

**HOCKING RIVER BASIN, OHIO  
MONDAY CREEK RESTORATION PROJECT  
ATHENS, HOCKING AND PERRY COUNTIES, OHIO**

**Section 401 Water Quality Certification Application**

**Revised January 2012**

## 5. LOCATION

This restoration project consists of 20 separate remediation project components within the Monday Creek Watershed, a section of the Hocking River Basin (HUC 05030204). The watershed is approximately 116 square miles (74,240 acres) and lies within portions of Athens County, Hocking County and Perry County, Ohio. The 20 separate project components will be located on non-Federal lands adjacent to or within the Wayne National Forest boundary in four sub-basins within the watershed and will address mine related water impairments. Sub-basins where project components are proposed are Dixie Hollow, Lost Run, Snow Fork and Brush Fork. Each project component has a separate delineated Construction Work Limit. Coordinates for each project component are provided in section 10 of this application.

This project was originally discussed in a report entitled *Hocking River Basin, Ohio, Monday Creek Sub-basin, Ecosystem Restoration Project Final Feasibility Report and Environmental Assessment*, March 2006. Problems identified in the watershed included impacts to 235 acres of the aquatic ecosystem from past coal mining activities. Underground mining has caused the generation of Acid Mine Drainage (AMD) and subsidence impacts that have affected the flora and fauna of the watershed. The report identified sources of AMD and locations of subsided areas and recommended restoration alternatives that would restore the aquatic ecosystem.

In addition to public meetings held on June 21-22, 2004, this report, which included a 404(b)(1) Report, was circulated to state and federal resource agencies, interested groups, and the public for comment during April-May 2005. A Finding of No Significant Impacts (FONSI) was signed on July 25, 2005. Coordination letters were obtained from the Ohio Department of Natural Resources (ODNR) and the U.S. Fish and Wildlife Service.

That report recommended a plan that included 178 remediation components. Since authorization, the Army Corps of Engineers, Huntington District (District) was informed that appropriations for this project could not be spent on US Forest Service lands which comprised a substantial portion of the affected acreage. Also, since the report was completed, the ODNR and the Monday Creek Restoration Project have completed work in several of Monday Creek's sub-basins. As a result, this project was scaled down significantly from 178 remediation components to 20.

This application is organized by sub-basins. As mentioned above, the work being covered under this permit application will occur in four sub-basins; Dixie Hollow, Lost Run, Snow Fork and Brush Fork. Our plans include 17 remediation components in Brush Fork and one component in each of the other three sub-basins. This application separates out each remediation component for discussion, and provides a table that summarizes the quantities from all four sub-basins into a single project-wide table. Since the overall project is designed to improve water quality within the mainstem of Monday Creek, some of the discussions related to impacts/benefits that are required in the application (10 b thru j) will be addressed by treatment type or sub-basins rather than by individual remediation component.

The Ohio Department of Natural Resources (ODNR) is serving as the non-Federal sponsor for the project. USACE and ODNR will work together in order to complete the 20 projects.

Funding for the entire project will likely take numerous budget cycles to procure and could take 5 to 10 years to obtain. Due to the funding uncertainties, the 401 certification will be utilized by both ODNR and USACE at various stages of the project.

## **8. DESCRIPTION OF THE ACTIVITY**

### **8a. Describe the Overall Activity**

The environmental restoration project planned within these four sub-basins of Monday Creek include closing mine subsidence and stream captures, constructing stream channels, wetland dikes and water treatment systems including limestone dosers and limestone leach beds.

The water treatment systems (dosers and leach beds) were designed for a service life of 20 years, while the stream channel construction and the closing of stream captures and subsidence are intended to be permanent. The wetland dikes are proposed to address head cutting of a stream channel and stabilize an existing wetland. Operation and maintenance of the water treatment systems will be performed by Ohio Department of Natural Resources - Division of Mineral Resource Management.

Refer to Item 10, Table 3 for a summary of impacts associated with the Preferred and Minimal Degradation Alternatives. See respective tabs for a detailed description of the Preferred Plan and the Minimum Degradation Plan for each site.

### **8b. Describe the purpose, need and intended use of the activity:**

Extensive underground and surface mining was conducted within the Monday Creek Watershed from 1850 to 1958. This pre-law mining resulted in severe water quality degradation and surface instability. Problems being addressed include reject material from the coal mining partially blocking streams, streams captured by underground mines, and mine drainage discharging from underground mines are contributing acid and metals to streams resulting in extremely low pH water with high dissolved iron and aluminum concentrations. In 2001 the Ohio Environmental Protection Agency (OEPA) completed a TMDL Study indicating that 77% of Monday Creek and its tributaries were impaired due to acid mine drainage. The purpose of this project is restoration; to reduce the acid mine drainage pollution throughout Monday Creek Watershed in order to restore a warm water fishery on the mainstream of Monday Creek. To achieve this, the sub-basins within the watershed will be used as treatment areas for the benefit of the mainstem.

### **8c. Discharge of dredged or fill material: type/quantity of dredge material and type/quantity of fill material (CY)**

Discharge of dredged or fill material into the waters will consist of the following:

Graded limestone aggregate will be used to construct trench fills to line the trapezoidal and 'V' notch channels, construct limestone leach beds and low water crossings for construction/maintenance access. This material will be obtained from certified quarries and will consist of clean, well graded suitable limestone. Geosynthetic filter fabric and HDPE

membranes will be used to line stream channels and prohibit surface water from percolating down to underground mine through fractured substrates.

**Table 1: Summary Table of Total Project Quantities**

<b>Sub-Watershed Treatment Site</b>	<b>Stream Impact (linear feet)</b>	<b>Wetland Impact (acres)</b>	<b>Dredge Material (y<sup>3</sup>)</b>	<b>Fill Material (y<sup>3</sup>)</b>
Brush Fork Doser	110	0.1	110	209
Brush Fork 107	0	0	0	0
Brush Fork 108	1,555	NA	2,796	7,460
Brush Fork 109	870	NA	2,143	4,134
Brush Fork 110	1,905	NA	4,039	9,253
Brush Fork 226	420	NA	754	2,030
Brush Fork 228	285	NA	477	1,260
Brush Fork 229	1,040	NA	1,832	4,909
Brush Fork 230 & 286	60	NA	36	97
Brush Fork 233	40	NA	36	76
Brush Fork 234 & 284	250	NA	1,142	1,260
Brush Fork 285	790	NA	1,727	3,842
Brush Fork LLB-1	280	0	164	315
Brush Fork LLB-3	105	NA	437	334
Brush Fork LLB-5	473	0.1	874	656
Brush Fork LLB-8	70	1.1	126	338
Brush Fork LLB-10	160	NA	457	384
Dixie Hollow	100	0.23	250	660
Lost Run	40	NA	380	216
Murray City	365	NA	466	1,169
<b>Total</b>	<b>8,918</b>	<b>1.53</b>	<b>18,244</b>	<b>38,604</b>

**9. Waterbody and location of waterbody where activity exists or is proposed. Indicate the distance to, and the name of any receiving stream.**

The Brush Fork tributary is located in the southeast section of the Monday Creek Watershed in Hocking County. Brush Fork is approximately 5 miles long and discharges into Snow Fork near RM 4.9. The Snow Fork Hydrologic Unit Code is 05030204 05 03. The Dixie Hollow and Lost Run tributaries are located in Perry and Hocking Counties, and discharge directly into Monday Creek mainstem (HUC 05030204 060 010).

**Table 2: Summary Table of Existing Site Conditions**

Sub-Watershed Treatment Site	Stream Reach	Approximate Wetland Area (acres)	ORAM Score	Stream Length (feet)	Stream Type	HHEI/QHEI	USACE Jurisdictional
Brush Fork Doser	NA	1.04	41	NA	NA	NA	Yes
	Brush Fork	NA	NA	200	Perennial	61	Yes
Brush Fork LLB-1	NA	0.12	24	NA	NA	NA	Yes
	Tributary 1	NA	NA	90	Intermittent	51	Yes
Brush Fork LLB-3	NA	0	NA	NA	NA	NA	NA
	Brush Fork	NA	NA	200	Perennial	46	Yes
Brush Fork LLB-5	NA	2.72	64	NA	NA	NA	Yes
	Brush Fork	NA	NA	200	Perennial	43	Yes
	Stream 1	NA	NA	65	Perennial	15	Yes
	Stream2	NA	NA	340	Perennial	52	Yes
Brush Fork LLB-8	NA	10.18	64	NA	NA	NA	Yes
	Brush Fork	NA	NA	200	Perennial	48	Yes
	Stream 1	NA	NA	30	Perennial	31	Yes
	Stream 2	NA	NA	40	Perennial	22	Yes
Brush Fork LLB-10	NA	0	NA	NA	NA	NA	NA
	Brush Fork Section 1	NA	NA	200	Perennial	49	Yes
Brush Fork 107	Section 1	NA	NA	50	Perennial	42	Yes
	NA	0.67	52	NA	NA	NA	Yes
Brush Fork 108	Brush Fork	NA	NA	200	Perennial	52	Yes
	Section 1	NA	NA	900	Intermittent	60	Yes
	Section 2	NA	NA	500	No channel	NA	No
	Section 3	NA	NA	400	Intermittent	53	No
	Section 4	NA	NA	250	Ephemeral	32	No
	Tributary 1	NA	NA	200	Ephemeral	34	No
	Tributary 2	NA	NA	65	Ephemeral	33	No
Brush Fork 109	Section 1	NA	NA	450	Intermittent	25	Yes
	Section 2	NA	NA	580	No channel	NA	No
	Section 3	NA	NA	100	Ephemeral	31	No
	Section 4	NA	NA	292	No channel	NA	No
	Tributary 1	NA	NA	200	Ephemeral	43	No
Brush Fork 110	Brush Fork	NA	NA	200	Perennial	50	Yes
	Section 1	NA	NA	350	Intermittent	66	Yes
	Section 2	NA	NA	550	No channel	NA	No
	Section 3	NA	NA	475	Ephemeral	43	No

