JURISDICTIONAL WATERS DELINEATION REPORT
AMERICAN ELECTRIC POWER CO., INC.
PROPOSED MITCHELL LANDFILL PHASE II HAUL ROAD PROJECT
CRESAP, MARSHALL COUNTY, WEST VIRGINIA

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1.0 INTRODUCTION

1.1 GENERAL INFORMATION

This report presents the findings of a supplemental wetland and stream delineation conducted at the Ohio Power Company dba American Electric Power Company, Inc. (AEP) proposed Mitchell Landfill Phase II Haul Road Project Area (the Project Area) located in Cresap, Marshall County, West Virginia. The Project Area is located north of Gatts Ridge Road southwest of its intersection with Taylors Ridge Road (Figure 1) and consists of a proposed haul road and adjacent areas, most of which may be cleared or otherwise disturbed by haul road construction or landfill related activities. The current Phase II Haul Road limits of disturbance of approximately 45 acres includes a linear area located north and west of Gatts Ridge Road and south of an existing fly ash reservoir (Conner Run) in Marshall County, West Virginia (Figure 1). The proposed haul road will link AEP's existing Mitchell Power Plant to the proposed coal combustion byproducts landfill (Mitchell Landfill).

In 2011, CEC conducted a wetland and stream delineation study within the Mitchell Landfill Original Site Plan and Proposed Site Plan limits of disturbance areas shown on Figures 1 through 3 (*Jurisdictional Waters Delineation Report - American Electric Power Co., Inc. - Proposed Mitchell Landfill Project – Cresap, Marshall County, West Virginia*; CEC 2011). As seen on Figures 4 and 5, a wetland and stream delineation was previously conducted by Stantec in 2011 within a Phase II Haul Road study area (*Stantec Delineation Report - American Electric Power Mitchell Haul Road Improvements Assessment of Potential Wetlands and Streams - Phase 2*; Stantec 2011). AEP submitted Stantec's 2011 delineation report for the original Phase II Haul Road study area, along with a Jurisdictional Determination (JD) request cover letter, to the U.S. Army Corps of Engineers (USACE) on December 19, 2011.

Subsequent to the Stantec delineation study, the proposed limits of disturbance associated with construction of the Phase II Haul Road were expanded. A supplemental wetland and stream delineation study was completed by CEC in February 2012 for the expanded Phase II Haul Road limits of disturbance (*Supplemental Jurisdictional Waters Delineation Report - American*

Electric Power Co., Inc. - Proposed Mitchell Landfill Project – Cresap, Marshall County, West Virginia; CEC 2012). That report was submitted to the USACE for review on March 16, 2012. Areas included within CEC's supplemental Phase II Haul Road wetland and stream delineation study area are shown with orange hatching on Figures 1 through 5 and total approximately 22 acres.

CEC conducted additional stream sampling and wetland delineation activities within the limits of Stantec's Phase II Haul Road study area on March 20 and 21, 2012. On March 21, 2012, CEC and representatives from AEP conducted a JD site visit within the Project Area with the USACE. Based on observations made by CEC during the March 20 and 21, 2012, site visits and requests made by the USACE during the March 21, 2012, JD site visit, the locations and/or classification of streams and the extent of wetlands within the Project Area were updated. The USACE also requested that one jurisdictional waters delineation report be compiled for the entire Phase II Haul Road Project Area (hereafter referred to as the Project Area). Therefore, this report has been prepared to summarize the results of stream and wetland delineation studies within the Project Area as completed by CEC and incorporates the Stantec findings as field verified and/or updated by CEC in March 2012.

Stantec completed their field reconnaissance portion of the wetland and stream delineation within the Project Area on August 22 and 23, 2011, and September 26 and 27, 2011. CEC conducted our field reconnaissance portion of the wetland and stream delineation within the Project Area on February 14, 15, and 28, 2012, as well as on March 20 and 21, 2012.

1.2 METHODOLOGY

This report identifies delineated wetlands, streams (ephemeral, intermittent, and perennial), and other waters within the Project Area. The methodology for conducting the wetland and stream delineation is presented below.

1.2.1 Wetlands

The delineation was based on CEC's professional judgment and interpretation of the technical criteria presented in the 1987 *Corps of Engineers Wetlands Delineation Manual* (USACE Manual) and the 2008 *Corps of Engineers Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region* (Eastern Mountains and Piedmont Supplement). The wetland boundaries, where present, were delineated using the routine onsite determination method described in the USACE Manual and Eastern Mountains and Piedmont Supplement, supplemented by the *National List of Plant Species That Occur in Wetlands: Northeast (Region 1)* (Reed 1988) and *Hydric Soils of the United States* (USDA 1991). CEC completed the following scope of services to identify and delineate wetland boundaries within the Project Area:

1. Office Data Review: CEC personnel reviewed the U.S. Geological Survey (USGS) topographic map (Figure 1), U.S. Department of Agriculture (USDA) Soil Survey of Marshall County, West Virginia (Figure 2), U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) map (Figure 3), and the corresponding county hydric soils list. These resources were used to identify potential wetland areas prior to conducting the site reconnaissance. Based on this information, there were no potential wetlands identified within the Project Area.
2. Site Reconnaissance: CEC performed the field reconnaissance portion of the wetland and stream delineation on February 14, 15, and 28, 2012, as well as on March 20 and 21, 2012. Stantec completed their field reconnaissance portion of the wetland and stream delineation within the Project Area on August 22 and 23, 2011, and September 26 and 27, 2011. The prior Stantec findings were field verified and/or updated as part of CEC's March 2012 field activities. First, plant communities present within the Project Area were identified. The dominant plant species within each community were identified and a determination was made on whether the plant community was dominated by hydrophytic (wetland) plants. If areas that appeared to be dominated by hydrophytic plants were identified within the Project Area, a representative test site was located within the plant community and soils were sampled using a spade shovel to determine if hydric soil indicators were present. Lastly, the test site was inspected to determine if indicators of wetland hydrology (ponding, soil saturation, etc.) were present. If a test site was determined to be within a wetland, further testing was performed to locate the wetland/non-wetland boundary and a second test site was established outside the wetland boundary to document conditions in the non-wetland area. If found, the boundaries of areas having the three necessary criteria were to be marked in the field with consecutively numbered plastic flagging tape and subsequently located using a sub-meter accuracy Trimble Geo-XT Global Positioning System (GPS) unit.

3. Data Collection: Eastern Mountain and Piedmont Supplement wetland determination data forms for the routine onsite determination method were completed for four representative locations within the Project Area boundaries (see Figure 4 for test site locations and Appendix A for the wetland determination data forms). The wetland determination data forms provide a record of the vegetation, soils, and hydrology observations used in making the wetland determinations.

   CEC and Stantec photographed the test site locations and wetland areas located within the Project Area; representative photographs are included in Appendix B.

1.2.2 Streams

Using professional judgment and field indicators such as flow, substrate composition, embeddedness, defined bed and bank, vegetation, and benthic macroinvertebrates, stream segments within the Project Area were classified into one of three stream types: ephemeral, intermittent, and perennial. The following descriptions are provided to clarify the different stream classifications.

- Ephemeral Stream – An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
- Intermittent Stream – An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow. Intermittent streams have also been defined as those streams which have no flow during sustained periods of no precipitation and which do not support life whose life history requires residence in flowing waters for a continuous period of at least 6 months.
- Perennial Stream – A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

The uppermost limit of an ephemeral stream is determined at the point where the stream loses its defined "bed and bank" or ordinary high water mark (OHWM) and a predominance of upland vegetation occurs in the channel. Under natural, undisturbed conditions, streams generally originate as headwater ephemeral drainages along the tops of ridges, transition into intermittent

stream systems, and eventually transition into perennial stream systems. CEC placed blue flagging tape with the words "Stream X start" at the locations where a defined bed and bank/OHWM began within streams within the Project Area. In order to determine the locations where ephemeral streams transitioned to intermittent streams, where applicable, CEC walked downstream until pooled or flowing water was observed in the stream channel. At the point where flowing water or a pool was observed, CEC excavated a test pit approximately 12 to 16 inches deep in the streambed outside of the area of the pool or flowing water in order to determine if groundwater was present. If groundwater was present within the test pit, CEC recorded the location of the test pit with the Trimble Geo-XT GPS unit and placed blue flagging tape with the words "Stream X Ephemeral/Intermittent Break Point" at this location.

Following the methodology outlined in the U.S. Environmental Protection Agency's (USEPA) *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition* (Barbour et al. 1999), CEC and/or Stantec completed the following forms for each stream identified within the Project Area (see Appendix C):

- Habitat Assessment Field Data Sheet – High Gradient Streams
- Physical Characterization/Water Quality Field Data Sheet
- Benthic Macroinvertebrate Field Data Sheet

Within the streams identified within the Project Area that contained sufficient amounts of water, CEC also used a Horiba U-52 multiparameter water quality meter to measure temperature, specific conductivity, dissolved oxygen, pH, and turbidity.

In addition to the above outlined forms, CEC and/or Stantec also completed field data sheets for streams following the methodology outlined in the USACE's *Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky*. These forms are provided in Appendix D. These forms were not completed for Streams E-1 and E-2, which were identified

by Stantec within the Project Area but determined later to be outside the limits of disturbance associated with construction of the Phase II Haul Road.

In addition to these forms, CEC documented the average OHWM width, average bankfull width, average depth of flowing water and/or pools (if present), and dominant substrates for each stream, with the exception of Streams E-1 and E-2.

The limit of each distinct stream segment was located in the field using a Trimble GeoXT GPS unit. The total stream segment lengths and stream designations are summarized in Section 2.6 and Table 2 of this report. Representative photographs of the streams are included in Appendix B. Additionally, scores assigned to each stream segment sampled following the USEPA and/or USACE high gradient stream sampling methodology are provided in Table 2.

2.0 FINDINGS

2.1 NATIONAL WETLANDS INVENTORY MAPS

NWI maps have been prepared by the USFWS based on high altitude infrared aerial photography and limited ground truthing. Wetlands and deep water habitats are identified on these maps and classified according to the system developed by Cowardin and co-workers (1979). The aerial photographs reflect conditions during the specific year and season the data were acquired and all wetlands may not be indicated.

The NWI maps for the Glen Easton, WV and the Powhatan Point, WV topographic quadrangles (Figure 3) do not identify waterbodies within the Project Area. One NWI mapped waterbody is shown as being present north of the Project Area in what is currently a fly ash reservoir. The NWI maps identify this waterbody as a lacustrine, limnetic, unconsolidated bottom, artificially, permanently flooded, diked/impounded wetland (L1UBKHh). CEC investigated this mapped NWI wetland during the field surveys in order to determine if it was a potential wetland and in order to verify that it is not within the boundary of the Project Area. The mapped NWI waterbody is actually the existing fly ash reservoir located north of the Project Area (Conner Run). Its location on the NWI map was field verified by CEC to be located outside of the limits of the Project Area. CEC did not excavate test pits within this waterbody.

2.2 SITE SOILS

Soils information for Marshall County, WV is available online via the Web Soil Survey through the USDA Natural Resources Conservation Service (NRCS). The NRCS (USDA 2010) identifies six soil types within the Project Area (Table 1, Figure 2). The NRCS does not list the six soil types as being hydric or as having hydric components.

