permitting activities are ongoing and construction activities are pending. Efforts have yet to begin in the third and fourth areas in need of remediation in order for the TMDLs for Hubler Run to be met. The restoration of a fifth area having erosion and stream encroachment considerations was not included in the schedule as restoration of this area is not essential to achieving the TMDLs for the watershed.

An implementation schedule, including implementation milestones, funding, construction, and maintenance activities, responsible parties, local considerations, and progress monitoring and reporting is detailed in the following paragraphs. Because the watershed is fairly small in size, the watershed was not divided into subwatersheds.

7.1 Implementation Milestones

The implementation milestones for the restoration of Hubler Run include funding, construction, and maintenance activities, are shown in Section 7.5 of this narrative. The milestones provide specific target dates to obtain funding, construct or implement projects, to maintain projects, and to monitor and report on the progress of projects.

The Watershed Advisory Group for Hubler Run will meet at least once per year, preferably in January of each year. The meeting will allow for coordination of project funding applications, and will provide an opportunity for the responsible parties to address the planning of future projects, to review and report on the progress of ongoing and completed projects, and to address any difficulties in achieving the project implementation milestones. If milestones are not achieved due to a lack of funding, weather, or any other unforeseen factors that may prevent construction of all of the scheduled projects in any given year, the project implementation milestones and schedule will be adjusted accordingly, and uncompleted projects will be rescheduled for the following year.

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7.2 Funding, Construction, and Maintenance Activities

Funding for restoration activities in the Hubler Run Watershed has historically been obtained from grant sources, with small amounts of matching funds provided from contractors, watershed and/or environmental organizations, government organizations, and consultants. A schedule for applying for funding for remaining projects in the watershed is included in Section 7.5. This schedule is subject to change based on availability and award of funding.

The status of construction of existing projects has been included in Section 7.5, and estimated construction dates have been included for anticipated future projects. Construction is dependent on project funding, and the construction schedule may need to be revised in the future. As construction of each project is completed, the evaluation process will begin and the implementation schedule for future projects will be reviewed to determine if changes should be made prior to construction to incorporate considerations such as improvements in BMP technology, successes or failures of BMPs in the watershed, and maintenance concerns specific to the watershed.

Maintenance activities have also been included in the implementation schedule. Operation and maintenance activities have been determined for those BMPs designed and/or constructed. Maintenance activities have been estimated for those treatment systems or BMPs not yet designed. The actual performance of various BMPs may vary in following implementation, and the operation and maintenance schedule will be revised accordingly in the future.

7.3 Parties Responsible for Implementation Milestones

The WBSA will be responsible for the funding, implementation, construction, operation and maintenance, and progress monitoring and reporting for the restoration projects in the Hubler Run watershed. The WBSA is and will be responsible for the reclamation activities and treatment systems that it installs. The group has historically assumed operation and maintenance responsibility for all the projects that they have implemented with assistance from the project property owners. Specific project responsibilities are summarized in the Schedule in Section 7.5.

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7.4 Local Considerations

The WBSA has been conducting watershed restoration activities in the Hubler Run and Alder Run Watersheds. This organization faces the same concerns as many other watershed organizations in this area, including lack of funding, limited membership, and an aging active membership. The WBSA has recently experienced a change in leadership with a combination of new officers taking office and some prior officers resuming their duties. This change in leadership was made to improve the financial resources of the group, to increase membership, and to attract younger members better able to assist with the physical needs of such an organization. The officers responsible for the original Hubler Run activities have resumed their role with the group, and the organization is well on the way to overcoming the issues that have presented difficulties to the sustainability of the group in recent years.

Landowner permission poses a tremendous concern for the restoration of Hubler Run. The majority of the headwaters of the stream are located on a large tract of private land, and the landowner to-date has been uncooperative in terms of allowing any type of restoration activities on her property. Fortunately, the adjacent and downstream property owners have been fully cooperative. In order for the TMDLs at sample point HR03 to be met, the cooperation of this landowner is crucial, or some other type of accommodations must be developed.

Conflicting priorities have also posed a consideration in the watershed. The Alder Run Watershed is severely impacted by AMD, and many of the property owners have AMD discharges on their property or streams affected by AMD. Most property owners would like to have their property restored, and most believe their property should be the biggest priority in the watershed. For example, the property owners along Mons Run would like the WBSA's restoration efforts and available funding to be focused on Mons Run, which is not the current priority of the WBSA and which would require tremendous funding to restore. In order to establish priorities, the WBSA will focus on completion of restoration of Hubler Run, which is an achievable goal. Priorities for the remaining Alder Run Watershed will be set as part of the ongoing assessment, and the WBSA will extend their efforts elsewhere in the watershed following the completion of the Hubler Run activities.