Sub-Watershed Treatment Site	Stream Reach	Approximate Wetland Area (acres)	ORAM Score	Stream Length (feet)	Stream Type	HHEI/QHEI	USACE Jurisdictional
	Section 4	NA	NA	100	Ephemeral	39	No
	Section 5	NA	NA	100	Ephemeral	45	No
	Section 6	NA	NA	800	Ephemeral	30	No
Brush Fork 226	Section 1	NA	NA	220	Intermittent	30	Yes
	Section 2	NA	NA	250	No channel	NA	No
	Section 3	NA	NA	200	Intermittent	40	No
	Section 4-5	NA	NA	1,140	No channel	NA	No
Brush Fork 228	Section 1	NA	NA	20	Ephemeral	34	Yes
	Section 2	NA	NA	150	No channel	NA	No
	Section 3	NA	NA	125	Ephemeral	36	No
	Section 4	NA	NA	750	No channel	NA	No
Brush Fork 228	Section 5	NA	NA	200	No channel	NA	No
	Section 6	NA	NA	100	Intermittent	30	No
	Section 7	NA	NA	700	No channel	NA	No
Brush Fork 229	Section 1	NA	NA	700	Ephemeral	30	Yes
	Section 2	NA	NA	900	No channel	NA	No
	Section 3	NA	NA	300	Perennial	69	No
Brush Fork 230 & 286	Section 1A	NA	NA	440	No channel	NA	No
	Section 1	NA	NA	20	Ephemeral	10	No
	Section 2	NA	NA	620	No channel	NA	No
Brush Fork 233	Section 1	NA	NA	1,145	No channel	NA	No
Brush Fork 234 & 284	Brush Fork	NA	NA	200	Perennial	48	Yes
	Section 1	NA	NA	220	No channel	NA	No
	Section 2	NA	NA	150	Ephemeral	35	No
Brush Fork 285	Section 1	NA	NA	1,850	No channel	NA	No
	Section 2	NA	NA	150	Ephemeral	40	No
	Section 3	NA	NA	100	Ephemeral	40	No
	Section 4	NA	NA	550	No channel	NA	No
	Section 5	NA	NA	100	No channel	NA	No
	Section 6	NA	NA	500	Ephemeral	48	No
Dixie Hollow	NA	12.28	68	NA	NA	NA	Yes
	Dixie Hollow	NA	NA	200	Perennial	48	Yes
Lost Run	NA	0	NA	NA	Perennial	53	Yes
Murray City	NA	0	NA	NA	NA	NA	NA
	Snow Fork	NA	NA	200	Perennial	60	Yes
	Section 1	NA	NA	360	Perennial	41	Yes

## **10. Preferred Design, Minimal Degradation Alternatives, and the Non-Degradation Alternatives**

The projects included in this application were analyzed under the National Environmental Policy Act in an integrated Feasibility Report and Environmental Assessment. This project is being constructed under the Ecosystem Restoration Authority granted to the USACE. A project being constructed under this type of authority cannot by its definition require mitigation. The benefits derived by this project make it self-mitigating since the intent of the project is to improve water quality and the biological life that depends on it. Therefore, no further discussion will be provided under 10k) mitigation techniques.

All of the treatments included in this application are water-dependent. Therefore the **Non-Degradation Alternative** is a “no action” alternative. No impacts would result from a “no action” alternative, for this reason no further discussion of the Non-degradation alternative will be provided in the application.

Refer to Table 3 for a summary of impacts associated with the Preferred and Minimal Degradation Alternatives. The description of each project requested in item 10a of the application is provided for each project. To simplify the presentation of information required for items 10b through 10j and eliminate duplication, a table has been developed that groups like projects together. Three tables were provided for Brush Fork; one for the doser, one for all the Limestone Leach Beds and the third for all the stream remediation projects. Separate tables are also provided for the work in the other three tributaries.

**Table 3: Comparison of Preferred Design and Minimal Degradation Alternatives**

Receiving Stream	Treatment Site	Treatment Type	Preferred Design		Minimal Degradation Alternative		Non-Degradation Alternative		Comments
			Stream (LF)	Wetland (Acres)	Stream (LF)	Wetland (Acres)	Stream (LF)	Wetland (Acres)	
Brush Fork	Doser	Doser	110	1.04	110	0.1	0	0	The proposed doser is a water powered treatment system. In order to run the system, stream impacts cannot be avoided.
Brush Fork	LLB-1	Limestone Leach Bed	190	0.12	280	0	0	0	The size of the limestone leach bed was modified based on the collection of additional water quality data. The leach bed location was shifted to the east in order to avoid wetland impacts, resulting in impacts to an unnamed tributary adjacent to the site. The unnamed tributary will likely require placement of stone slope protection, due to severe erosion occurring immediately downstream of the road culvert.
Brush Fork	LLB-3	Limestone Leach Bed	105	NA	105	NA	0	NA	
Brush Fork	LLB-5	Limestone Leach Bed	480	0.2	473	0.1	0	0	The size of the limestone leach bed was modified based on the collection of additional water quality data. LLB location was shifted to the west to avoid wetland impacts.
Brush Fork	LLB-8	Limestone Leach Bed	70	0.18	70	1.1	NA	0	The size of the limestone leach bed was increased based on the collection of additional water quality data, resulting in additional wetland impacts.
Brush Fork	LLB-10	Limestone Leach Bed	270	NA	160	NA	0	NA	Location of the feature was changed to avoid impacts to streams or wetlands.
Brush Fork	107	Stream Channel Construction	NA	0.67	NA	0	NA	0	Location of the feature was changed to avoid impacts to streams or wetlands.
Brush Fork	108	Stream Channel Construction	1,555	NA	1,555	NA	0	NA	
Brush Fork	109	Stream Channel Construction	870	NA	870	NA	0	NA	Location of the feature was changed to avoid impacts to streams or wetlands.
Brush Fork	110	Stream Channel Construction	1,905	NA	1,905	NA	0	NA	
Brush Fork	226	Stream Channel Construction	420	NA	420	NA	0	NA	
Brush Fork	228	Stream Channel Construction	285	NA	285	NA	0	NA	
Brush Fork	229	Stream Channel Construction	1,040	NA	1,040	NA	0	NA	
Brush Fork	230/286	Stream Channel Construction	60	NA	60	NA	0	NA	
Brush Fork	233	Stream Channel Construction	40	NA	40	NA	0	NA	
Brush Fork	234/284	Stream Channel Construction	250	NA	250	NA	0	NA	
Brush Fork	285	Stream Channel Construction	790	NA	790	NA	0	NA	
Brush Fork	SLB-1	Slag Leach Bed	360	NA	NA	NA	0	NA	Feature was removed from the project scope.
Brush Fork	SLB-2	Slag Leach Bed	280	NA	NA	NA	0	NA	Feature was removed from the project scope.
Brush Fork	SLB-3	Slag Leach Bed	50	NA	NA	NA	0	NA	Feature was removed from the project scope.
Spencer Hollow	SLB-1	Slag Leach Bed	270	NA	NA	NA	0	NA	Feature was removed from the project scope.
Jobs Hollow	SLB-5	Slag Leach Bed	300	NA	NA	NA	0	NA	Feature was removed from the project scope.
Dixie Hollow	Wetland Dike	Wetland Dike	200	0.34	100	0.23	0	0	Location of the feature was changed to avoid impacts to streams or wetlands.
Lost Run	In-Stream Remediation	Stream Channel Construction	NA	NA	40	NA	0	NA	Feature was added to the project scope.
Murray City	Doser	Doser	NA	NA	365	NA	0	NA	Feature was added to the project scope. The proposed doser is a water powered treatment system. In order to run the system, stream impacts cannot be avoided.
<b>Total</b>			<b>9,900</b>	<b>2.55</b>	<b>8,918</b>	<b>1.53</b>	<b>0</b>	<b>0</b>	

**Brush Fork  
Sub-Watershed**

**Individual Project Discussion  
(10a thru 10j)**

**Brush Fork Doser** (LAT\_83 = 39.501167N; LONG\_83 = -82.180436W)

**10a) Preferred Plan:** This plan represents the 50% complete plans as developed by the District. At this stage, streams and wetlands were not yet identified and rated. The doser site would be located on the north side of County Road 22 adjacent to an existing 1.04 acre wetland. An underground pipe would be installed to collect mine drainage and direct it to the doser. After passing through the doser, the mine effluent would be piped under the road and discharged into Brush Fork. A gravel road would be constructed within the wetland to facilitate construction, access the doser silo for loading lime, and to facilitate future operation and maintenance at the site.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. A 1.04 acre wetland was identified which qualifies as a Category 2 Wetland. The location of the doser was moved to the south side of the road to avoid impacts to the wetland. An underground pipe would be installed through the wetland and under County Road 22 to convey acid mine drainage from the mine portal to the doser. After treatment at the doser, the water would be conveyed to Brush Fork via a concrete lined channel. A gravel road would be constructed to facilitate construction, access the doser silo for loading lime, and to facilitate future operation and maintenance at the site.