TABLE 1 SOILS INFORMATION			
Soil Mapping Unit Symbol	**Soil Mapping Unit Name**	**Drainage Class**	**Hydric Component**
CmC	Culleoka-Dormont complex, 8 to 15 percent slopes	Well drained	Not Hydric
CmD	Culleoka-Dormont complex, 15 to 25 percent slopes	Well drained	Not Hydric
CpD	Culleoka-Dormont-Peabody complex, 15 to 25 percent slopes	Well drained	Not Hydric
CpE	Culleoka-Dormont-Peabody complex, 25 to 35 percent slops	Well drained	Not Hydric
CrF	Culleoka-Dormont-Peabody complex, 35 to 65 percent slopes, very stony	Well drained	Not Hydric
DrE	Dormont-Culleoka complex, 25 to 35 percent slopes	Moderately well drained	Not Hydric

The Project Area is mapped to consist of well drained to moderately well drained soils. Some of the soils within the Project Area have been disturbed by industrial activities. Therefore, some of the soils within the Project Area may no longer reflect the characteristics of the soil mapping units in the NRCS Web Soil Survey.

2.3 PLANT COMMUNITIES

The plant communities present within the Project Area consist of old field habitat, second growth forest, mixed second growth/early successional forest, riparian forest, and hay fields. Riparian forest was present in limited areas along the bottom of slopes adjacent to streams. One small area of mixed old field habitat/early successional forest located south of Gatts Ridge Road is used as open pasture (see Figure 5). Dominant plant species comprising these plant communities were identified and the USFWS wetland plant indicator status was determined according to Reed (1988). The USFWS has defined five wetland plant indicator categories, which include:

- Obligate Wetland (OBL – has >99% probability of occurring in wetlands);
- Facultative Wetland (FACW – has 66% to 99% chance of occurring in wetlands);
- Facultative (FAC – has 33% to 66% chance of occurring in wetlands);

- Facultative Upland (FACU – has 1 to 33% chance of occurring in wetlands); and
- Upland (UPL – has <1% chance of occurring in wetlands).

Plants classified as OBL, FACW, or FAC are considered to be wetland plants (hydrophytes) by the USFWS and USACE.

Old field habitat is present primarily on the edges of hayfields and selectively logged areas as well as within disturbed areas. Dominant species included the following: Allegheny blackberry (*Rubus allegheniensis*), wildgrape (*Vitis* sp.), multiflora rose (*Rosa multiflora*), tall goldenrod (*Solidago altissima*), black raspberry (*Rubus occidentalis*), Christmas fern (*Polystichum acrostichoides*), and orchardgrass (*Dactylis glomerata*).

Second growth forest is present within the majority of the Project Area. These areas are located primarily on steeper slopes and do not appear to have been logged recently. Dominant canopy/subcanopy species included the following: sugar maple (*Acer saccharum*), hickory (*Carya* spp.), white ash (*Fraxinus americana*), American beech (*Fagus grandifolia*), northern red oak (*Quercus rubra*), tulip poplar (*Liriodendron tulipifera*), American elm (*Ulmus americana*), white oak (*Quercus alba*), and black cherry (*Prunus serotina*). Dominant understory/shrub and herbaceous species included hophornbeam (*Ostrya virginiana*) and American hornbeam (*Carpinus caroliniana*), hawthorn (*Crataegus* sp.), gooseberry, (*Ribes* sp.) spicebush (*Lindera benzoin*), multiflora rose, sweetcicely (*Osmorhiza berteroi*), garlic mustard (*Alliaria petiolata*), marginal woodfern (*Dryopteris marginalis*), Christmas fern, and wood aster (*Symphyotrichum* sp.).

Mixed second growth/early successional forest is present throughout areas that have been logged or selectively logged recently. Dominant plant species in these habitats were similar to those found within the second growth forest habitats within the Project Area. However, the understory was significantly denser with multiflora rose, Allegheny blackberry, black raspberry and wildgrape.

Riparian forest is present along the base of slopes adjacent to portions of the intermittent streams present within the Project Area. Dominant canopy species in the riparian forest included the following: American elm, American sycamore (*Platanus occidentalis*), boxelder (*Acer negundo*), tulip poplar, sugar maple, and American beech. The understory included species found in the canopy except for American sycamore, as well as American hornbeam, boxelder, spicebush, gooseberry, and multiflora rose. Herbaceous species and vines common in these areas consisted of Christmas fern, marginal woodfern, wood aster, and wildgrape.

Hay field habitats were present along Gatts Ridge Road and near the residential areas. Dominant species in the hay fields included tall fescue (*Schedonorus phoenix*), narrowleaf plantain (*Plantago lanceolata*), common yarrow (*Achillea millifolium*), white clover (*Trifolium repens*), Queen Anne's lace (*Daucus carota*), common dandelion (*Taraxacum officinale*), and orchardgrass.

The locations of plant communities identified within the Project Area are shown on Figure 5.

2.4 HYDROLOGY

The Glen Easton, WV and the Powhatan Point, WV topographic quadrangle maps (1978) indicate that the majority of the Project Area is located within relatively steep terrain. Ground surface elevations within the Project Area are mapped to range from approximately 990 feet to 1,320 feet above mean sea level (AMSL). CEC assumes groundwater flow in the Project Area follows regional topography and generally flows north towards the existing fly ash reservoir (Conner Run).

2.5 WETLANDS

No wetlands were identified by CEC in the Project Area. One palustrine emergent/palustrine scrub shrub wetland (Wetland K), totaling approximately 0.14-acre in size, was identified by Stantec within the Project Area (Figure 4). Wetland K was not field verified by CEC because it is located outside of the currently planned limits of disturbance within the Project Area.

2.6 OTHER WATERS

Thirty interpreted ephemeral and intermittent streams were found within the Project Area (Figure 4). The entire reach of some streams identified within the Project Area were interpreted as being ephemeral, while other reaches were interpreted as being entirely intermittent. One stream had an upper reach interpreted as being ephemeral and a lower reach interpreted as being intermittent. Table 2 contains information on each stream documented within the Project Area. The stream designations used herein are sequential to the designations used in CEC's prior delineation report for the adjacent Mitchell Landfill area. Following Table 2 are narrative summaries of each stream. Representative photographs of each of the streams can be found in Appendix A, with photograph locations depicted on Figure 5. USEPA Rapid Bioassessment Protocol stream forms are provided in Appendix B, while USACE High-gradient Headwater Stream forms are provided in Appendix C.

TABLE 2
STREAM CHARACTERISTICS

Stream Segment Identifier	Classification	Approximate Length Within Project Area (Feet)	USEPA High Gradient Stream Score	USACE Functional Capacity Units (FCU)		
				Hydrology	Biogeo-chemical Cycling	Habitat
Stream 17	Ephemeral	97	108	0.95	0.98	0.98
Stream 18	Ephemeral	73	95	0.71	0.69	0.65
Stream 19	Ephemeral	159	96	0.81	0.96	0.87
Stream 20	Ephemeral	178	108	0.75	0.88	0.85
Stream 20	Intermittent	97	119	0.74	0.83	0.84
Stream 21	Ephemeral	157	105	0.78	0.81	0.74
Stream I-4	Intermittent	234	95	0.54	0.82	0.74
Stream E-14	Ephemeral	91	65	0.57	0.48	0.63
Stream E-14a	Ephemeral	169	90	0.66	0.82	0.59
Stream 22	Intermittent	511	110	0.60	0.82	0.64
Stream E-9	Ephemeral	421	105	0.63	0.80	0.64
Stream 24	Intermittent	424	124	0.63	0.77	0.73
Stream E-7	Ephemeral	313	112	0.60	0.78	0.83
Stream 25a	Ephemeral	94	88	0.48	0.60	0.68

TABLE 2 STREAM CHARACTERISTICS						
Stream Segment Identifier	**Classification**	**Approximate Length Within Project Area (Feet)**	**USEPA High Gradient Stream Score**	**USACE Functional Capacity Units (FCU)**		
				Hydrology	**Biogeo-chemical Cycling**	**Habitat**
Stream 26	Ephemeral	95	75	0.48	0.75	0.74
Stream 27	Ephemeral	37	95	0.71	0.81	0.86
Stream E-3	Ephemeral	609	104	0.65	0.66	0.57
Stream I-2	Intermittent	72	93	0.71	0.63	0.75
Stream E-4	Ephemeral	90	95	0.67	0.54	0.61
Stream E-5	Ephemeral	109	97	0.65	0.76	0.50
Stream E-5a	Ephemeral	59	82	0.61	0.45	0.63
Stream E-5b	Ephemeral	53	88	0.55	0.55	0.68
Stream E-1*	Ephemeral	60	108	-	-	-
Stream E-2*	Ephemeral	216	81	-	-	-
Stream E-6	Ephemeral	320	85	0.60	0.66	0.45
Stream E-8	Ephemeral	58	76	0.62	0.72	0.54
Stream E-10	Ephemeral	134	111	0.70	0.64	0.63
Stream E-11	Ephemeral	99	87	0.91	0.80	0.81
Stream E-12	Ephemeral	101	92	0.62	0.70	0.65
Stream E-13	Ephemeral	62	85	0.74	0.82	0.84
Total	--	**5,192**	--	--	--	--

* This stream was identified by Stantec, but has not been verified by CEC, as it was located outside of the currently planned limits of disturbance.

Stream 17 is an unnamed ephemeral stream, which originates in the northeastern portion of the Project Area, as shown on Figure 4. Stream 17 flows north through the Project Area. Approximately 97 linear feet of Stream 17 were found on the Project Area.

Stream 17 did not have pools or flowing water during the site visit and was characterized by an OHWM width that ranged from approximately 0.5 to 1 foot and an average bankfull width of 1.5 to 2 feet. Substrates consisted of silt, clay, and smaller amounts of cobble and gravel, with substantial leaf litter/woody debris present. During the site visits, CEC sampled one reach within Stream 17. No fish, amphibians, or benthic macroinvertebrates were observed within the sample reach of Stream 17. The USEPA High Gradient Stream score for the Stream 17 sample reach was 108.

Stream 18 is an unnamed ephemeral stream that originates in the northeastern portion of the Project Area and flows east. Approximately 73 linear feet of Stream 18 were found within the Project Area.

Stream 18 had an OHWM width of approximately 1 foot and an average bankfull width of approximately 2 feet. No flowing water or pools were observed within Stream 18 during the site visit. The substrates of Stream 18 consisted primarily of boulders, cobble, and silt. There was substantial leaf litter/woody debris present within the channel. No fish, amphibians, or benthic macroinvertebrates were observed within Stream 18 during the field survey. During the site visits, CEC sampled one reach within Stream 18. The USEPA High Gradient Stream score for this representative reach sampled within Stream 18 was 95.

Stream 19 is an unnamed ephemeral stream that originates within the northeastern portion of the Project Area and flows west. Approximately 159 linear feet of Stream 19 were found within the Project Area.

Stream 19 had an OHWM width of approximately 1 to 1.5 feet and an average bankfull width of approximately 2 to 3 feet. No flowing water or pools were observed during the site visit. The substrates of Stream 19 consisted of boulders, cobble, gravel, and silt. Leaf litter/woody debris was present in lesser amounts. No fish, amphibians, or benthic macroinvertebrates were observed within Stream 19 during the field survey. Large piles of household garbage were observed within the stream for at least 50 feet of its length beginning at its origin. During the site visits, CEC sampled one reach within Stream 19. The USEPA High Gradient Stream score for Stream 19 was 96.

Stream 20 is an unnamed stream that originates in the northern portion of the Project Area. Stream 20 contains an ephemeral portion and an intermittent portion. The ephemeral portion of Stream 20 consists of an unnamed ephemeral stream that originates within the northern portion of the Project Area. Stream 20 flows west. Approximately 178 linear feet of the ephemeral portion of Stream 20 were found within the Project Area. During the site visits, CEC sampled

one reach within the ephemeral portion of Stream 20 and one reach within the intermittent portion of Stream 20.

The ephemeral portion of Stream 20 had an OHWM of approximately 1.5 to 2 feet and an average bankfull width of approximately 3 to 4 feet. The channel was moist and one shallow pool with approximately 0.5 inches of water was observed at the confluence of Stream 20 and Stream 19 within the Project Area. The substrates of Stream 20 consisted of boulders, cobble, gravel, and silt, with moderate amounts of leaf litter/woody debris also present. No fish, amphibians, or benthic macroinvertebrates were observed within the ephemeral portion of Stream 20. The USEPA High Gradient Stream score for the ephemeral portion of Stream 20 was 108.