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A final local consideration includes winter weather. The winter weather in this watershed can be severe and as a result, construction during the winter and spring months is often not practical or possible. In addition, frozen or muddy conditions often make sampling or monitoring difficult due to the presence of ice, thick snow, or mud. The schedule provided in Section 7.5 accounts for potential weather concerns by allowing longer times for construction activities to offset weather delays.

7.5 Schedule

The proposed schedule for completion of ongoing remediation activities and for future reclamation or remediation efforts is provided in the following table. Milestone and parties responsible for the activities listed on the schedule are also shown.

TABLE 7.1 PROJECT IMPLEMENTATION SCHEDULE

IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Final Permitting of the Hubler Run 2 Passive Treatment System	September 1, 2007	WBSA and consultant
Final Design and Permitting of the Hubler Run 1 Passive Treatment System Rehabilitation	September 1, 2007 (Preliminary Permit Materials Submitted)	WBSA and consultant
Rehabilitation of the Hubler Run 1 Passive Treatment System	Completed by June 30, 2008	WBSA and construction contractor
Monitoring of Hubler Run 1 Passive Treatment System	Monthly monitoring associated with construction -- July 2008 to June 2009 Future monitoring in accordance with Section 8 of this narrative	WBSA

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IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Construction of the Hubler Run 2 Passive Treatment System	Completed by September 2008	WBSA and construction contractor
Monitoring of Hubler Run 2 Passive Treatment System	Monthly monitoring associated with construction – October 2008 to September 2009 Future monitoring in accordance with Section 8 of this narrative	WBSA
Operation and Maintenance of Hubler Run 1 Passive Treatment System	Manual flushing of Limestone Cells —bi-yearly Cleanout of Settling Basins — every 10 years Mixing and/or Replacement of Limestone — every 20-25 years Other — As needed	WBSA
Operation and Maintenance of Hubler Run 2 Passive Treatment System	Flushing of Anoxic Limestone Cells —bi-yearly Cleanout of Settling Basins — every 5 years Mixing and/or Replacement of Limestone — every 20-25 years Other — As needed	WBSA

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IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Headwaters Restoration Project (Future Hubler Run 3)	Request for design, permitting, and construction funds—spring 2007 Design and Permitting —fall of 2007 – fall of 2008 Construction — fall of 2008 though spring 2009 (as determined by availability of funding) Operation and Maintenance to be determined by BMPs during design	WBSA
Unnamed Tributary Restoration Project (Future Hubler Run 4)	Request for design, permitting, and construction funds—spring 2008 Design and Permitting —fall of 2008 – fall of 2009 Construction — fall of 2009 though spring 2010 (as determined by availability of funding) Operation and Maintenance to be determined by BMPs during design	WBSA
Implementation Monitoring—All Projects	Monthly monitoring for the first year following construction; Quarterly monitoring for years 2 and 3 following construction; Semi-annual monitoring thereafter	WBSA

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IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Implementation Progress Reporting — All Projects	Annually, at Watershed Advisory Group Meeting	WBSA

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8.0 WATER QUALITY MONITORING AND EVALUATION

The goals of this implementation plan are the restoration of water quality in Hubler Run to a quality sufficient to achieve the designated use of the stream as a Cold Water Fishery (CWF), to achieve water quality sufficient to allow the stream to be removed from the 2006 Pennsylvania Integrated List of Impaired Waters, and to achieve the TMDL endpoints specified for Hubler Run in the *Alder Run TMDL*. In order to determine if the watershed restoration goals for Hubler Run are met, a water quality evaluation and monitoring plan has been developed. The plan, as discussed in the following sections of this narrative, includes loading and water quality milestones, local considerations, and schedules, and identifies responsible parties.

8.1 Loading and Water Quality Milestones

Loading and water quality milestones are presented in Section 8.4 of this narrative. These milestones were developed to fit within the framework provided by the sampling points used in the *Upper Alder Run Assessment* and the framework of the TMDL developed for Alder Run, which also included sampling of major tributaries such as Hubler Run and the development of limits for Hubler Run. The *Upper Alder Run Assessment* divided Hubler Run into smaller segments to allow evaluation of water quality improvements and impairments in more detail, but the TMDL sample point locations are still used as milestone and endpoint locations for consistency. Because the Hubler Run Watershed is of a relatively small size and there are relatively few pollutant sources, the watershed was not divided into subwatersheds based on tributaries for the TMDL study.