**Wetland Information:** One wetland encompassing 1.04 acres was identified within the Contractor Work Limit (CWL). The Minimal Design Alternative would impact .10 acres of a Category 2 wetland. Wetland Determination and ORAM data sheets are included in the Waters of the U.S Report.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork Doser	Pipe Installation	1.04	2	1.04	0.10

## **Brush Fork Doser**

**Stream Information:** One perennial stream (Brush Fork) was identified within the CWL. The Minimal Design Alternative would impact 110 linear feet of the Brush Fork tributary. Stone slope protection is required in order to convey treated mine water to the mainstem.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork Doser	Stone Slope Protection (SSP)	P	Stone Slope Protection (SSP)	110	110	0	110	110	0	99	0	0

## Brush Fork Doser

Topic	Preferred Alternative	Min Degradation Alt
10b) Biological/Physical Impacts	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. Surface hydrology of the site is disconnected and/or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. Surface hydrology of the site is disconnected and/or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor.
10b) Water Quality	Acid mine drainage (AMD) discharging from an underground mine will be treated by the doser to a pH > 7 and subsequently discharged into Brush Fork mainstem. Metal hydroxides and unreacted lime will accumulate for a short distance downstream of the doser resulting in embedded substrates.	Acid mine drainage (AMD) discharging from an underground mine will be treated by the doser to a pH > 7 and subsequently discharged into Brush Fork mainstem. Metal hydroxides and unreacted lime will accumulate for a short distance downstream of the doser resulting in embedded substrates.
10c) Technical Feasibility	The Preferred Design Alternative is technically sound, reliable and cost effective. The doser is an active treatment system that will require an annual investment in order to operate and maintain the system.	The Minimal Degradation Alternative is technically sound, reliable and cost effective. The doser is an active treatment system that will require an annual investment in order to operate and maintain the system.
10d) Sewage projects	N/A	N/A
10e) Other conservation projects	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.
10f) Water pollution control	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.
10g) Human Health/Quality and Value of Water Resource	The Brush Fork sub-watershed contains exposed gob piles, strip pits, head cuts, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the	The Brush Fork sub-watershed contains exposed gob piles, strip pits, head cuts, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction

	<p>construction of stream channels in order to direct and convey overland flows, prevent surface water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and metal loads, as well as the prevention of surface water contamination.</p>	<p>of stream channels in order to direct and convey overland flows, prevent surface water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource of the water resource include reduction of acid and metal loads, as well as the prevention of surface water contamination.</p>
10h) Social and economic Benefits	<p>This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.</p>	<p>This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.</p>
10i) Social and economic losses	<p>No social or economic benefits will be lost as a result of implementing the Preferred Alternative.</p>	<p>No social or economic benefits will be lost as a result of implementing the Minimal Degradation Alternative.</p>
10j) Environmental benefits	<p>This project, along with other projects constructed in Brush Fork will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.</p>	<p>This project, along with other projects constructed in Brush Fork will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.</p> <p>This plan will also avoid long-term impacts to .94 acres of Category 2 wetland.</p>

**Brush Fork LLB-1** (LAT\_83 = 39.53187683N; LONG\_83 = -82.21198579W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. At this stage, streams and wetlands were not yet identified and rated. LLB-1 is a proposed limestone leach bed located on the Brush Fork floodplain northwest of the historic settlement of Blatchford, Ohio. The Corps plans to construct a limestone leach bed, 89.9ft x 30ft x 3ft to treat the underground mine drainage. An open limestone channel would connect the leach bed to Brush Fork. Sampling events in 2010 have shown this open water area to have a pH range of 3.1 to 4.0. A short gravel road would be constructed for construction and maintenance access. A 60' x 90' spoil area would be required on-site to dispose of excavated material.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. A significantly larger 320' x 180' leach bed would be constructed in the same location as the Preferred Plan. Stone slope protection would be required along Brush Fork and along an unnamed tributary to the east. A water level control valve would be installed in the southeast corner of the bed so water levels could be raised as the lower levels of limestone lose treatment capability. The Contractor Work Limit would be adjusted to avoid impacts to an existing 0.12 acre wetland to the west.

**Wetland Information:** One wetland encompassing 0.12 acres was identified within the Contractor Work Limit (CWL). The Minimal Design Alternative would not impact acres the Category 1 wetland. Wetland Determination and ORAM data sheets are included in the Waters of the U.S Report.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork LLB-1	NA	0.12	1	0.12	0

## **Brush Fork LLB-1**

**Stream Information:** The proposed project is located adjacent to Brush Fork. The unnamed tributary located to the east of the LLB location received a HHEI score of 51. The Minimal Design Alternative will impact 280 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork LLB-1	Stone Slope Protection (SSP) – Unnamed Tributary	I	Stone Slope Protection (SSP)	90	90	0	90	90	0	81	0	0
	Stone Slope Protection (SSP) – LBB Spillway Mainstem	P	Stone Slope Protection (SSP)	45	45	0	45	45	0	41	0	0
	LLB Embankment Mainstem	P	LLB Embankment	145	145	0	29	58	0	0	0	0

**Brush Fork LLB-3** (LAT\_83 = 39.5207274N; LONG\_83 = -82.20073284W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. LLB-3 is a proposed limestone leach bed located on the right bank of Brush Fork. Water discharges from a partially closed historic mine entry next to the creek will discharge into the limestone leach bed. A gravel road and a standard low-water crossing will be constructed for construction and maintenance access. The crossing will be constructed with limestone and will simulate a natural riffle. Effluent from the leach bed will be conveyed to Brush Fork via a concrete or rock lined channel. This alternative will require extensive stone slope protection and relocation of approximately 200’ of Brush Fork.

**Minimum Degradation Design:** This alternative represents the 90% complete plans. LLB-3 will be a limestone leach bed located on the left bank of Brush Fork. Water discharges from a partially closed historic mine entry located on the right bank will discharge into a limestone leach bed via a PVC pipe under Brush Fork. Effluent from the leach bed will be conveyed to Brush Fork via a concrete or rock lined channel. A gravel road and a low-water crossing will be constructed to facilitate construction and maintenance of the mine discharge capture. The crossing will be constructed with limestone and will simulate a natural riffle. Locating the leach bed on the left descending bank would eliminate the need to relocate Brush Fork and minimize stone slope protection required.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork LLB-3	NA	0	NA	NA	NA

## **Brush Fork LLB-3**

**Stream Information:** The Minimal Design Alternative will impact 105 linear feet of perennial stream (Brush Fork).

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork LLB-3	Stone Slope Protection (SSP) Mainstem	P	Stone Slope Protection (SSP)	45	45	0	45	45	0	41	0	0
	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Pipe Installation Under Mainstem	P	Pipe Installation	20	20	0	12	12	0	0	0	20

**Brush Fork LLB-5** (LAT\_83 = 39.51423678N; LONG\_83 = -82.19634983W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. LLB-5 is a proposed limestone leach bed on the Brush Fork floodplain. An abandoned shovel mine at this location consists of a rock highwall, pit floor, and spoil berm all running parallel to Brush Fork. The highwall and berm impound water from at least 3 discharges from interconnected underground mines. These discharges will be fed into the proposed limestone leach bed. Sampling events in 2001 have shown this open water area to have a pH range of 2.9 to 2.5 and of net acidity of 187 to 211 ml/l. The proposed limestone leach bed, which will be constructed on this pit floor, will be 289.0ft x 20ft x 3ft. Outflow from the leach bed will be directed into Brush Fork via a concrete or rock lined channel. An existing unpaved road and low-water crossing will be improved to facilitate construction and maintenance of the leach bed.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. LLB-5 is a proposed limestone leach bed on the Brush Fork floodplain. An abandoned shovel mine at this location consists of a linear rock highwall, pit floor, and spoil berm all running parallel to Brush Fork. The highwall and berm impound water discharge from at least 3 discharges from interconnected underground mines. Due to the collection of additional water quality data the proposed limestone leach bed size was modified in size from the Preferred Design to incorporate additional water quality benefits to the system. 0.1 acres of a Category 3 wetland will be impacted by the embankment of the limestone leach bed. Water will flow through the limestone leach bed into the Category 3 wetland to incorporate additional water quality benefits before entering Brush Fork via a grouted spillway.