Approximately 97 linear feet of the intermittent portion of Stream 20 were found within the Project Area. The intermittent portion of Stream 20 had an OHWM of approximately 2 to 3 feet and an average bankfull width of 4 to 6 feet. Shallow flowing water was observed with the channel and the two pools observed during the March 21, 2012, site visit contained water approximately 2 to 3 inches deep. The substrates of the intermittent portion of Stream 20 consisted of boulders, cobble, flat boulders, gravel, and silt. Leaf litter/woody debris was present throughout the intermittent portion. No fish or amphibians were observed within the intermittent portion; however, benthic macroinvertebrates were observed and included midges (Family Chironomidae) and spring stoneflies (Order Plecoptera, Family Nemouridae). The USEPA High Gradient Stream score for the intermittent portion of Stream 20 was 119.

Stream 21 is a tributary of Stream 20 and is an unnamed ephemeral stream that originates in the northern portion of the Project Area. Stream 21 flows southwest to Stream 20 within the Project Area. Approximately 157 linear feet of Stream 21 were found within the Project Area.

Stream 21 and was characterized by an average OHWM width of 0.5 to 1 foot and an average bankfull width of approximately 1 foot. No flowing water or pools were observed during the site visit. The substrates of Stream 21 consisted of silt, boulders, and cobble, and were covered completely with leaf litter/woody debris. No fish, amphibians, or benthic macroinvertebrates

were observed within Stream 21 during the field survey. During the site visits, CEC sampled one reach within Stream 21. The USEPA High Gradient Stream score for this representative reach of Stream 21 was 105.

Stream I-4 is an unnamed intermittent stream that originates where water was observed flowing at the surface of the ground, as shown on Figure 4. Stream I-4 flows north toward the existing fly ash reservoir, (Conner Run). Approximately 234 linear feet of Stream I-4 were found within the Project Area.

Stream I-4 was characterized by an average OHWM width of 1.5 to 2 feet and an average bankfull width of approximately 3 to 5.5 feet within the sample reach. Slowly flowing water was observed within the stream and the pools observed within the sample reach contained roughly 1 to 3 inches of water. Stream I-4 substrates consisted of boulders, cobble, gravel, sand, and silt. CEC sampled one reach within Stream I-4. No fish or benthic macroinvertebrates were observed within the sample reach; however, one adult northern dusky salamander, (*Desmognathus fuscus*), was observed. The USEPA High Gradient Stream score for this representative reach of Stream I-4 was 95.

Stream E-14 is an unnamed ephemeral stream that originates at a head cut located adjacent to and north of Gatts Ridge Road, as shown on Figure 4. Stream E-14 flows north and becomes intermittent where water was observed flowing out of the ground. The stream was designated as Stream I-4 at this breakpoint. Approximately 91 linear feet of Stream E-14 were found within the Project Area.

Stream E-14 was characterized by an OHWM width ranging from 0.5 to 1 foot and by an average bankfull width of approximately 1.5 to 2 feet. No flowing water or pools were observed during the site visit. The substrates of Stream E-14 consisted of silt, gravel, and minimal amounts of cobble and boulders. Leaf litter/woody debris covered roughly 30 percent of the stream channel. Substrate material at the origin of Stream E-14 originated from Gatts Ridge Road. No water was observed within the channel. Additionally, no fish, benthic macroinvertebrates, or amphibians were observed within Stream E-14. During the site visits,

CEC sampled one reach within Stream E-14. The USEPA High Gradient Stream score for Stream E-14 was 65.

Stream E-14a is an unnamed ephemeral stream, which originates north of and adjacent to Gatts Ridge Road and flows parallel to E-14, as shown in Figure 4. Stream E-14a flows north to Stream I-4. Approximately 169 linear feet of Stream E-14a was found within the Project Area.

Stream E-14a was characterized by an OHWM width of 1 foot and an average bankfull width of approximately 1 to 3 feet. No water or pools were observed within the channel during the site visit. The substrates of Stream E-14a consisted of gravel, sand, silt, and cobble, with small amounts of boulders also present. The entire channel was covered with leaf litter/woody debris. CEC sampled one reach along Stream E-14a. No fish, amphibians, or benthic macroinvertebrates were observed within the sample reach. The USEPA High Gradient Stream score for Stream E-14a was 90.

Stream 22 is an unnamed intermittent stream, which originates at the confluence of two ephemeral streams (Stream E-10 and Stream E-13) in the middle portion of the Project Area, as shown on Figure 4. It was identified as Stream P-1 in Stantec's 2011 delineation report for the Phase II Haul Road study area. Based on field conditions observed by CEC on February 14 and March 21, 2012, CEC determined that Stream 22 is an intermittent stream. Stream 22 flows northwest within the Project Area to the existing fly ash reservoir (Conner Run). Approximately 446 linear feet of Stream 22 were found within the Project Area.

Stream 22 was characterized by an average OHWM width of approximately 2 to 3 feet and an average bankfull width of approximately 3 to 5 feet. Flowing water with an average depth of approximately 1 inch was observed by CEC within Stream 22. The pools observed during the site visit contained approximately 2 inches of water. CEC sampled one reach within Stream 22. No benthic macroinvertebrates, fish, or amphibians were observed within the sample reach during the February 2011 site visits. During the March 21, 2012, site visit, limited amounts of benthic macroinvertebrates (primarily stoneflies – Order Plecoptera) were observed within Stream 22. The substrates of Stream 22 consisted of boulders, bedrock, cobble, gravel, flat

boulders, and silt, with leaf litter/woody debris covering the entire channel. The USEPA High Gradient Stream score for Stream 22 was 110.

Stream E-9 consists of an unnamed ephemeral stream which originates in the central portion of the Project Area, as shown on Figure 4. Stream E-9 flows north northwest within the Project Area and drains to Stream 24. Approximately 95 linear feet of Stream E-9 were found within the Project Area. Stream E-9 had a moist channel and one small pool was present with approximately 1 to 1.5 inches of water.

The average OHWM width of Stream E-9 was approximately 1 foot and the average bankfull width was approximately 3 to 4 feet. Substrates within Stream E-9 consisted of bedrock, boulders, flat boulders, cobble, gravel, and silt as well as leaf litter/woody debris. CEC sampled one reach within Stream E-9. No fish, amphibians, or benthic macroinvertebrates were observed within the pool and/or sample reach of Stream E-9. The USEPA High Gradient Stream score for Stream E-9 was 105.

Stream 24 is an unnamed intermittent stream, which originates as an ephemeral stream in the middle portion of the Project Area, as shown on Figure 4. Stream 24 flows north within the Project Area to the fly ash reservoir (Conner Run). Approximately 424 linear feet of Stream 24 were found within the Project Area.

The intermittent portion of Stream 24 had an average OHWM width ranging from 4 to 6 feet and an average bankfull width ranging from 5 to 7 feet. Flowing water was observed within Stream 24 with an average depth of 1 to 3 inches in pools and an average depth of 0.5 to 1 inch in non-pool areas. The substrates of Stream 24 primarily consisted of boulders, flat boulders, cobble, gravel, silt, and bedrock. CEC sampled one reach within the Stream 24. There were no fish or benthic macroinvertebrates observed within Stream 24 during the site visit. One adult northern dusky salamander was observed within the sample reach of Stream 24. The USEPA High Gradient Stream score for this representative reach of the intermittent portion of Stream 24 was 124.

Stream E-7 consists of an unnamed ephemeral stream that originates in the central portion of the Project Area, as shown on Figure 4. Stream E-7 flows generally northwest to Stream 24. Approximately 251 linear feet of Stream E-7 were found within the Project Area.

During the site visit, Stream E-7 was characterized by an OHWM width ranging from approximately 2 to 3 feet and a bankfull width of approximately 3 to 4 feet. The channel was moist but no flowing water was observed within the channel during the site visit. The substrates of Stream E-7 consisted of boulders, flat boulders, bedrock, cobble, gravel, and silt, as well as leaf litter/woody debris. No fish, amphibians, or benthic macroinvertebrates were observed within Stream E-7 during the site visit. CEC sampled one reach within Stream E-7. The USEPA High Gradient Stream score for the representative reach of Stream E-7 was 112.

Stream 25a is an unnamed ephemeral stream that originates in the central portion of the Project Area and flows northwest to Stream E-7. Approximately 94 linear feet of Stream 25a were found within the Project Area. During the site visit, Stream 25a was characterized by an OHWM width of 1 foot and an average bankfull width of 2.5 feet. No flowing water or pools were observed within Stream 25a during the site visit. The substrates of Stream 25a consisted of silt, gravel, and cobble with boulders also present to a lesser extent. Leaf litter/woody debris covered the entire channel. No fish, amphibians, or benthic macroinvertebrates were observed within Stream 25a during the field survey. The USEPA High Gradient Stream score for the representative reach of Stream 25a was 88.

Stream 26 is an unnamed ephemeral stream that originates in the central portion the Project Area. Stream 26 flows generally north to Stream 24. Approximately 95 linear feet of Stream 26 were found within the Project Area. Stream 26 was characterized by an OHWM width of one foot. Stream 26 had a bankfull width of approximately 1 foot. The channel was moist but no flowing water or pools were observed within Stream 26 during the site visit. The substrates of Stream 26 consisted primarily of silt, boulders, cobble, and gravel, with leaf litter/woody debris present within the entire channel. No fish, amphibians, or benthic macroinvertebrates were observed within Stream 26 during the site visit. The USEPA High Gradient Stream score for Stream 26 was 75.

Stream 27 is an unnamed ephemeral stream that originates in the central portion the Project Area. Stream 27 flows north to the fly ash reservoir (Conner Run). Approximately 36 linear feet of Stream 27 were found within the Project Area.

Stream 27 was characterized by an OHWM width of approximately 1 foot and a bankfull width of approximately 1 foot. No flowing water or pools were observed within Stream 27 during the site visit. The substrates of Stream 27 consisted primarily of silt, gravel, boulders, flat boulders, and cobble, with leaf litter/woody debris covering the entire channel. CEC sampled one reach within the stream. No fish, amphibians, or benthic macroinvertebrates were observed within Stream 27 during the site visit. The USEPA High Gradient Stream score for Stream 27 was 95.

Stream E-3 is an unnamed ephemeral stream that originates in the western portion the Project Area. Stream E-3 flows north to the fly ash reservoir (Conner Run) along an old road bed. Approximately 609 linear feet of Stream E-3 were found within the Project Area.

CEC observed an OHWM width of approximately 1.5 feet and a bankfull width of approximately 3.5 feet and slowly flowing water within Stream E-3 on March 20, 2012. The substrates of Stream E-3 consisted primarily of silt, gravel, cobble, and sand, with leaf litter/woody debris covering approximately 20 percent of the channel. No fish, amphibians, or benthic macroinvertebrates were observed within Stream E-3 by CEC on March 20, 2012. The USEPA High Gradient Stream score for Stream E-3 was 104.

Stream I-2 is an unnamed intermittent stream that originates in the western portion of the Project Area. Stream I-2 flows north to the fly ash reservoir (Conner Run). Approximately 72 linear feet of Stream I-2 were found within the Project Area.

Stream I-2 was characterized by an OHWM width of approximately 2.5 feet and a bankfull width of approximately 4 feet. Shallow flowing water was observed within Stream I-2 during the March 20, 2012, site visit. The substrates of Stream I-2 consisted primarily of boulders, silt, gravel, and cobble, with leaf litter/woody debris covering approximately 5 percent of the

channel. No fish, or amphibians, were observed within Stream I-2 during the site visit. Benthic macroinvertebrates of the families Simuliidae, Ephemeroptera (genus Nemouridae), and Trichoptera (genus Rhycophilidae and Limnephilidae) were observed during the March 20, 2012, site visit. The USEPA High Gradient Stream score for Stream I-2 was 93.