The water quality milestones were developed for reductions in pollutant load and improvements in water quality that will lead to the achievement of the DEP's standards for water quality and recommended use. The milestones were tailored to the specific impairments in Hubler Run, specifically AMD. The parameters for sampling were based on impairment by AMD, and the resultant parameters of interest--acidity, alkalinity, and metals. Sampling locations and sample collection frequency have been provided.

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8.2 Local Considerations

Local considerations with respect to monitoring of water quality include winter weather. The winter weather in this watershed can be severe, and as a result, collection of water samples during the winter months is often not practical or possible. The presence of ice precludes access to collect samples, and thick snow may prevent the sample collector from reaching the sample site. The schedule provided in Section 8.4 allows for potential weather concerns by allowing some flexibility in the sample collection schedule.

A final consideration for water quality monitoring and evaluation, while not specific to the local area, is the availability of funding for water quality monitoring activities. The WBSA relies heavily on volunteer labor and sources of grant funding to achieve project goals. Typically, manpower to collect a small number of water samples on a quarterly to yearly frequency does not pose any major difficulties to volunteer organizations such as this group. However, the cost for ongoing monitoring does present an issue for ongoing water quality monitoring. As mentioned earlier, both the WBSA and ERLWA organizations are dependent on grant funding for projects, and many of the grant programs do not provide funding for the laboratory analysis of water samples. Long-term monitoring will require the ongoing laboratory analysis of water samples, resulting in significant costs for the responsible party. The WBSA must seek a funding source to meet the costs of laboratory analysis for ongoing monitoring.

8.3 Responsible Parties

The Watershed Advisory Group for Hubler Run will meet at least once per year, preferably in January of each year. The meeting will provide an opportunity for the group to review the water quality monitoring to determine if pollutant loading and water quality milestones are being achieved.

The WBSA, which will be responsible for the funding, implementation, construction, operation and maintenance, and progress monitoring and reporting for the restoration projects in this watershed will also be responsible for water quality monitoring and evaluation. Specific project responsibilities are summarized in the Schedule in Section 8.4 of this narrative.

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8.4 Schedules

The proposed schedule for water quality monitoring activities and the achievement of water quality milestones is provided in the following table. The party responsible for the activities listed on the schedule, the WBSA, is also shown. Maps showing the locations of water sampling points are provided as Figures 4A and 4B in Appendix A.

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The Water Quality Monitoring Schedule and Milestones utilizes the term "restoration" of stream reaches with respect to water quality milestones. This term should be defined as restoration of water quality sufficient to achieve the designed use of Hubler Run as a CWF, including all applicable water quality criteria as described in 25 PA Code §93 for the designated use as well as sufficient water quality to achieve the water quality criteria of the *Alder Run TMDL* and to allow for removal of the stream from the 303(d) List of Impaired Waters. By doing so, the sport fishery of the stream will be restored.

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TABLE 8.1 WATER QUALITY MONITORING SCHEDULE AND MILESTONES

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
ACTIVITY 1 Monitoring of Discharge of Hubler Run 1 Passive Treatment System plus sample point HR03	Construction to be completed by June 30, 2008. Monitoring commences immediately following construction completion. Monthly monitoring July 2008-June 2009. Quarterly monitoring July 2009-June 2011. Semi-annual monitoring July 2011-2016.	Treatment System Outfall at final settling basin Point HR03 of Alder Run TMDL study (Hubler Run Above confluence with unnamed tributary HR02)	pH, acidity, alkalinity, iron, aluminum, and manganese		WBSA

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MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
MILESTONE *Year-round improvement in water quality indicated by increase in pH and reduction of aluminum and manganese concentrations in Hubler Run from headwaters down to sample point HR03 (See note 3)*	*To be achieved by December 30, 2008*	*Same as Activity 1*	*Same as Activity 1*	Average Loadings at HR03 iron 2.8 lb/day aluminum 8.9 lb/day acidity 273.9 lb/day manganese 10.9 lb/day	*Same as Activity 1*