**Wetland Information:** One wetland encompassing 2.72 acres was identified within the Contractor Work Limit (CWL). The Minimal Design Alternative would impact .10 acres of a Category 3 wetland. Wetland Determination and ORAM data sheets are included in the Waters of the U.S Report.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork LLB-5	LLB Embankment	2.72	3	0.2	0.1

## **Brush Fork LLB-5**

**Stream Information:** The proposed project is located along a high wall adjacent to Brush Fork. Stream 1 received a HHEI score of 55. Stream 2 received a HHEI score of 52. The Minimal Design Alternative will impact 473 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork LLB-5	Crossing Mainstem 1	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Crossing Mainstem 2	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Stone Slope Protection (SSP) – LLB Spillway Mainstem	P	Stone Slope Protection (SSP)	45	45	0	45	45	0	41	0	0
	Diversion Berm (Active Channel)	P	Diversion Berm	8	8	0	1	2	0	0	0	0
	LLB Embankment (Active channel)	P	LLB Embankment	340	340	0	68	136	0	0	0	0

**Brush Fork LLB-8** (LAT\_83 = 39.50808954N; LONG\_83 = -82.1921766W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. LLB-8 is a proposed limestone leach bed on the Brush Fork floodplain. A mine discharge point has created a large iron hydroxide deposit adjacent to and feeding into a 7.83 acre wetland. Sampling events in 2010 have shown this mine discharge to have a pH range of 3.4 to 3.6. This leach bed would be constructed adjacent to the large iron hydroxide deposit. Effluent from the leach bed would be conveyed to Brush Fork via a concrete or rock lined channel through the wetland. In addition, a large pit/ pond would also be conveyed to Brush Fork via a concrete or rock lined channel. An existing gravel road and low-water crossing would be upgraded to facilitate construction and maintenance. The low-water crossing will be upgraded with limestone and will mimic a natural stream riffle. An additional low-water crossing would be constructed where the road crosses over the unnamed tributary. This access road will be shared with Site 109.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. A significantly larger leach bed would be constructed to extend the functional life of the treatment. The leach bed would be constructed on top of the iron hydroxide deposit and the mine seep will flow into this leach bed. Effluent from the leach bed would be directed to Brush Fork via concrete or rock lined channel to the east of the wetland. A gravel road and low-water crossing would be constructed to facilitate construction and maintenance. The low-water crossing will be constructed with limestone and will mimic a natural stream riffle. An additional low-water crossing would be constructed where the road crosses over the unnamed tributary. This access road will be shared with Site 109.

**Wetland Information:** One wetland encompassing 10.18 acres was identified within the Contractor Work Limit (CWL). The Minimal Design Alternative would impact 1.1 acres of the Category 3 wetland. Wetland Determination and ORAM data sheets are included in the Waters of the U.S Report.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork LLB-8	LLB Embankment	10.18	3	0.18	1.1

## **Brush Fork LLB-8**

**Stream Information:** Two perennial streams/seeps were identified within the CWL and are associated with underground mine drainage. Stream 1 received a HHEI score of 31 and Stream 2 scored a 22. The Minimal Design Alternative would impact 70 linear feet of stream channel. Stream impacts for the construction of the access road are included in the summary table for site Brush Fork 109 (Section 1).

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork LLB-8	LLB Stream 1	P	Trapezoidal	30	30	0	72	50	34	38	71	0
Brush Fork LLB-8	LLB Stream 2	P	Trapezoidal	40	40	0	54	37	26	29	53	0

**Brush Fork LLB-10** (LAT\_83 = 39.5026055N; LONG\_83 = 82.18383731W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. LLB-10 is a proposed limestone leach bed located on the right descending bank of Brush Fork. The limestone leach bed will be fed from water that collects where a portion of the outcrop barrier was mined adjacent to and within a historic underground room and pillar mine. Outflow from the leach bed will be directed into Brush Fork via a concrete or rock lined channel. A gravel road and low-water crossing will be constructed to facilitate construction and maintenance of the leach bed. The low-water crossing will be constructed with limestone and will mimic a natural stream riffle.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The leach bed will be constructed on the left descending bank of Brush Fork which will allow the bed to be significantly larger than the preferred design. This additional size will prolong the functional life and reduce maintenance for the project. The mine seep will be captured on the right bank and directed under Brush Fork via a PVC pipe. Outflow from the leach bed will be directed into Brush Fork via a concrete or rock lined channel. A gravel road and low-water crossing will be constructed to facilitate construction and maintenance of the seep capture and diversion. The low-water crossing will be constructed with limestone and will mimic a natural stream riffle.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork LLB-10	NA	0	NA	NA	NA

## **Brush Fork LLB-10**

**Stream Information:** The LLB will be constructed adjacent to the Brush Fork tributary. Section 1 received a HHEI score of 42. The Minimal Design Alternative will impact 160 linear feet of stream channel on Brush Fork.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork LLB-10	Stone Slope Protection (SSP) – LLB Spillway Mainstem	P	Stone Slope Protection (SSP)	50	50	0	50	50	0	45	0	0
	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Pipe Installation Under Mainstem	P	Pipe Installation	40	40	0	24	24	0	0	0	40
	Section 1	P	Diversion Berm	50	30	0	3	9	0	0	0	0

## Brush Fork LLB's

Topic	Preferred Alternative	Min Degradation Alt
10b) Biological/Physical Impacts	The project area is primarily forested and has been underground and/or surface mined. Surface hydrology of the site is disconnected and/ or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor. A Biological Assessment has been prepared which assessed if suitable habitat for T & E species exists within the CWL. Areas with suitable habitat will be surveyed prior to construction.	The project area is primarily forested and has been underground and/or surface mined. Surface hydrology of the site is disconnected and/ or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor. A Biological Assessment has been prepared which assessed if suitable habitat for T & E species exists within the CWL. Areas with suitable habitat will be surveyed prior to construction.
10b) Water Quality	Acid mine drainage (AMD) discharging from an underground mine /strip pit will be routed into a LLB, that will reduce acid and metal concentrations of the water, prior to discharging into Brush Fork mainstem.	Acid mine drainage (AMD) discharging from an underground mine /strip pit will be routed into a LLB, that will reduce acid and metal concentrations of the water, prior to discharging into Brush Fork mainstem.
10c) Technical Feasibility	The Preferred Design Alternative is technically sound, reliable and cost effective. The limestone leach bed (LLB) is a passive treatment system. Passive treatment systems are designed to last 10 years with minimal maintenance.	The Preferred Design Alternative is technically sound, reliable and cost effective. The limestone leach bed (LLB) is a passive treatment system. Passive treatment systems are designed to last 10 years with minimal maintenance.
10d) Sewage projects	N/A	N/A
10e) Other conservation projects	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.
10f) Water pollution control	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving disturbed slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving disturbed slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.
10g) Human Health/Quality and Value of Water Resource	<p>The Brush Fork sub-watershed contains exposed gob piles, strip pits, head cuts, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction and stabilization of stream channels in order to direct and convey overland flows, prevent surface water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and</p>	<p>The Brush Fork sub-watershed contains exposed gob piles, strip pits, head cuts, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction and stabilization of stream channels in order to direct and convey overland flows, prevent surface water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and metal</p>

	metal loads, as well as the prevention of surface water contamination.	loads, as well as the prevention of surface water contamination.
10h) Social and economic Benefits	This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.	This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.
10i) Social and economic losses	No social or economic benefits will be lost as a result of implementing the Preferred Alternative.	No social or economic benefits will be lost as a result of implementing the Minimal Degradation Alternative.
10j) Environmental benefits	This project, along with other projects constructed in Brush Fork will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.	This project, along with other projects constructed in Brush Fork will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.  This plan will also avoid long-term impacts to a Category 3 wetland.

**Brush Fork 107/279** (LAT\_83 = 39.52602954N; LONG\_83 = -82.19587238W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an instream remediation for an unnamed tributary to Brush Fork. This small tributary is approximately 0.707 miles (3,792 feet) long with a drainage basin of approximately 0.24 square miles. The stream currently discharges into a 0.67 acre wetland. Above this point, all surface runoff is currently captured by subsidences and fractured bedrock which is directing the waters into the abandoned mines. Approximately 2,800 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Two side channels will also be constructed beginning with a trapezoidal and transitioning to a 'V' notch channel. Two subsidences will be filled to prevent stream capture. The constructed channel will terminate at County Road 22 where it will enter an existing culvert prior to entering into Brush Fork. An existing unpaved road will be upgraded to facilitate construction and maintenance of the channel. Two low-water crossings will be constructed with limestone and will mimic a natural stream riffle.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an instream remediation for an unnamed tributary to Brush Fork. This small tributary is approximately 0.707 miles (3,792 feet) long with a drainage basin of approximately 0.24 square miles. The stream currently discharges into a 0.67 acre wetland. Above this point, all surface runoff is currently captured by subsidences and fractured bedrock which is directing the waters into the abandoned mines. Approximately 1,800 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. This channel will terminate on the upstream end of the 0.67 acre wetland thereby eliminating impacts to this water. Two side channels will also be constructed beginning with a trapezoidal and transitioning to a 'V' notch channel. Two subsidences will be filled to prevent stream capture. Flow from the constructed channel will flow through the wetland to Brush Fork via the existing stream channels and culvert. An existing unpaved road will be upgraded to facilitate construction and maintenance of the channel. Two low-water crossings will be constructed with limestone and will mimic a natural stream riffle.