Stream E-4 is an unnamed ephemeral stream that originates in the western portion of the Project Area. Stream E-4 flows north to Stream I-4. Approximately 90 linear feet of Stream E-4 were found within the Project Area.

Stream E-4 was characterized by an OHWM width of approximately 1 foot and a bankfull width of approximately 1.5 feet. The channel was moist, but no flowing water was observed within Stream E-4. The substrates of Stream E-4 consisted primarily of silt, boulders, cobble, and gravel, with a small amount of sand also present. Leaf litter/woody debris covered approximately 50 percent of the channel. No fish, amphibians or benthic macroinvertebrates were observed within Stream E-4 during the site visit. The USEPA High Gradient Stream score for Stream E-4 was 95.

Stream E-5 is an unnamed ephemeral stream that originates in the western portion of the Project Area. Stream E-5 flows north to Stream I-4. Approximately 108 linear feet of Stream E-5 were observed within the Project Area.

Stream E-5 was characterized by an OHWM width of approximately 1 foot and a bank to bank width of 1.5 feet. The upper portion of the channel was dry and the lower portion of the channel was moist. The substrates of Stream E-5 consisted of silt, boulders, cobble, and gravel. Leaf litter/woody debris covered approximately 60 percent of the channel reach. No fish or amphibians were observed within the stream during the site visit conducted by CEC on March 20, 2012. One benthic macroinvertebrate (a mayfly of the family Ephemeroptera, genus Nemouridae) was observed within the stream channel approximately 5 feet above the intermittent Stream I-4 break point. The USEPA High Gradient Stream score for Stream E-5 was 95.

Stream E-5a is an unnamed ephemeral stream that originates in the western portion of the Project Area. Stream E-5a flows north northwest to Stream E-5. Approximately 59 linear feet of Stream E-5a were observed within the Project Area.

Stream E-5a was characterized by an OHWM width of approximately 1 foot and a bank to bank width of 2 feet. No flow was observed within the channel. The substrates of Stream E-5a primarily consisted of silt, with very small amounts of gravel and sand also present. Leaf litter/woody debris covered approximately 60 percent of the channel reach. No fish, amphibians, or benthic macroinvertebrates were observed within the stream during the site visit conducted by CEC on March 20, 2012. The USEPA High Gradient Stream score for Stream E-5a was 85.

Stream E-5b is an unnamed ephemeral stream that originates in the western portion of the Project Area and drains to Stream E-5. Stream E-5b flows north/northwest to Stream E-5. Approximately 53 linear feet of Stream E-5b were observed within the Project Area.

Stream E-5b was characterized by an OHWM width of approximately 1 foot and a bank to bank width of 1.5 feet. Very low flow was observed within the channel. The substrates of Stream E-5b consisted of silt, gravel, and very small amounts of cobble. Leaf litter/woody debris covered approximately 80 percent of the channel reach. No fish, amphibians, or benthic macroinvertebrates were observed within the stream during the site visit conducted on March 20, 2012. The USEPA High Gradient Stream score for Stream E-5b was 88.

Stream E-6 is an unnamed ephemeral stream that originates in the central portion of the Project Area and drains north to Stream 24. Approximately 320 linear feet of Stream E-6 were observed within the Project Area.

Stream E-6 was characterized by an OHWM width of approximately 2 to 2.5 feet and a bank to bank width of 2.5 feet. Very low flow was observed within the channel. The substrates of Stream E-6 consisted of cobble, boulders, gravel, and silt. Leaf litter/woody debris covered approximately 10 percent of the channel reach. No fish or amphibians were observed within the stream during the site visit conducted on March 21, 2012. Benthic macroinvertebrates observed

included midges (Order Chironomidae), mayflies of the Order Ephemeroptera, and stoneflies of the Family Nemouriidae. It is assumed these macroinvertebrates were present due to the unusually wet summer of 2011. The USEPA High Gradient Stream score for Stream E-6 was 85.

Stream E-8 is an unnamed ephemeral stream that originates in the central portion of the Project Area and drains north to Stream 24. Approximately 58 linear feet of Stream E-8 were observed within the Project Area.

Stream E-8 was characterized by an OHWM width of approximately 1.5 feet and a bank to bank width of 2 feet. Very shallow flowing water was observed within the channel. The substrates of Stream E-8 consisted of silt, cobble, gravel, and sand. Leaf litter/woody debris covered approximately 40 percent of the channel reach. No fish or amphibians were observed within the stream during the site visit March 21, 2012. Benthic macroinvertebrates observed included mayflies and spring stoneflies. It is assumed these macroinvertebrates were present due to the unusually wet summer of 2011. The USEPA High Gradient Stream score for Stream E-8 was 92.

Stream E-10 is an unnamed ephemeral stream that originates in the central portion of the Project Area and drains north/northwest to Stream E-13. Approximately 134 linear feet of Stream E-10 were observed within the Project Area.

Stream E-10 was characterized by an OHWM width of approximately 1.5 to 3 feet and a bank to bank width of 2 to 4 feet. No flow was observed within the channel. The substrates of Stream E-10 consisted of silt, boulders, cobble, and gravel. Leaf litter/woody debris covered approximately 90 percent of the channel reach. No fish, amphibians or benthic macroinvertebrates were observed within the stream during the site visit conducted on March 21, 2012. The USEPA High Gradient Stream score for Stream E-10 was 111.

Stream E-11 is an unnamed ephemeral stream that originates in the central portion of the Project Area and drains west to Stream E-13. Approximately 99 linear feet of Stream E-11 were observed within the Project Area.

Stream E-11 was characterized by an OHWM width of approximately 1 foot and a bank to bank width of 2 to 3 feet. No flowing water was observed within the channel. The substrates of Stream E-11 consisted of silt and boulders. Leaf litter/woody debris covered approximately 75 percent of the channel reach. No fish or amphibians were observed within the stream during the site visit conducted on March 21, 2012. One benthic macroinvertebrate, a caddisfly of the Order Trichoptera/ Family Hydropsychidae, was observed within the stream channel beneath a moist rock. The USEPA High Gradient Stream score for Stream E-11 was 87.

Stream E-12 is an unnamed ephemeral stream that originates in the central portion of the Project Area and drains north to Stream E-13. Approximately 101 linear feet of Stream E-12 were observed within the Project Area.

Stream E-12 was characterized by an OHWM width of approximately 1.5 feet and a bank to bank width of 2 feet. No flowing water was observed within the channel. The substrates of Stream E-12 consisted of silt, boulders, cobble, and gravel. Leaf litter/woody debris covered approximately 50 percent of the channel reach. No fish, amphibians, or benthic macroinvertebrates were observed within the stream during the site visit conducted on March 21, 2012. The USEPA High Gradient Stream score for Stream E-12 was 92.

Stream E-13 is an unnamed ephemeral stream that originates in the central portion of the Project Area and drains north to Stream 22. Approximately 62 linear feet of Stream E-13 were observed within the Project Area.

Stream E-13 was characterized by an OHWM width of approximately 2 to 2.5 feet and a bank to bank width of 2.5 to 4 feet. A very limited amount of shallow flowing water was observed within the channel. The substrates of Stream E-13 consisted of boulders, cobble, gravel, and silt. Leaf litter/woody debris covered approximately 65 percent of the channel reach. No fish,

amphibians, or benthic macroinvertebrates were observed within the stream during the site visit conducted on March 21, 2012. The USEPA High Gradient Stream score for Stream E-13 was 85.

Streams E-1 and E-2 are ephemeral streams located within Stantec's 2011 Phase II Haul Road study area but outside of the currently planned limits of disturbance associated with the Project Area. Therefore, CEC did not field verify those streams or conduct additional sampling activities within them. USEPA Rapid Bioassessment Protocol data forms for Streams E-1 and E-2 were prepared by Stantec and are provided in Appendix C.

3.0 REGULATORY CONSIDERATIONS

3.1 MEETINGS WITH REGULATORY AGENCIES

A JD site visit and field review was conducted on March 21, 2012, and the attendees included representatives from AEP, the USACE, and CEC.

The wetland and stream delineation findings presented in this document were developed based upon CEC's professional training and experience, the results of the wetland and stream delineation site visits completed by Stantec and CEC in 2011 and 2012, and upon the results of the JD site visit and additional stream sampling activities completed by CEC on March 20 and 21, 2012.

3.2 REGULATORY PERMITTING

Jurisdictional waters of the United States, including wetlands, are defined by *33 CFR Part 328* and are protected by Sections 404 and 401 of the Clean Water Act (CWA) (*33 USC 1344*). Within this portion of West Virginia, the Regulatory Branch of the Pittsburgh District of the USACE administers Section 404 of the CWA. The WVDEP administers Section 401 of the CWA (a.k.a. the Water Quality Certification Program [WQC]). Impacts to jurisdictional waters/wetlands/open waters associated with proposed development require permits issued by these agencies.

Based on the results of the delineation, CEC and Stantec identified approximately 5,192 linear feet of stream within the Project Area, consisting of approximately 3,854 linear feet of ephemeral stream and approximately 1,338 linear feet of intermittent stream within the boundaries of the Project Area. Stantec identified one wetland, totaling approximately 0.14 acre in size, within the Project Area. This wetland is outside of the current planned limits of disturbance.

A formal JD will need to be conducted by the USACE to verify CEC's delineation findings, prior to permit issuance. The JD will identify those waters, including wetlands that are classified

as waters of the United States. Activities in waters of the United States will be regulated by the USACE and WVDEP under the CWA. The streams and wetland identified herein within the Project Area must be reviewed for potential consideration as waters of the United States. However, as seen in Appendix E, the USACE previously determined that the Conner Run drainage no longer exhibits a significant nexus to the Ohio River, a Traditional Navigable Water (TNW). Therefore, it is possible that the streams and wetland identified within the Project Area may not be considered jurisdictional by the USACE due to their potential lack of a significant nexus to a TNW.

Two types of Section 404 CWA permits have been implemented by the USACE – Nationwide Permits (NWPs) and Individual Section 404 Permits, which are both utilized in conjunction with WVDEP 401 WQCs. The purpose of NWPs is to protect the aquatic environment and public interest while authorizing activities that have minimal individual and cumulative adverse effects on the aquatic environment. When impacts to waterbodies are greater than allowed by NWPs, an Individual Section 404 Permit and Individual 401 WQC are typically required. The Individual Permit and Individual 401 WQC application and approval process is significantly more involved relative to the NWP process, and requires interaction and review by a number of federal and state agencies, as well as opportunities for public comment. Based on conversations with AEP regarding proposed landfill construction and operation activities, it is anticipated that impacts to jurisdictional streams and wetlands within the Mitchell Landfill, would require Individual Section 404 Permit and individual section 401 WQC permit applications. Should the USACE determine the streams and wetland in the Phase II Haul Road Project area are jurisdictional, these waters would require Individual Section 404 and Individual Section 401 permitting. Individual permit applications would be required because stream impacts within the Mitchell Landfill and Phase II Haul Road Project Area would exceed the thresholds authorized under applicable NWPs.

Individual Section 401/404 Permits require a sequencing review, which requires the permit applicant to demonstrate that the project purpose cannot be accomplished without impacting wetlands and other jurisdictional waters to the extent practicable. If this can be demonstrated, then the applicant is required to further demonstrate that the scope of the project has been revised

alternatives analysis be performed, and that the alternatives analysis must address other potential sites. Alternative site plans which attempt to avoid or minimize jurisdictional water impacts must be developed and evaluated. The regulatory agencies will only consider mitigation of jurisdictional water impacts after satisfactory completion of the sequencing requirements. A mitigation plan will be required for unavoidable impacts to jurisdictional streams and wetlands.