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MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
ACTIVITY 2 Monitoring of Discharge of Hubler Run 2 Passive Treatment System plus sample point HR03	Construction to be completed by September 30, 2008. Monitoring commences immediately following construction completion. Monthly monitoring October 2008-September 2009. Quarterly monitoring October 2009-September 2011. Semi-annual monitoring October 2011-2016.	Treatment System Outfall at final settling basin Point HR03 of Alder Run TMDL study (Hubler Run Above confluence with unnamed tributary HR02)	pH, acidity, alkalinity, iron, aluminum, and manganese		WBSA

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MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
MILESTONE *Year-round improvement in water quality indicated by increase in pH and reduction of aluminum concentrations in Hubler Run from headwaters down to sample point HR03 (See note 3)*	*To be achieved by March 30, 2009*	*Same as Activity 2*	*Same as Activity 2*	Average Loadings at HR03 iron 1.8 lb/day aluminum 8.8 lb/day acidity 267.5 lb/day manganese 10.9 lb/day	*Same as Activity 2*
ACTIVITY 3 Monitoring of Discharge of Treatment System for future Hubler Run 3 Treatment System plus sample point HR03	Estimated completion of construction by June 30, 2009. Monitoring commences immediately following construction completion. Monthly monitoring July 2009-June 2010. Quarterly monitoring	Treatment System Outfall Point HR03 of Alder Run TMDL study (Hubler Run Above confluence with unnamed tributary HR02)	pH, acidity, alkalinity, iron, aluminum, and manganese		WBSA

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MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
	July 2010-June 2012. Semi-annual monitoring July 2012-2015.				
MILESTONE *Restoration of Hubler Run segment from headwaters downstream to HR03*	*To be achieved by December 30, 2009.*	*Same as Activity 3*	*Same as Activity 3*	Average Loadings at HR03 iron <0.5 lb/day aluminum 6.8 lb/day acidity 213.6 lbl/day manganese 0.5 lb/day	*Same as Activity 3*

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MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
ACTIVITY 4 Monitoring of Discharge of Treatment System for future Hubler Run 4 Treatment System plus sample points HR02 and HR01	Estimated completion of construction by June 30, 2010. Monitoring commences immediately following construction completion. Monthly monitoring July 2010-June 2011. Quarterly monitoring July 2011-June 2012. Semi-annual monitoring July 2012-2015.	Treatment System Outfall Points HR02 and HR01 of Alder Run TMDL study (Mouth of unnamed tributary to Hubler Run and Hubler Run above confluence with Alder Run)	pH, acidity, alkalinity, iron, aluminum, and manganese		WBSA

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MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	THRESHOLD CRITERIA IN STREAM	RESPONSIBLE PARTY
MILESTONE *Restoration of entire length of Hubler Run from headwaters to discharge into Alder Run at HR01*	*To be achieved by December 30, 2010*	*Same as Activity 4 plus Activities 1, 2, and 3*	*Same as Activity 4*	Average Loadings at HR01 iron <0.5 lb/day aluminum <0.5 lb/day acidity 116.6 lb/day manganese <0.5 lb/day	*Same as Activity 4*
Water Quality Progress Reporting—All Projects	Annually, at Watershed Advisory Group Meeting Special meeting to be called if problems or declines in water quality are noted	All points listed above	All points listed above		WBSA

Notes:

1. All samples to be analyzed for the parameters of acidity, alkalinity, iron, aluminum, and manganese.

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2. If projects are completed sooner than anticipated, monitoring shall begin immediately following completion of construction.

3. A time of 6 months following completion of construction of passive treatment systems or other BMPs has been allowed before a water quality milestone was considered to be achieved. This 6-month time period was allowed to account for variability in treatment system efficiency during startup and any necessary adjustments to treatment systems due to unforeseen conditions.

4. The sampling timeframe has been left fairly flexible to allow for adjustments for winter weather conditions, flooding conditions, etc. However, the sample should be collected during high flow winter conditions, when treatment efficiency is likely to decline, and during low flow summer conditions, when discharges may be less diluted and other environmental factors such as temperature and oxygen levels are likely to have negative impacts to aquatic life.

5. See also Sample Location Map provided in Appendix A. Sample location points reference the same sample point designations as the *Alder Run TMDL*

6. Manganese, and aluminum to be measured as total recoverable quantity. Iron to be measured as total recoverable, dissolved, as per PA Code, Title 25, Chapter 93.