## **Brush Fork 107/279**

**Wetland Information:** One wetland encompassing 0.67 acres was identified within the Contractor Work Limit (CWL). The Minimal Design Alternative would not impact the wetland. Wetland Determination and ORAM data sheets are included in the Waters of the U.S Report.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 107	NA	0.67	2	0.67	0

**Stream Information:** The Minimal Design Alternative will not impact stream channels.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 107	Section 1	NC	Trapezoidal	1768	0	1768	0	0	0	0	0	0
	Tributary 1	NC	Trapezoidal	300	0	300	0	0	0	0	0	0
	Tributary 1	NC	V Notch	500	0	500	0	0	0	0	0	0
	Tributary 2	NC	Trapezoidal	100	0	100	0	0	0	0	0	0
	Tributary 2	NC	V Notch	250	0	250	0	0	0	0	0	0

**Brush Fork 108** (LAT\_83 = 39.50230787N; LONG\_83 = -82.19325778W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,600 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The constructed channel will terminate at Brush Fork. An existing unpaved road will be upgraded to facilitate construction and maintenance of the channel. A low-water crossing for Brush Fork will be constructed with limestone and will mimic a natural stream riffle.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an instream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. The main channel will consist of approximately 2,300 linear feet of trapezoidal limestone lined channel that will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Two additional side channels consisting of 183 linear feet of ‘V’ notch channel and 213 linear feet of trapezoidal channel will be constructed to capture additional flows. Two catchments will be constructed along the channel to collect runoff from two ephemeral streams. The constructed channel will terminate at Brush Fork. An existing unpaved road will be upgraded and additional access road constructed to facilitate construction and maintenance of the channel. A low-water crossing for Brush Fork will be constructed with limestone and will mimic a natural stream riffle.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 108	NA	0	NA	NA	NA

## **Brush Fork 108**

**Stream Information:** The proposed project is located in an unnamed tributary to Brush Fork. This tributary drains an area of approximately 0.19 square miles. Six distinct channel sections were identified during the field investigation. Section 1 received a HHEI score of 60. Section 3 received a HHEI score of 53. Section 4 received a HHEI score of 32. Tributary 1 received a HHEI score of 34. Tributary 2 is the right fork of the channel received a HHEI score of 33. The Minimal Design Alternative would impact 1,555 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 108	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Section 1	I	Trapezoidal	650	650	0	1,168	811	554	621	1,156	0
	Section 2	NC	Trapezoidal	750	0	750	0	0	0	0	0	0
	Section 3	E	Trapezoidal	400	400	0	719	499	341	382	711	0
	Section 4	E	Trapezoidal	200	200	0	359	250	170	191	356	0
	Tributary 1	E	V Notch	200	200	0	53	205	225	191	267	0
	Tributary 2	E	Trapezoidal	65	65	235	117	81	55	62	116	0

**Brush Fork 109** (LAT\_83 = 39.50688123N; LONG\_83 = -82.19516021W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by subsidences and fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,100 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. An additional 100 feet of side channel will also be constructed to capture additional flow. The constructed channel will terminate at an existing channel about 300 feet from Brush Fork. A gravel road will be constructed to facilitate construction and maintenance of the channel. This road will be shared with LLB-8. A low-water crossing for Brush Fork will be constructed with limestone and will mimic a natural stream riffle.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by subsidences and fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,050 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. An additional 200 feet of side channel will also be constructed to capture additional flow. The constructed channel will terminate at an existing culvert about 300 feet from Brush Fork. Four subsidences will be closed. An existing unpaved road will be upgraded to facilitate construction and maintenance of the channel. This road will be shared with LLB-8. An existing low-water crossing for Brush Fork will be upgraded with limestone and will mimic a natural stream riffle.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 109	NA	0	NA	NA	NA

## **Brush Fork 109**

**Stream Information:** The proposed project is located in an unnamed tributary to Brush Fork. This small tributary drains an area of approximately 0.09 square miles. Five distinct channel sections were identified during the field investigation. Section 1 received a HHEI score of 25. Tributary 1 received a HHEI score of 43. Section 3 received a HHEI score of 31. The Minimal Design Alternative would impact 870 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material (CY)				
								Stone	Soil	Filter Fabric	HDPE Liner	Pipe
Brush Fork 109	Culvert Replacement Section 1	P	Culvert Replacement	40	40	0	36	36	0	0	0	40
	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Crossing Section 1	I	Culvert Replacement	40	40	0	380	216	0	0	0	0
	Section 1	I	Trapezoidal	450	450	0	808	562	383	430	800	0
	Section 2	NC	Trapezoidal	660	0	660	0	0	0	0	0	0
	Section 3	E	Trapezoidal	100	100	0	180	125	85	96	178	0
	Section 4	NC	Trapezoidal	292	0	292	0	0	0	0	0	0
	Tributary 1	E	Trapezoidal	200	200	0	359	250	170	191	356	0

**Brush Fork 110** (LAT\_83 = 39.49931858N; LONG\_83 = -82.18491882W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,600 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Two additional side channels will also be constructed to capture additional flow. These side channels will be approximately 600 and 250 linear feet. The constructed channel will terminate at Brush Fork. A gravel road will be constructed to facilitate construction and maintenance of the channel. A low-water crossing for Brush Fork will be constructed with limestone and will mimic a natural stream riffle.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,800 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Two additional side channels will also be constructed to capture additional flow. These side channels will be approximately 475 and 800 linear feet. The constructed channel will terminate at Brush Fork. An existing unpaved road will be upgraded to facilitate construction and maintenance of the channel. An existing low-water crossing for Brush Fork will be upgraded with limestone and will mimic a natural stream riffle.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 110	NA	0	NA	NA	NA

## **Brush Fork 110**

**Stream Information:** The proposed project is located in an unnamed tributary to Brush Fork. The proposed project is located in an unnamed tributary to Brush Fork. Section 1 received a HHEI score of 66. Section 6 received a HHEI score of 30. Section 3 received a HHEI score of 43. Section 3 ends at a fork in the valley. Section 4 received a HHEI score of 39. Section 5 received a HHEI score of 45. The Minimal Design Alternative would impact 1,905 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 110\	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Stream Crossing 1	E	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Stream Crossing 2	NC	Low Water Crossing	40	0	0	0	0	0	0	0	0
	Stream Crossing 3	NC	Low Water Crossing	40	0	0	0	0	0	0	0	0
	Section 1	I	Trapezoidal	350	350	0	629	437	298	334	622	0
	Section 2	NC	Trapezoidal	550	0	550	0	0	0	0	0	0
	Section 3	E	Trapezoidal	475	475	0	853	593	405	454	844	0
	Section 4	E	Trapezoidal	100	100	0	180	125	85	96	178	0
	Section 5	E	Trapezoidal	100	100	0	180	125	85	96	178	0
	Section 6	E	Trapezoidal	800	800	0	1437	999	681	764	1422	0
	Tributary 1	NC	Trapezoidal	425	0	425	0	0	0	0	0	0
	Tributary 2	NC	Trapezoidal	300	0	300	0	0	0	0	0	0
	Tributary 3	NC	Trapezoidal	300	0	300	0	0	0	0	0	0

**Brush Fork 226** (LAT\_83 = 39.53095164N; LONG\_83 = -82.20548123W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 2,100 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. An additional 300 linear foot side channel will also be constructed to capture additional flow. The constructed channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,950 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. An additional 150 linear foot side channel will also be constructed to capture additional flow. The constructed channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 226	NA	0	NA	NA	NA

## **Brush Fork 226**

**Stream Information:** This proposed project is in an unnamed tributary to Brush Fork. Section 1 received a HHEI score of 30. Section 3 received a HHEI score of 40. The Minimal Design Alternative would impact 420 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 226	Section 1	I	Trapezoidal	220	220	0	395	275	187	210	391	0
	Section 2	NC	Trapezoidal	250	0	250	0	0	0	0	0	0
	Section 3	I	Trapezoidal	200	200	0	359	250	170	191	356	0
	Section 4 & Section 5	NC	Trapezoidal	1,140	0	1,140	0	0	0	0	0	0
	Tributary 1	NC	Trapezoidal	150	0	150	0	0	0	0	0	0