4.0 CONCLUSIONS

Approximately 5,192 linear feet of stream consisting of 3,854 linear feet of ephemeral stream and 1,338 linear feet of intermittent stream were identified within the Project Area. Stantec identified one wetland, totaling approximately 0.14 acre in size, within the Project Area. This wetland is outside of the current planned limits of disturbance. Stream and wetland locations are shown on Figure 4.

5.0 LEVEL OF CARE

The jurisdictional waters delineation services performed by CEC were conducted in a manner consistent with the criteria contained in the USACE Manual and Eastern Mountain and Piedmont Supplement and with the level of care and skill ordinarily exercised by members of the environmental consulting profession practicing contemporaneously under similar conditions in the locality of the project. It must be recognized that the wetland and stream delineation was based on field observations and CEC's professional interpretation of the criteria in the USACE Manual and corresponding supplement at the time of our field visits. Jurisdictional water determinations may change subsequent to CEC's delineation based on changes in the regulatory criteria, seasonal variations in hydrology, alterations to drainage patterns and other human activities and/or land disturbances.

CEC has relied on the accuracy of the information presented in the referenced Stantec report and assumes the presented information is valid. While CEC has field verified and/or updated pertinent aspects of the Stantec findings as part of our March 2012 field activities, CEC has no responsibility for the accuracy of the information contained therein.

6.0 REFERENCES

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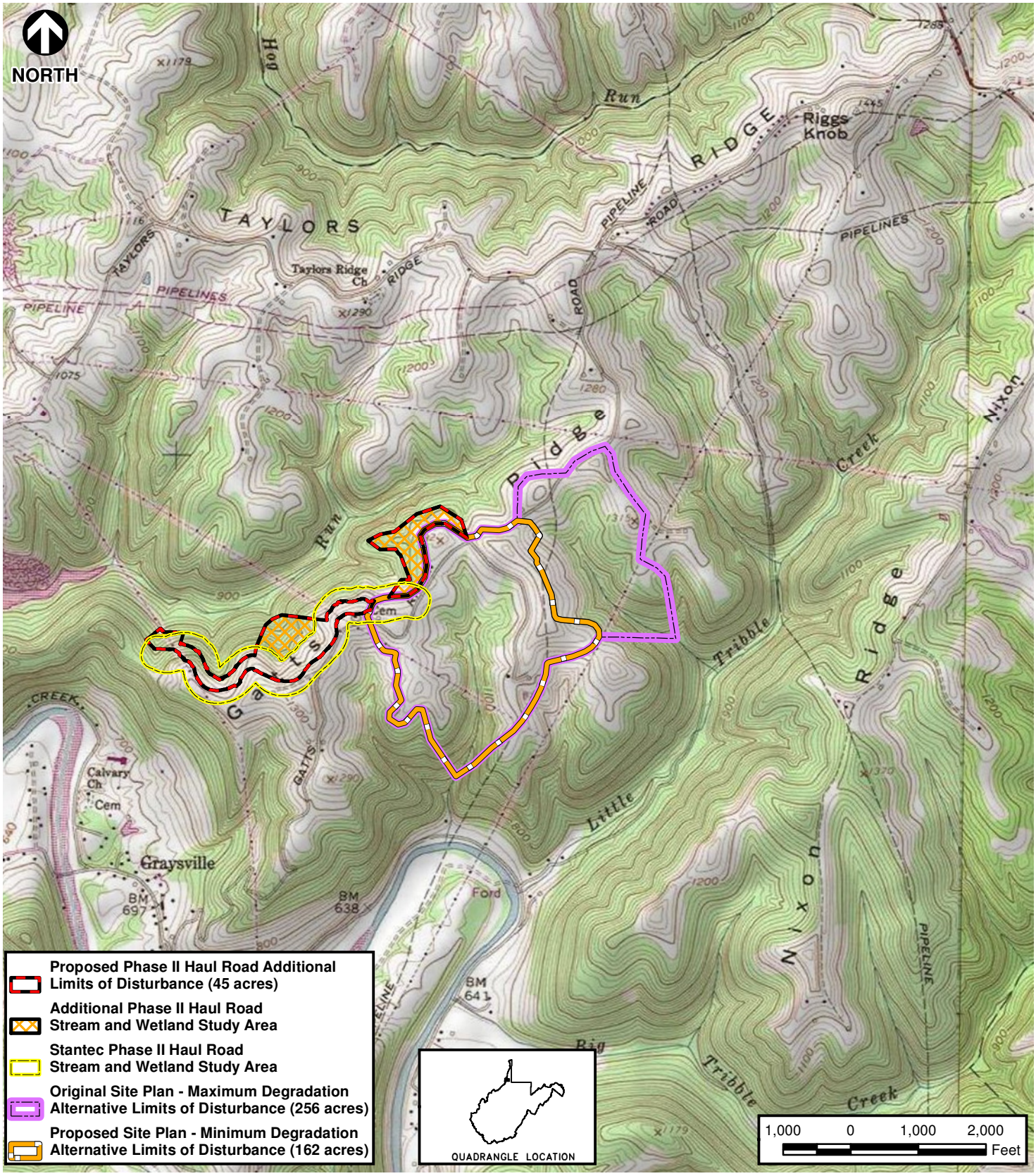
FIGURES



SOURCE: PORTION OF THE USGS 7.5-MINUTE SERIES TOPOGRAPHIC QUADRANGLE MAP - GLEN EASTON, WV - 1978 AND POWHATAN POINT, WV - 1978.

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PHASE II HAUL ROAD PROJECT
GATTS RIDGE ROAD
CRESAP, MARSHALL CO., WEST VIRGINIA

SITE LOCATION MAP

DRAWN BY:	MJB	CHECKED BY:	DJG	APPROVED BY:	JEZ*	FIGURE NO:	1
DATE:	MARCH 30, 2012	DWG SCALE:	1 " = 2,000 '	PROJECT NO:	110-416.8000		

Signature on File *

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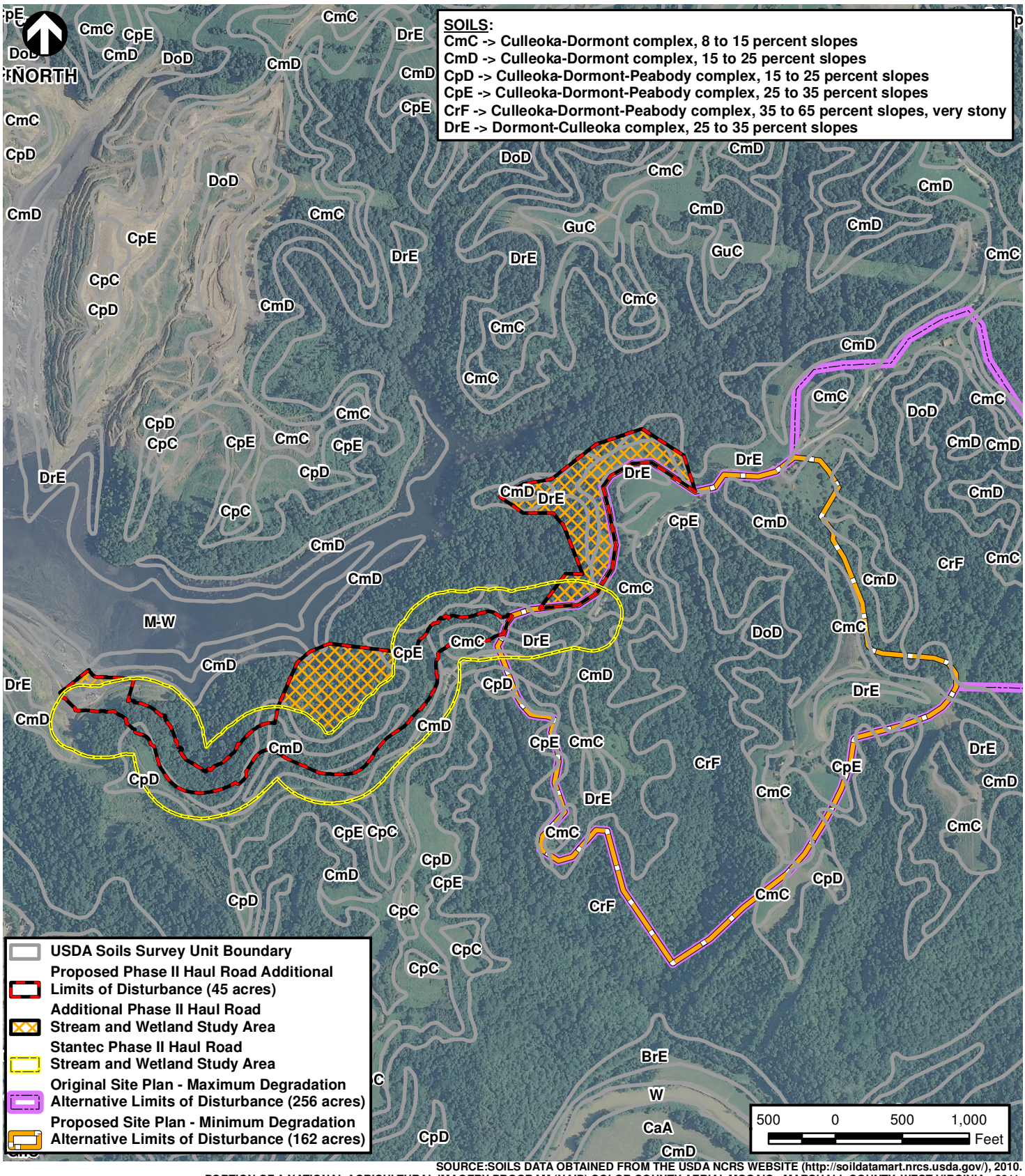

SOURCE:SOILS DATA OBTAINED FROM THE USDA NCRS WEBSITE (http://soildatamart.nrcs.usda.gov/), 2010.
PORTION OF A NATIONAL AGRICULTURAL IMAGERY PROGRAM (NAIP) COLOR COUNTY AERIAL MOSAIC - MARSHALL COUNTY, WEST VIRGINIA - 2011.