7. Monitoring through 2015 provides for monitoring for 5 years following construction of final BMP in the watershed.

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9.0 REMEDIAL ACTIONS

The need for remedial or corrective actions for BMPs and restoration activities will be based on achieving certain criteria that were established for the purpose of evaluating the results of restoration projects in the Hubler Run watershed. The criteria for evaluating results and re-evaluation procedures are discussed in the following paragraphs.

9.1 Criteria for Evaluating Results

The results of project implementation and water quality monitoring will be judged against prescribed milestones for water quality improvement. Water quality milestones were addressed in Section 8.4 of this narrative.

The water quality criteria to be met for Hubler Run include the following criteria established by the TMDLs for Hubler Run in the Alder Run TMDL plan as provided in Tables 9.1 through 9.3.

TABLE 9.1 WATER QUALITY CRITERIA TO BE MET AT SAMPLE POINT HR03

SAMPLE POINT HR03	ALLOWABLE	
	Concentration (mg/l)	Load (lb/day)
Iron	0.58	2.8
Manganese	0.45	2.2
Aluminum	0.27	1.4
Acidity	3.03	14.9

Milligrams per liter = mg/l
Pound per day = lb/day

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TABLE 9.2 WATER QUALITY CRITERIA TO BE MET AT SAMPLE POINT HR02

SAMPLE POINT HR02	**ALLOWABLE**	
	Concentration (mg/l)	Load (lb/day)
Iron	0.28	0.4
Manganese	0.30	0.4
Aluminum	0.11	0.1
Acidity	3.17	4.1

TABLE 9.3 WATER QUALITY CRITERIA TO BE MET AT SAMPLE POINT HR01

SAMPLE POINT HR01	**ALLOWABLE**	
	Concentration (mg/l)	Load (lb/day)
Iron	NA*	NA*
Manganese	0.47	2.6
Aluminum	0.25	1.4
Acidity	3.82	21.1

*NA = not applicable. NA results from the measured concentrations and loadings being non-detectable.

Title 25, §93.7 of the Pennsylvania Code provides water quality criteria for designated uses such as CWF, the designated use the Alder Run Basin, which includes Hubler Run. The criteria listed above for the TMDL should be used for iron, manganese, aluminum, and acidity. Alkalinity must be 20 mg/l minimum as per §93.7.

It should be noted that in some cases the TMDLs for Hubler Run involve relatively small allowable pollutant concentrations. The allowable metals concentrations are all well below the level of 1 mg/l. Reductions in metals concentrations below 1 mg/l are difficult to predict and achieve using today's current passive treatment technologies, and special care must be exercised to provide appropriate treatment methods to achieve the necessary reductions in pollutant concentration.

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9.2 Re-evaluation Procedures

The goal of this implementation plan is the restoration of water quality in Hubler Run to a quality sufficient to achieve the designated use of the stream as a Cold Water Fishery (CWF) and to meet the TMDLs that were established for the stream. Alder Run, the receiving water of Hubler Run, is on Pennsylvania's 303(d) list due to impairments from acidity and metals, and reduction of the loadings contributed by Hubler Run to Alder Run is also a goal of this plan. Post-construction water quality monitoring will be used to indicate if the implemented projects are meeting the water quality criteria established for the restoration of Hubler Run.

In the event that the water quality data collected during the post-construction sampling indicate that project implementation has not produced the desired improvements in water quality, if the water quality criteria are not being met, or if progress is less than expected, the implementation process must be re-evaluated. Implementation efforts, project milestones, the selected restoration measures, and the TMDLs for the stream may be re-evaluated, either collectively or on an individual basis.

Specific goals or milestones that will trigger re-evaluation have been determined. These specific interim milestones or goals were established in Table 8.1 of Section 8.4. The interim goals include specific water quality criteria for the parameters of pH, acidity, iron, aluminum, and manganese and specific dates for the water quality goals to be met.

The Watershed Advisory Group will be responsible for the re-evaluation process. As indicated on the Water Quality Monitoring Schedule, the Watershed Advisory Group will meet on a yearly basis, but a special meeting will be called if water quality results indicate that the water quality criteria are not being met and a problem is occurring. The group will discuss the nature and severity of the situation and develop a plan and schedule for correction of the situation. As needed, additional special meetings will be called until the situation is addressed. On an as-needed basis, the group may take actions such as re-scheduling proposed activities and shifting priorities to the necessary corrective action to ensure that remediation of the watershed is proceeding in an effective and technically appropriate fashion based on current watershed conditions.

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