**Brush Fork 228** (LAT\_83 = 39.508133N; LONG\_83 = -82.18864333W)

**10a) Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock and a subsidence which are directing the waters into the underground, abandoned mines. Two spoil blocks are also impeding the flow. Approximately 1,200 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Two additional channels will also be constructed to capture additional flow. These channels will be 700 and 200 linear feet. The subsidence will be closed and the spoil blocks removed to restore the gradient. The constructed channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock and a subsidence which are directing the waters into the underground, abandoned mines. Two spoil blocks are also impeding the flow. Approximately 1,200 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Two additional channels will also be constructed to capture additional flow. These channels will be 700 and 200 linear feet. The subsidence will be closed and the spoil blocks removed to restore the gradient. The constructed channel will terminate at a new culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 228	NA	0	NA	NA	NA

## **Brush Fork 228**

**Stream Information:** This proposed project is located in an unnamed tributary to Brush Fork. Section 1 received a HHEI score of 34. Section 3 received a HHEI score of 36. Section 6 received a HHEI score of 30. The Minimal Design Alternative would impact 285 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 228	Culvert Replacement	P	Culvert Replacement	40	40	0	36	36	0	0	0	40
	Section 1	E	Trapezoidal	20	20	0	36	25	17	19	36	0
	Section 2	NC	Trapezoidal	150	0	150	0	0	0	0	0	0
	Section 3	E	Trapezoidal	125	125	0	225	156	106	119	222	0
	Section 4	NC	Trapezoidal	0	0	750	0	0	0	0	0	0
	Section 5	NC	Trapezoidal	0	0	200	0	0	0	0	0	0
	Section 6	I	Trapezoidal	100	100		180	125	85	96	178	
	Section 7	NC	Trapezoidal	0	0	700	0	0	0	0	0	0
	Tributary 1	NC	Trapezoidal	50	0	50	0	0	0	0	0	0

**Brush Fork 229** (LAT\_83 = 39.51304643N; LONG\_83 = -82.19163717W)

**Preferred Design:** The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,600 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The constructed channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,850 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The constructed channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel. The construction of this access road will require that a culvert and fill be placed in about 130 linear feet of the road ditch.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 229	NA	0	NA	NA	NA

## **Brush Fork 229**

**Stream Information:** This proposed project is located in an unnamed tributary to Brush Fork. Section 1 received a HHEI score of 30. Section 3 received a HHEI score of 69. The Minimal Design Alternative would impact 1,040 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 229	Culvert Replacement	P	Culvert Replacement	40	40	0.00	36	0	0	0	0	40
	Section 1	E	Trapezoidal	700	700	0	1257	874	596	669	1,244	0
	Section 2	NC	Trapezoidal	900	0	900	0	0	0	0	0	0
	Section 3	P	Trapezoidal	300	300	0.00	539	374	256	287	533	0

**Brush Fork 230 & 286** (LAT\_83 = 39.5173065N; LONG\_83 = -82.19493589W)

**Preferred Design:** The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. The proposed project, numbered 230 & 286, is an in-stream remediation for an unnamed tributary to Brush Fork. This small tributary is approximately 0.20 miles (1,040 feet) long with a drainage basin of approximately 0.07 square miles. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 850 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The constructed channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project, numbered 230 & 286, is an in-stream remediation for an unnamed tributary to Brush Fork. This small tributary is approximately 0.20 miles (1,040 feet) long with a drainage basin of approximately 0.07 square miles. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. There are also two subsidences that are also trapping surface waters. Approximately 1,200 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The two subsidences will be closed. The constructed channel will terminate at a new culvert that will be constructed under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 230 & 286	NA	0	NA	NA	NA

## **Brush Fork 230 & 286**

**Stream Information:** The proposed project is located in an unnamed tributary to Brush Fork. Section 1 is the only defined channel in this valley bottom. It is approximately 20 ft in length and received a HHEI score of 10. The Minimal Design Alternative would impact 60 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 230&286	Culvert Placement	P	Culvert Placement	40	40	0	0	0	0	0	0	0
	Section 1A	NC	Trapezoidal	440	0	440	0	0	0	0	0	0
	Section 1	E	Trapezoidal	20	20	0	36	25	17	19	36	0
	Section 2	NC	Trapezoidal	620	0	620	0	0	0	0	0	0

**Brush Fork 233** (LAT\_83 = 39.52744394N; LONG\_83 = -82.2034265W)

**Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,450 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. Three additional channels will also be constructed to capture additional flow. These channels will be 200, 300 and 300 linear feet. The constructed main channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock which is directing the waters into the underground, abandoned mines. Approximately 1,600 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. One tributary channel will be constructed to capture additional flow. This tributary 1 channel will be 200 linear feet of primarily ‘V’ notch channel. The constructed main channel will terminate at an existing culvert under County Road 22 and then follow the existing channel to Brush Fork. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 233	NA	0	NA	NA	NA

## **Brush Fork 233**

**Stream Information:** The proposed project is located in an unnamed tributary to Brush Fork. No defined channel is present within this valley bottom. The Minimal Design Alternative would impact 40 linear feet of stream channel along Brush Fork.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 233	Culvert Replacement	P	Culvert Replacement	40	40	0	36	36	0	0	0	40
	Section 1	NC	Trapezoidal	1,600	0	1,600	0	0	0	0	0	0
	Tributary 1	NC	V Notch	100	0	100	0	0	0	0	0	0

**Brush Fork 234 & 284** (LAT\_83 = 39.53176603N; LONG\_83 = -82.21376747W)

**Preferred Design:** This plan represents the 50% complete plans as developed by the District. The proposed project, numbered 234 & 284, is an in-stream remediation for an unnamed tributary to Brush Fork. This small tributary is currently blocked from draining into Brush Fork by an extremely steep manmade spoil pile which is redirecting the flow into a mine opening. Some additional flow is being captured by another subsidence. Approximately 500 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The subsidence and mine opening will be filled and the spoil pile removed. The constructed main channel will terminate at Brush Fork. A gravel access road and low-water crossing will be constructed to facilitate construction and maintenance of the channel. A low-water crossing for Brush Fork will be constructed with limestone and will mimic a natural stream riffle.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. The proposed project, numbered 234 & 284, is an in-stream remediation for an unnamed tributary to Brush Fork. This small tributary is currently blocked from draining into Brush Fork by an extremely steep manmade spoil pile which is redirecting the flow into a mine opening. Some additional flow is being captured by another subsidence. Approximately 475 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating the fractured bedrock. The subsidence will be filled, the mine opening will be fitted with a bat gate, and the spoil pile will be removed to restore the natural stream gradient. The constructed main channel will terminate at Brush Fork. A gravel access road and low-water crossing will be constructed to facilitate construction and maintenance of the channel. A low-water crossing for Brush Fork will be constructed with limestone and will mimic a natural stream riffle.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 234 & 284	NA	0	NA	NA	NA

## **Brush Fork 234 & 284**

**Stream Information:** The proposed project is located in an unnamed tributary to Brush Fork. Section 2 received a HHEI score of 35. The Minimal Design Alternative would impact 250 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 234 & 284	Crossing Mainstem	P	Low Water Crossing	90	90	0	855	487	0	0	0	0
	Section 1	NC	Trapezoidal	290	0	290	0	0	0	0	0	0
	Section 2	E	Trapezoidal	160	160	0	287	200	136	153	284	0

**Brush Fork 285** (LAT\_83 = 39.51628N; LONG\_83 = -82.205603W)

**Preferred Design:** This plan represents the 50% complete plans as developed by the District. This proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock and a subsidence which is directing the waters into the underground abandoned mines. This tributary is the second largest tributary to Brush Fork. The proposed project only encompasses the upper portion of the drainage, approximately 0.80 miles (4,200 feet) long with a secondary tributary approximately 0.36 miles (1,900 ft) long. The drainage basin for this proposed project is approximately 0.37 square miles. Approximately 2,250 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating fractured bedrock. The subsidence will be filled. The constructed main channel will terminate at a section of the channel that was previously remediated by the Forest Service. A gravel access road and low-water crossing will be constructed to facilitate construction and maintenance of the channel. The small portion of this road and the low-water crossing would also be used to construct and service LLB-5.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. This proposed project is an in-stream remediation for an unnamed tributary to Brush Fork. Surface runoff is currently captured by fractured bedrock and a mine opening which is directing the waters into the underground abandoned mines. This tributary is the second largest tributary to Brush Fork. The proposed project only encompasses the upper portion of the drainage, approximately 0.80 miles (4,200 feet) long with a secondary tributary approximately 0.36 miles (1,900 ft) long. The drainage basin for this proposed project is approximately 0.37 square miles. Approximately 2,600 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating fractured bedrock. The mine opening/ stream capture will be closed. The constructed main channel will terminate at an existing culvert which flows under a gravel access road that currently serves some existing tanks. The culvert will be removed and a low-water crossing will be constructed to facilitate construction and maintenance of the channel. The constructed channel will then direct flow into Brush Fork via the existing channel.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Brush Fork 285	NA	0	NA	NA	NA