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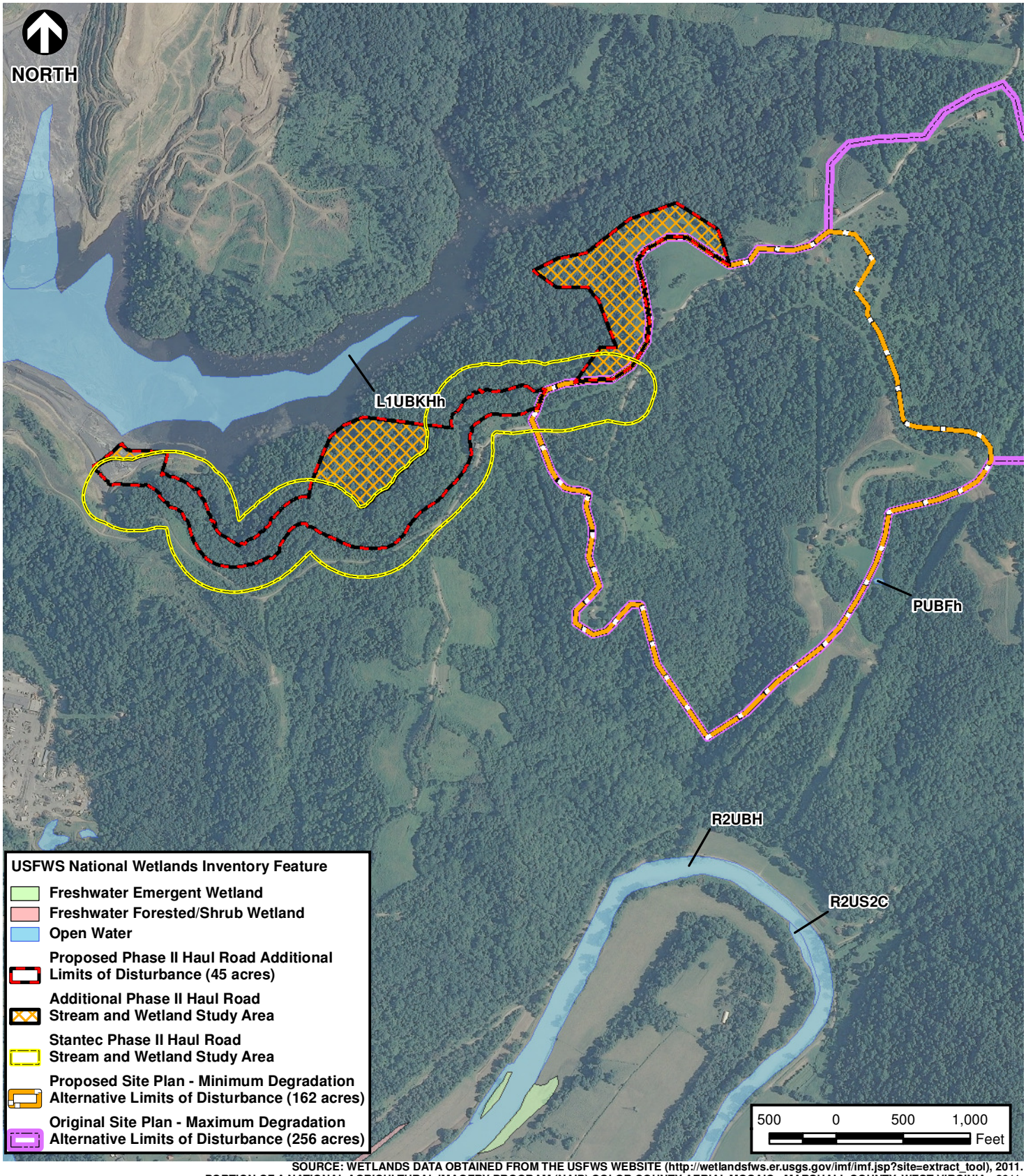
USDA SOIL SURVEY MAP

DRAWN BY:	MJB	CHECKED BY:	DJG	APPROVED BY:	JEZ*	FIGURE NO:	2
DATE:	MARCH 30, 2012	DWG SCALE:	1 " = 1,000 '	PROJECT NO:	110-416.8000		

Signature on File *



SOURCE: WETLANDS DATA OBTAINED FROM THE USFWS WEBSITE (http://wetlandsfws.er.usgs.gov/imf/imf.jsp?site=extract_tool), 2011.
PORTION OF A NATIONAL AGRICULTURAL IMAGERY PROGRAM (NAIP) COLOR COUNTY AERIAL MOSAIC - MARSHALL COUNTY, WEST VIRGINIA - 2011.

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NATIONAL WETLANDS INVENTORY MAP

DRAWN BY:	MJB	CHECKED BY:	DJG	APPROVED BY:	JEZ*	FIGURE NO:	3
DATE:	MARCH 30, 2012	DWG SCALE:	1 " = 1,000 '	PROJECT NO:	110-416.8000		

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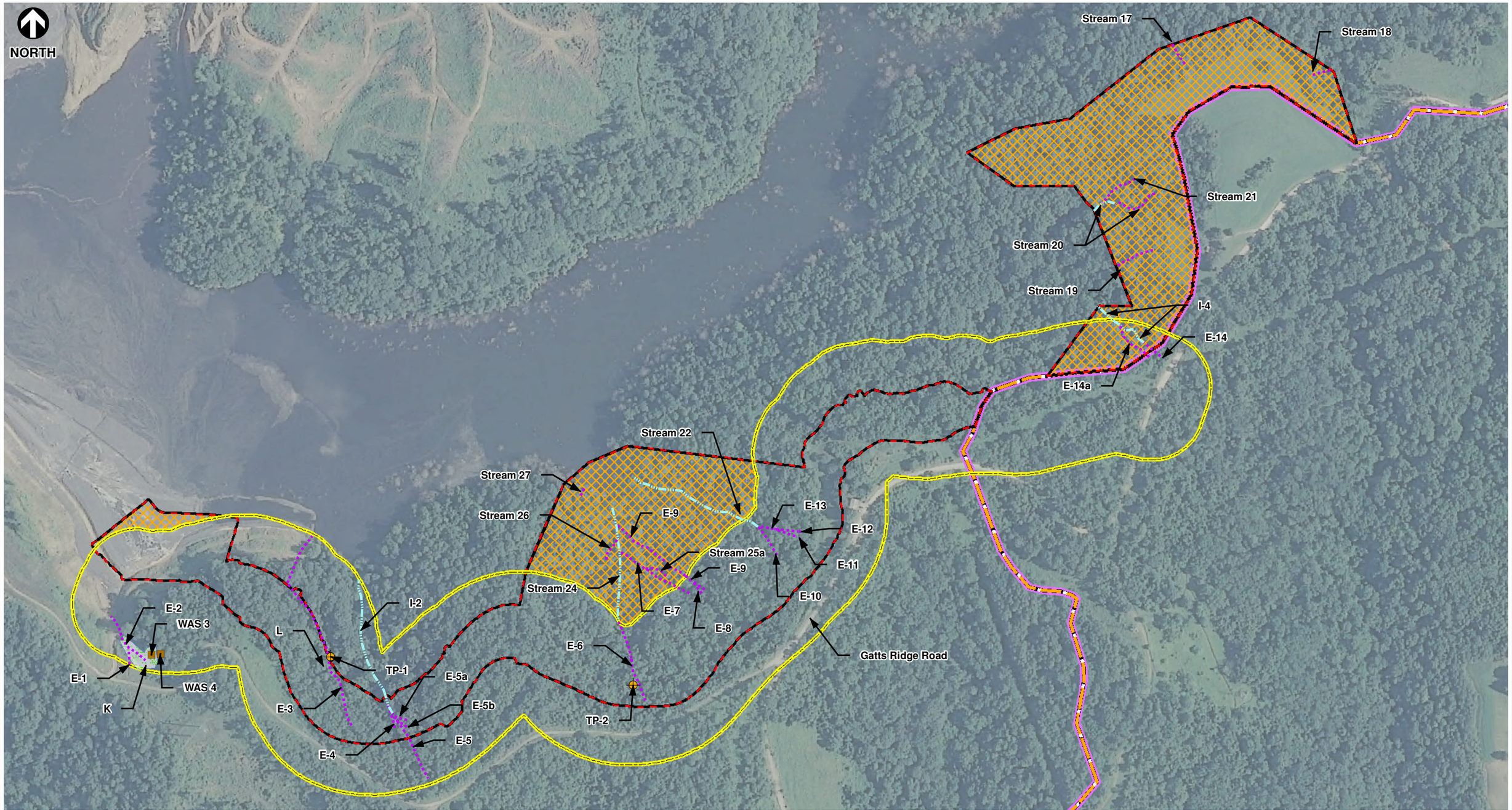

PORTION OF A NATIONAL AGRICULTURAL IMAGERY PROGRAM (NAIP) COLOR COUNTY AERIAL MOSAIC - MARSHALL COUNTY, WEST VIRGINIA - 2011.

- Wetland Determination Test Pit
- Wetland Determination Test Pit (Stantec 2011)
- Intermittent Stream
- Ephemeral Stream
- Additional Phase II Haul Road Stream and Wetland Study Area
- Stantec Phase II Haul Road Stream and Wetland Study Area
- Wetland Feature (Stantec 2011)
- Proposed Phase II Haul Road Additional Limits of Disturbance (45 acres)
- Proposed Site Plan - Minimum Degradation Alternative Limits of Disturbance (162 acres)
- Original Site Plan - Maximum Degradation Alternative Limits of Disturbance (256 acres)

NOTES:

- All CEC stream locations are approximate and based off of topographic interpetation from the AutoCAD file titled - "ML_ConnerRun&Plant_11-10-10_8388SF.dwg", June 26, 2011, and GPS data collected during CEC's February 14, 15, & 28, March 20 and 21, 2012.
  wetland and waterbody delineation site visits.
- Streams E-1 & E-2 and Wetland K shown within Stantec's Phase II Haul Road Stream and Wetland Study Area are for informational purposes only and have not been verified by CEC.

175 0 175 350 Feet

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JURISDICTIONAL WATERS DELINEATION MAP

DRAWN BY:	MJB	CHECKED BY:	DJG	APPROVED BY:	JEZ*	FIGURE NO:	4
DATE:	MARCH 30, 2012	DWG SCALE:	1 " = 350 '	PROJECT NO:	110-416.8000		

Signature on File *

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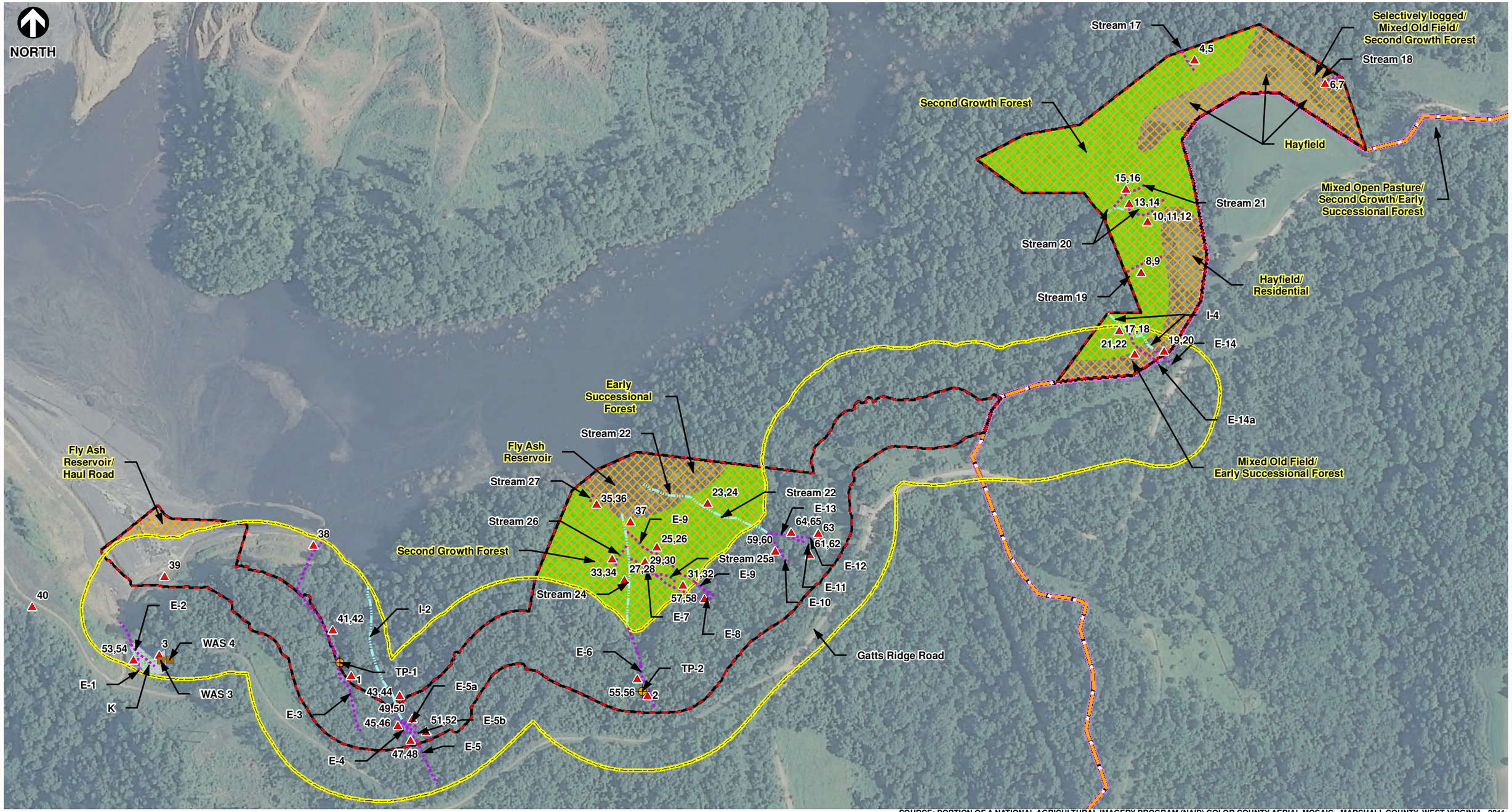

SOURCE: PORTION OF A NATIONAL AGRICULTURAL IMAGERY PROGRAM (NAIP) COLOR COUNTY AERIAL MOSAIC - MARSHALL COUNTY, WEST VIRGINIA - 2011.

- Approximate Photograph Location
- Wetland Determination Test Pit
- Wetland Determination Test Pit (Stantec 2011)
- Intermittent Stream
- Ephemeral Stream
- Additional Phase II Haul Road Stream and Wetland Study Area
- Stantec Phase II Haul Road Stream and Wetland Study Area
- Second Growth Forest
- Approximate Wetland Feature (Stantec 2011)
- Proposed Phase II Haul Road Additional Limits of Disturbance (45 acres)
- Proposed Site Plan - Minimum Degradation Alternative Limits of Disturbance (162 acres)
- Original Site Plan - Maximum Degradation Alternative Limits of Disturbance (256 acres)

NOTES:

- All CEC stream locations are approximate and based off of topographic interpetation from the AutoCAD file titled - "ML_ConnerRun&Plant_11-10-10_8388SF.dwg", June 26, 2011, and GPS data collected during CEC's February 14, 15, & 28, March 20 and 21, 2012.
  wetland and waterbody delineation site visits.
- Streams E-1 & E-2 and Wetland K shown within Stantec's Phase II Haul Road Stream and Wetland Study Area are for informational purposes only and have not been verified by CEC.

175 0 175 350 Feet

Civil & Environmental Consultants, Inc.
4274 Glendale-Milford Road - Cincinnati, OH 45242
513-985-0226 - 800-759-5614
www.cecinc.com

AMERICAN ELECTRIC POWER CO., INC.
PROPOSED MITCHELL LANDFILL
PHASE II HAUL ROAD PROJECT
GATTS RIDGE ROAD
CRESAP, MARSHALL CO., WEST VIRGINIA

PHOTOGRAPH LOCATIONS MAP

DRAWN BY:	MJB	CHECKED BY:	DJG	APPROVED BY:	JEZ*	FIGURE NO:	5
DATE:	MARCH 30, 2012	DWG SCALE:	1 " = 350 '	PROJECT NO:	110-416.8000		

Signature on File *

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APPENDIX A

WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: Mitchell Haul Road Expansion, Phase 2 **City/County:** Marshall **Sampling Date:** 22-Aug-11

Applicant/Owner: AEP **State:** WV **Sampling Point:** **WAS 3**

Investigator(s): J.Edwards, A.Sjollema **Section, Township, Range:** S ___ T ___ R ___

Landform (hillslope, terrace, etc.): Channel (active) **Local relief (concave, convex, none):** concave **Slope:** 3.0% / 1.7 °

Subregion (LRR or MLRA): LRR N **Lat.:** 38.8245 **Long.:** -80.7897 **Datum:** WVSPN

Soil Map Unit Name: Culleoka-Dormont-Peabody complex, 35 to 65 percent slopes, very stony **NWI classification:** PFO

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	
Water Table Present?	Yes ○ No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches): 0	

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Drains via E-3 to Conner Run Impoundment.

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: WAS 3

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Acer negundo	25	☑	41.7%	FAC+
2. Ulmus americana	20	☑	33.3%	FACW-
3. Acer saccharum	15	☑	25.0%	FACU-
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	60	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: 15 ft)				
1. Lindera benzoin	15	☑	100.0%	FACW-
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10	0	☐	0.0%	
	15	= Total Cover		

Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5 ft)				
1. Impatiens capensis	40	☑	44.4%	FACW
2. Polygonum virginianum	25	☑	27.8%	FAC
3. Podophyllum peltatum	10	☐	11.1%	FACU
4. Viola cucullata	5	☐	5.6%	FACW+
5. Polygonum pensylvanicum	5	☐	5.6%	FACW
6. Athyrium filix-femina	5	☐	5.6%	FAC
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	90	= Total Cover		

Woody Vine Stratum (Plot size: 15 ft)				
1. Vitis labrusca	15	☑	75.0%	FACU
2. Parthenocissus quinquefolia	5	☑	25.0%	FACU
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	20	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 62.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	85	x 2 =	170
FAC species	55	x 3 =	165
FACU species	45	x 4 =	180
UPL species	0	x 5 =	0
Column Totals:	185 (A)		515 (B)

Prevalence Index = B/A = 2.784

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WAS 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-2	10YR	4/3	100%						Silty Clay	
2-8	10YR	4/2	95%	10YR	5/6	5%	C	M	Silty Clay	
8-16	10YR	4/2	85%	10YR	5/6	15%	C	M	Silty Clay	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: Mitchell Haul Road Expansion, Phase 2 **City/County:** Marshall **Sampling Date:** 22-Aug-11

Applicant/Owner: AEP **State:** WV **Sampling Point:** **WAS 4**

Investigator(s): J.Edwards, A.Sjollema **Section, Township, Range:** **S** ____ **T** ____ **R** ____

Landform (hillslope, terrace, etc.): Hillside **Local relief (concave, convex, none):** concave **Slope:** 10.0% / 5.7 °

Subregion (LRR or MLRA): LRR N **Lat.:** 39.8244 **Long.:** -80.7897 **Datum:** WVSPN

Soil Map Unit Name: Culleoka-Dormont-Peabody complex, 35 to 65 percent slopes, very stony **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches): ____	
Water Table Present?	Yes ○ No ◉	Depth (inches): ____	**Wetland Hydrology Present?** Yes ○ No ◉
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches): ____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five/Four Strata)- Use scientific names of plants.

Sampling Point: WAS 4

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Acer saccharum	25	☑	55.6%	FACU-
2. Prunus serotina	15	☑	33.3%	FACU
3. Crataegus crus-galli	5	☐	11.1%	FACU
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
	45	= Total Cover		

Sapling-Sapling/Shrub Stratum (Plot size: 15 ft)				
1. Lindera benzoin	15	☑	60.0%	FACW-
2. Rubus occidentalis	5	☑	20.0%	UPL
3. Crataegus crus-galli	5	☑	20.0%	FACU
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10	0	☐	0.0%	
	25	= Total Cover		

Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5 ft)				
1. Polygonum virginianum	10	☑	50.0%	FAC
2. Viola cucullata	5	☑	25.0%	FACW+
3. Athyrium filix-femina	5	☑	25.0%	FAC
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	20	= Total Cover		

Woody Vine Stratum (Plot size: 15 ft)				
1. Parthenocissus quinquefolia	5	☑	100.0%	FACU
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
	5	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 44.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	20	x 2 =	40	
FAC species	15	x 3 =	45	
FACU species	55	x 4 =	220	
UPL species	5	x 5 =	25	
Column Totals:	95	(A)	330	(B)

Prevalence Index = B/A = 3.474

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definition of Vegetation Strata:

Four Vegetation Strata:

Tree stratum – Consists of woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub stratum – Consists of woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb stratum – Consists of all herbaceous (non-woody) plants, regardless of size, and all other plants less than 3.28 ft tall.

Woody vines – Consists of all woody vines greater than 3.28 ft in height.

Five Vegetation Strata:

Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling stratum – Consists of woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub stratum – Consists of woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody species, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vines – Consists of all woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: WAS 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type [1]	Loc[2]	Texture	Remarks
0-2	10YR	4/4	100%						Silty Clay	
2-6	10YR	4/3	95%	10YR	5/6	5%	C	M	Silty Clay	
6-16	10YR	4/3	90%	10YR	56	10%	C	M	Silty Clay	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ 2 cm Muck (A10) (LRR N)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1) (LRR N, MLRA 147, 148)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Polyvalue Below Surface (S8) (MLRA 147,148)
- ☐ Thin Dark Surface (S9) (MLRA 147, 148)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ☐ Umbric Surface (F13) (MLRA 136, 122)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 148)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10) (MLRA 147)
- ☐ Coast Prairie Redox (A16) (MLRA 147,148)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

N (39.824734 N
80.789677 W)

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: AEP Mitchell Landfill (Phase III Haul Rd) City/County: Cresap / Marshall Sampling Date: 21 Mar 2012

Applicant/Owner: AEP State: WV Sampling Point: TP #1

Investigator(s): D. Cooper / D. York Section, Township, Range: N/A (Area Not Part of Public Land Survey)

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Almost flat ledge Slope (%): 5%

Subregion (LRR or MLRA): LRR Lat: 39 49 28.727 Long: 80 47 22.581 Datum: _____

Soil Map Unit Name: CrF, Culleoka-Dormont-Peabody complex, 35-65% slope NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	Is the Sampled Area within a Wetland? Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Photo # 165
22 March 2012

Pg 2
AEP Mitchell Landfill Phase II Haul Rd

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: TP#1

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	50	YES	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	50 = Total Cover		

Sapling/Shrub Stratum (Plot size: _____)			
1. Acer negundo	20	YES	FAC
2. Rosa multiflora	20	YES	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40 = Total Cover		

Herb Stratum (Plot size: _____)			
1. Dryopteris marginalis	1	No	FACU
2. Polystichum Acrostichoides	2	No	FACU
3. Acer negundo	15	yes	FAC
4. Galium triflorum? (6 leaflets, slightly hairy)	1	No	FACU
5. Cardamine concatenata	5	No	FACU
6. cardamine pensylvanica	30	yes	OBL
7. stellaria media	30	yes	UPL
8. Viola sororia	10	yes	FAC
9. Claytonia virginica	1	No	FACU
10. Hydrophyllum virginianum	3	No	FAC
11.			
12.			
	98 = Total Cover		

(Rubus?)

Woody Vine Stratum (Plot size: _____)			
1. Vitis sp. (No leaves/tendrils)	50	YES	?
2.			
3.			
4.			
5.			
6.			
	50 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 63% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	1	x 1 = 1
FACW species	—	x 2 = —
FAC species	5	x 3 = 15
FACU species	6	x 4 = 24
UPL species	1	x 5 = 5
Column Totals:	13 (A)	45 (B)

Prevalence Index = B/A = 3.46

36

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Site is located @ toe of slope below old rd bed on ledge. No seeps located. Hydrology appears to originate from precipitation & stream overflow during precipitation event.