## **Brush Fork 285**

**Stream Information:** This proposed project is located in an unnamed tributary to Brush Fork. Section 6 received a HHEI score of 48. Sections 2 and 5 were combined for a HHEI score of 40. The Minimal Design Alternative would impact 790 linear feet of stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Brush Fork 285	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0
	Low Water Crossing	NC	Low Water Crossing	25	0	0	0	0	0	0	0	0
	Section 1	NC	Trapezoidal	1850	0	1850	0	0	0	0	0	0
	Section 2	E	Trapezoidal	150	150	0	269	187	128	143	267	0
	Section 3	E	Trapezoidal	100	100	0	180	125	85	96	178	0
	Section 4	NC	Trapezoidal	550	0	500	0	0	0	0	0	0
	Section 5	NC	Trapezoidal	100	0	100	0	0	0	0	0	0
	Section 6	E	Trapezoidal	500	500	0	898	624	426	478	889	0

## Brush Fork Channel Restoration

Topic	Preferred Alternative	Min Degradation Alt
10b) Biological/Physical Impacts	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. Surface hydrology of the site is disconnected and/ or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor. The project area has been assessed to determine if suitable habitat for T & E species exists within the CWL. Areas with suitable habitat will be surveyed prior to construction.	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. Surface hydrology of the site is disconnected and/ or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor. The project area has been assessed to determine if suitable habitat for T & E species exists within the CWL. Areas with suitable habitat will be surveyed prior to construction.
10b) Water Quality	A trapezoidal stream channel will be constructed within the drainage basins to move surface water to Brush Fork mainstem and prevent surface water from entering underground mines. Limestone channels will reduce acidity and facilitate metal precipitation through aeration.	A trapezoidal stream channel will be constructed within the drainage basins to move surface water to Brush Fork mainstem and prevent surface water from entering underground mines. Limestone channels will reduce acidity and facilitate metal precipitation through aeration.
10c) Technical Feasibility	The Preferred Design Alternative is technically sound, reliable and cost effective. The limestone channels are inexpensive and require little to no maintenance.	The Minimal Design Alternative is technically sound, reliable and cost effective. The limestone channels are inexpensive and require little to no maintenance.
10d) Sewage projects	N/A	N/A
10e) Other conservation projects	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.
10f) Water pollution control	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.
10g) Human Health/Quality and Value of Water Resource	The Brush Fork sub-watershed contains exposed gob piles, strip pits, head cuts, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction of stream	The Brush Fork sub-watershed contains exposed gob piles, strip pits, head cuts, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction of stream channels in order to

	<p>channels in order to direct and convey overland flows, prevent surface water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and metal loads, as well as the prevention of surface water contamination.</p>	<p>direct and convey overland flows, prevent surface water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and metal loads, as well as the prevention of surface water contamination.</p>
10h) Social and economic Benefits	<p>This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.</p>	<p>This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.</p>
10i) Social and economic losses	<p>No social or economic benefits will be lost as a result of implementing the Preferred Alternative.</p>	<p>No social or economic benefits will be lost as a result of implementing the Minimal Degradation Alternative.</p>
10j) Environmental benefits	<p>This project, along with other projects constructed in Brush Fork will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.</p>	<p>This project, along with other projects constructed in Brush Fork will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.</p>

**Lost Run  
Sub-Watershed**

**Individual Project Discussion  
(10a thru 10j)**

**Lost Run** (LAT\_83 = 39.55130996N; LONG\_83 = -82.23717615W)

**Preferred Design:** This plan represents the 50% complete plans as developed by the District. This proposed project is an in-stream remediation for Lost Run. Surface runoff is currently impeded by a spoil block and captured by fractured bedrock and subsidences which are directing the waters into underground abandoned mines. The spoil block will be removed to restore the natural stream gradient. Approximately 1,600 linear feet of trapezoidal limestone lined channel will be constructed on an impermeable barrier to prevent the water from infiltrating fractured bedrock. Three subsidences will be filled. The constructed main channel will terminate at a section of existing channel. A gravel access road with a culvert will be constructed to facilitate construction and maintenance of the channel.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. This proposed project is an in-stream remediation for Lost Run. Surface runoff is currently impeded by a spoil block and captured by fractured bedrock and subsidences which are directing the waters into underground abandoned mines. The spoil block will be removed to restore the natural stream gradient. The three subsidences will be filled. Loss of surface water through fractured bedrock is not considered significant enough to warrant the construction of a limestone channel. An existing unpaved road will likely be used to access the site; therefore impacts to Lost Run mainstem are anticipated.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Lost Run	NA	0	NA	NA	NA

**Stream Information:** The proposed project is located in Lost Run, a tributary to Monday Creek. The mainstem of the tributary received a QHEI score of 53. The Minimal Design Alternative will impact 40 linear feet of perennial stream.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Lost Run	Crossing Mainstem	P	Low Water Crossing	40	40	0	380	216	0	0	0	0

## Lost Run Channel Restoration

<b>Topic</b>	<b>Preferred Alternative</b>	<b>Min Degradation Alt</b>
10b) Biological/Physical Impacts	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. Surface hydrology of the site is disconnected and/ or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor. The project area has been assessed to determine if suitable habitat for T & E species exists within the CWL. Areas with suitable habitat will be surveyed prior to construction.	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. Surface hydrology of the site is disconnected and/ or contaminated by acid mine drainage. Surface water pH is < 4 with high concentrations of aluminum and iron. The overall aquatic community structure is very poor. The project area has been assessed to determine if suitable habitat for T & E species exists within the CWL. Areas with suitable habitat will be surveyed prior to construction.
10b) Water Quality	A trapezoidal stream channel will be constructed within the drainage basins to move surface water to Lost Run mainstem and prevent surface water from entering underground mines. Limestone channels will reduce acidity and facilitate metal precipitation through aeration.	A trapezoidal stream channel will be constructed within the drainage basins to move surface water to Lost Run mainstem and prevent surface water from entering underground mines. Limestone channels will reduce acidity and facilitate metal precipitation through aeration.
10c) Technical Feasibility	The Preferred Design Alternative is technically sound, reliable and cost effective. The limestone channels are inexpensive and require little to no maintenance.	The Minimal Design Alternative is technically sound, reliable and cost effective. The limestone channels are inexpensive and require little to no maintenance.
10d) Sewage projects	N/A	N/A
10e) Other conservation projects	Monday Creek Restoration Project, ODNr, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.	Monday Creek Restoration Project, ODNr, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.
10f) Water pollution control	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.
10g) Human Health/Quality and Value of Water Resource	The Lost Run sub-watershed contains exposed gob piles, strip pits, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction of stream channels in order to convey overland flows, prevent surface	The Lost Run sub-watershed contains exposed gob piles, strip pits, subsidence features, blocked drainages, losing streams, open mine portals and seeps. Proposed projects include the construction of stream channels in order to convey overland flows, prevent surface water loss to underground

	<p>water loss to underground mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and metal loads, as well as the prevention of surface water contamination.</p>	<p>mines, and treat acid mine drainage through various technologies.</p> <p>Impacts to overall quality of the water resource include reduction of acid and metal loads, as well as the prevention of surface water contamination.</p>
10h) Social and economic Benefits	<p>This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.</p>	<p>This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.</p>
10i) Social and economic losses	<p>No social or economic benefits will be lost as a result of implementing the Preferred Alternative.</p>	<p>No social or economic benefits will be lost as a result of implementing the Minimal Degradation Alternative.</p>
10j) Environmental benefits	<p>This project, along with other projects constructed in the sub- watershed will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.</p>	<p>This project, along with other projects constructed in the sub-watershed will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.</p>

**Dixie Hollow  
Sub-Watershed**

**Individual Project Discussion  
(10a thru 10j)**

**Dixie Hollow** (LAT\_83 = 39.624295N; LONG\_83 = 82.644500W)

**Preferred Design:** A plan at the 50% level was developed by the District. This plan called for a steel slag leach bed (SLB) to be constructed on a side channel of Dixie Hollow just upstream of the 12.28 acre Category 3 wetland. After further study, this project was deemed infeasible from a constructability standpoint and did not provide water quality benefits commensurate with the cost of the project. It was therefore dismissed as an alternative.

**Minimal Degradation Alternative:** This alternative represents the 90% complete plans. A reformulation of the project occurred between the 50% and 90% level of design. The 12.28 acre Category 3 wetland in Dixie Hollow is supported by beaver dams and is therefore considered extremely dynamic in nature. The wetland is considered an important resource in the watershed and worthy of protection. The 90% plan focused on protection and redundancy rather than enhancement/remediation. Two wetland dikes constructed of limestone are proposed for this area and are sited to enhance existing beaver dam wetlands that are threatened by stream head cutting and the uncertainty of long term beaver occupation of these sites. They are to be located downstream of the existing beaver dams. Since beaver dams are dynamic and are relocated over time, the exact locations of these wetland dikes will be field adjusted at the time of construction to avoid impacts to the existing wetlands. These wetland dikes will cross the Dixie Hollow tributary. The constructed wetlands are designed (sized) to capture iron and aluminum precipitates that have been released from solution as the pH of water increases by treatment or natural buffering. A gravel access road will be constructed to facilitate construction and maintenance of the channel.

**Wetland Information:** One wetland encompassing 12.28 acres was identified within the Contractor Work Limit (CWL). The Minimal Design Alternative would impact .23 acres of a Category 3 wetland. Wetland Determination and ORAM data sheets are included in the Waters of the U.S Report.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Dixie Hollow	Wetland Dike 1	12.28	3	0.34	0.23

## Dixie Hollow

**Stream Information:** The proposed project is located in Dixie Hollow, a tributary to Monday Creek. The mainstem of the tributary received a QHEI score of 48. The Minimal Design Alternative will impact 100 linear feet of perennial stream.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Dixie Hollow	Wetland Dike 1 Mainstem	P	Wetland Dike	50	50	0	125	165	0	165	0	0
	Wetland Dike 2 Mainstem	P	Wetland Dike	50	50	0	125	165	0	165	0	0

## Dixie Hollow Wetland Dikes

Topic	Preferred Alternative	Min Degradation Alt
10b) Biological/Physical Impacts	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. The Dixie Hollow tributary is contaminated by acid mine drainage. Upstream of the existing wetland, surface water is acidic with high concentrations of aluminum and iron. The overall aquatic community structure is very poor.	The project area is primarily forested and has been underground and/or surface mined. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction. The Dixie Hollow tributary is contaminated by acid mine drainage. Upstream of the existing wetland, surface water is acidic with high concentrations of aluminum and iron. The overall aquatic community structure is very poor.
10b) Water Quality	Acid mine drainage (AMD) discharges from underground and surface mines located in the headwaters of the sub-watershed. The wetland is located near the mouth reduces acid and metal concentrations of the water, prior to discharging into Monday Creek.  Installing a SLB in Dixie Hollow would add alkalinity to the wetland, increase pH and further reduce metal concentrations.	Acid mine drainage (AMD) discharges from underground and surface mines located in the headwaters of the sub-watershed. The wetland is located near the mouth and reduces metal concentrations in the water, prior to discharging into Monday Creek.  Installing dikes downstream of the wetland will ensure that the wetland will continue to improve surface water quality.
10c) Technical Feasibility	The Preferred Design Alternative is technically sound, reliable and cost effective. The SLB is a passive treatment system. Passive treatment systems are designed to last for 10 -25 years with minimal maintenance. The limestone dikes would require little to no maintenance.	The Minimal Design Alternative is technically sound, reliable and cost effective. The limestone dikes would require little to no maintenance.
10d) Sewage projects	N/A	N/A
10e) Other conservation projects	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.
10f) Water pollution control	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.
10g) Human Health/Quality and Value of Water Resource	The Dixie Hollow sub-watershed contains exposed gob piles, strip pits, open mine portals and seeps. Proposed projects include the construction of a SLB and wetland dikes in order to preserve a	The Dixie Hollow sub-watershed contains exposed gob piles, strip pits, open mine portals and seeps. The proposed project includes the construction of wetland dikes in order to preserve a Category 3 wetland

	Category 3 wetland located near the mouth of the Dixie Hollow tributary. Impacts to overall quality of the water resource include reduction of acid and metal loads.	located near the mouth of the Dixie Hollow tributary. Impacts to overall quality of the water resource include reduction of metal loads.
10h) Social and economic Benefits	This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.	This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent within the local area.
10i) Social and economic losses	No social or economic benefits will be lost as a result of implementing the Preferred Alternative.	No social or economic benefits will be lost as a result of implementing the Minimal Degradation Alternative.
10j) Environmental benefits	This project will raise the pH and reduce heavy metal concentrations to benefit water quality downstream in the mainstem of Monday Creek.	This project will reduce heavy metal concentrations to benefit water quality downstream in the mainstem of Monday Creek.

## **Murray City**

### **Individual Project Discussion (10a thru 10j)**

**Murray City Doser** (LAT\_83 = 39.5092100N; LONG\_83 = 82.1673083W)

**Preferred Design:** A plan at the 50% level was developed by the District. This plan called for a steel slag leach bed (SLB) to be constructed on a side channel of Spencer Hollow located upstream of Murray City. After further study, this project was deemed infeasible from a constructability standpoint and did not provide water quality benefits commensurate with the cost of the project. It was therefore dismissed as an alternative.

**Minimal Degradation Alternative:** This proposed doser site is located along Township Road 512, Sanborn Road, immediately north of the athletic fields in Murray City. A berm will be constructed at the mine portal to collect mine drainage and an underground pipe would be installed to direct it to the doser. After passing through the doser, the mine effluent would be piped under the road and discharged into Snow Fork via a concrete or rock lined channel.

**Wetland Information:** No wetlands were identified within the CWL.

Treatment Site	Type of In-Stream Remediation	Total Wetland Acres within Work Limit	Wetland Category	Preferred Alternative Total Acres Impacted	Minimal Design Alternative Total Acres Impacted
Murray City Doser	NA	0	0	0	0

**Stream Information:** Two perennial streams were identified within the CWL. Snow Fork received a QHEI score of 60. A mine seep flowing into Snow Fork runs parallel to the township road and received a HHEI score of 41. The Minimal Design Alternative will impact 365 linear feet of perennial stream channel.

Treatment Site	Stream Reach & Plan Identification	Stream Type E, I, P or NC	Type of In-Stream Remediation	Total Length on Site (LF)	Total Impact (LF)	Stream Length Created (LF)	Dredge Material (CY)	Fill Material				
								Stone (CY)	Soil (CY)	Filter Fabric (SY)	HDPE Liner (SY)	Pipe (LF)
Murray City Doser	Stone Slope Protection (SSP) Snow Fork	P	Stone Slope Protection (SSP)	110	110	0	110	110	0	99	0	0
	Doser Section 1	P	Diversion Berm	360	60	0	6	18	0	0	0	0
	Doser Section 1	P	Trapezoidal	360	195	0	350	243	166	186	347	0

# Murray City Doser

Topic	Preferred Alternative	Min Degradation Alt
10b) Biological/Physical Impacts	The project area is located on a reclaimed mine site in Spencer Hollow sub-watershed. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction.	The project area is located on the flood plain, adjacent to the Snow Fork tributary. A Biological Assessment has been completed that addresses the project area. Section 7 coordination with the USFWS is on-going and a compliance process is in place. Areas with suitable habitat will be surveyed prior to construction.
10b) Water Quality	Acid mine drainage (AMD) discharging from an underground mine will be treated by the doser to a pH > 7 and subsequently discharged into Snow Fork. Metal hydroxides and unreacted lime will accumulate for a short distance downstream of the doser resulting in embedded substrates.	Acid mine drainage (AMD) discharging from an underground mine will be treated by the doser to a pH > 7 and subsequently discharged into Snow Fork. Metal hydroxides and unreacted lime will accumulate for a short distance downstream of the doser resulting in embedded substrates.
10c) Technical Feasibility	The Preferred Design Alternative is technically sound, reliable and cost effective. The doser is an active treatment system that will require an annual investment in order to operate and maintain the system.	The Minimal Degradation Alternative is technically sound, reliable and cost effective. The doser is an active treatment system that will require an annual investment in order to operate and maintain the system.
10d) Sewage projects	N/A	N/A
10e) Other conservation projects	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.	Monday Creek Restoration Project, ODNR, and the USFS work together to leverage funding and complete projects within the watershed. The projects included in this application will improve overall water quality within the watershed, and complement both previous and future reclamation efforts.
10f) Water pollution control	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.	Water pollution controls will include BMP's such as construction sequencing, in order to avoid leaving slopes exposed for extended periods, installing silt fencing, straw bale ditch checks, and seeding and mulching areas disturbed by construction activities. A Storm Water Pollution Prevention Plan (SWPP) will be prepared and kept on site for the overall project.
10g) Human Health/Quality and Value of Water Resource	The Snow Fork sub-watershed contains strip pits, open mine portals and seeps. Impacts to overall quality of the water resource include reduction of acid and metal loads.	The Snow Fork sub-watershed contains strip pits, open mine portals and seeps. Impacts to overall quality of the water resource of the water resource include reduction of acid and metal loads.
10h) Social and economic Benefits	This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages	This project may have some incidental benefits to the local economy in increased recreational use, primarily hunting and fishing. Also, short term benefits will be derived from the construction through jobs, purchase of materials and wages spent

	spent within the local area.	within the local area.
10i) Social and economic losses	No social or economic benefits will be lost as a result of implementing the Preferred Alternative.	No social or economic benefits will be lost as a result of implementing the Minimal Degradation Alternative.
10j) Environmental benefits	This project, along with other projects constructed in watershed will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.	This project, along with other projects constructed in watershed will raise the pH and remove heavy metals to benefit water quality downstream in the mainstem of Monday Creek.