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AEP Mitchell Landfill Phase II haul Rd

SOIL

Sampling Point: TP#1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 3/2	100	—	—	—	—	silt loam	
2-16	10yr 4/3	100	—	—	—	—	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) (LRR N)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (MLRA 147, 148)
- ___ Thin Dark Surface (S9) (MLRA 147, 148)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- ___ Umbric Surface (F13) (MLRA 136, 122)
- ___ Piedmont Floodplain Soils (F19) (MLRA 148)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (MLRA 147)
- ___ Coast Prairie Redox (A16) (MLRA 147, 148)
- ___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

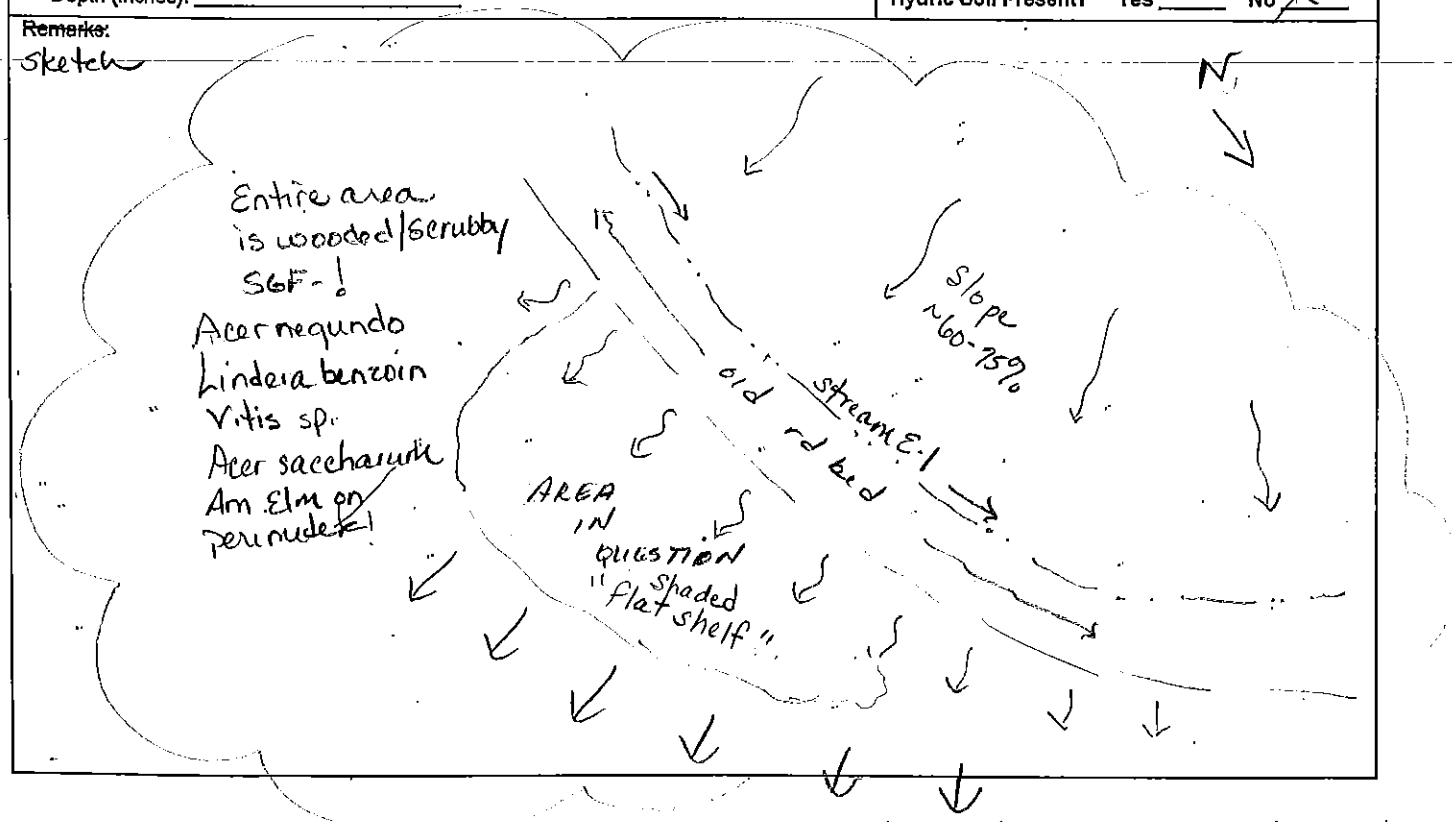
Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

Sketch



N (39.824503N 80.785241W)

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: AEP Mitchell Landfill Phase II Ext City/County: Cresap, Marshall CO Sampling Date: 22 Mar 2012

Applicant/Owner: AEP State: WV Sampling Point: TP-2

Investigator(s): D Godec / D. York Section, Township, Range: N/A (Area Not part of Public Land Survey)

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Side slope Slope (%): 40%

Subregion (LRR or MLRA): LLR Lat: 39 49 28.741 Long: 80 47 08.445 Datum: _____

Soil Map Unit Name: Cond, Culleoka-Dormont-complex, 15-25% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, Important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	Is the Sampled Area within a Wetland? Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 1/4"
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (Includes capillary fringe)	Yes X	No _____	Depth (inches): 0-2"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface saturation
rec'd > 1" rain 2 days prior to site visit
2 trees w/ buttressing –
Periodic seep.
Photo #164 – 22 March 2012

(Note – TP filled w/ water from surface flow not capillary fringe or high water table)

ACP Mitchell Landfill
Phase II Hwy 1 KL

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: TP-2

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	40	YES	FAC
2. Fraxinus americana	15	No	FACW
3. Acer saccharum	30	yes	FACU
4.			
5.			
6.			
7.			
8.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: _____)			
1. Rosa multiflora	20	yes	FACU
2. Sambucus canadensis	5	No	FACW
3. Acer negundo	15	yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40	= Total Cover	

Herb Stratum (Plot size: _____)			
1. Alliaria petiolata	15	yes	FACU
2. Aster sp. (possibly solidago rosette)	2	No	
3. Unknown grass (v. small)	3	No	
4. Viola sorbria	10	No	FAC
5. Cardamine pensylvanicum	20	yes	OBL
6. Stellaria media	20	yes	UPL
7.			
8.			
9.			
10.			
11.			
12.			
	70	= Total Cover	

Woody Vine Stratum (Plot size: _____)			
1. Vitis sp.	10	yes	?
2.			
3.			
4.			
5.			
6.			
	10	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: .50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	1	x 1 = 1
FACW species	1	x 2 = 2
FAC species	3	x 3 = 6
FACU species	4	x 4 = 16
UPL species	1	x 5 = 5
Column Totals:	10 (A)	30 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.)

AEP Mitchell Landfill
Phase II Haul Rd.

SOIL

Sampling Point: TP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10yr 4/2	100	—	—	—	—	silt loam	very silty
5-12	10yr 4/3	100	—	—	—	—	silt loam	Gravelly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

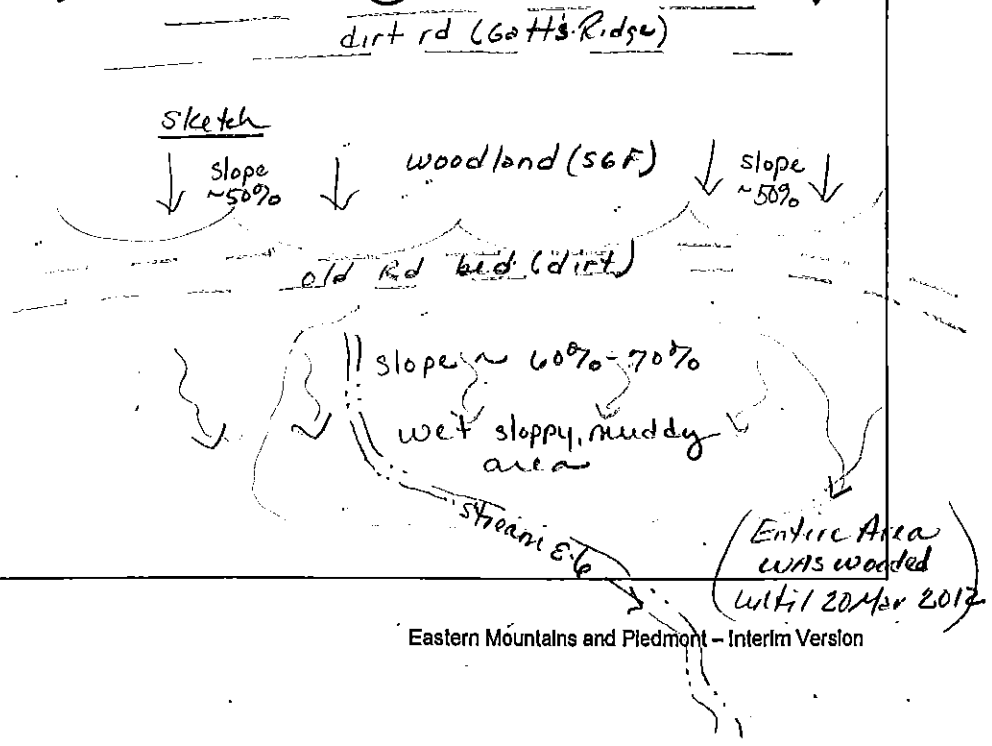
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

- Soil is saturated to 2" inches - Not below 2"
- WATER is running into TP from surface only
- refusal @ 12"

Area has been cleared



APPENDIX B

SITE PHOTOGRAPHS

Photograph 1. View of Test Pit 1. Photograph taken facing south.

Photograph 2. View of Test Pit 2. Photograph taken facing south.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 3. View of Wetland K. Photograph taken facing north-northwest. (Stantec. 2011)

Photograph 4. Upstream view of View of Stream 17. Photograph taken facing upstream.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 5. View of Stream 17. Photograph taken facing downstream.

Photograph 6. View of Stream 18. Photograph taken facing upstream.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 7. View of Stream 18. Photograph taken facing downstream.

Photograph 8. View of Stream 19. Photograph taken facing upstream.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 9. View of Stream 19. Photograph taken facing downstream.

Photograph 10. View of the ephemeral portion of Stream 20. Photograph taken facing upstream.

Photograph 11. View of the ephemeral portion of Stream 20. Photograph taken facing downstream.

Photograph 12. View of spring box located along Stream 20.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 13. View of the intermittent portion of Stream 20. Photograph taken facing upstream.

Photograph 14. View of intermittent portion of Stream 20. Photograph taken facing downstream.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 15. View of Stream 21. Photograph taken facing upstream.

Photograph 16. View of Stream 21. Photograph taken facing downstream.

American Electric Power Co., Inc.
Proposed Mitchell Landfill Phase II Haul Road Project
Cresap, Marshall County, West Virginia
CEC Project No. 110-416.8100
CEC Photographs taken on February 14, 15, and 28, March 20, and 21, 2012
Stantec Photographs taken on August 22, and 23, 2012

Photograph 17. View of Stream I-4. Photograph taken facing upstream.

Photograph 18. View of Stream I-4. Photograph taken facing downstream.

Photograph 19. View of Stream E-14. Photograph taken facing upstream.

Photograph 20. View of Stream E-14. Photograph taken facing downstream.

Photograph 21. View of Stream E-14a. Photograph taken facing upstream.

Photograph 22. View of Stream E-14a. Photograph taken facing downstream

Photograph 23. View of Stream 22. Photograph taken facing upstream.

Photograph 24. View of Stream 22. Photograph taken facing downstream.

Photograph 25. View of Stream E-9. Photograph taken facing upstream.

Photograph 26. View of Stream E-9. Photograph taken facing downstream.

Photograph 27. View of Stream 24. Photograph taken facing upstream.

Photograph 28. View of Stream 24. Photograph taken facing downstream.

Photograph 29. View of Stream E-7. Photograph taken facing upstream.

Photograph 30. View of Stream E-7. Photograph taken facing downstream.

Photograph 31. View of Stream 25a. Photograph taken facing upstream.

Photograph 32. View of Stream 25a. Photograph taken facing downstream.

Photograph 33. View of Stream 26. Photograph taken facing upstream.

Photograph 34. View of Stream 26. Photograph taken facing downstream.

Photograph 35. View of Stream 27. Photograph taken facing upstream.

Photograph 36. View of Stream 27. Photograph taken facing downstream.

Photograph 37. View of existing fly ash reservoir. Photograph taken facing north.

Photograph 38. View of existing fly ash reservoir (Conner Run). Photograph taken facing north.

Photograph 39. View of the existing fly ash reservoir (Conner Run). Photograph taken facing northwest toward the Phase II Haul Road expanded survey area located on the western portion of the Project Area.

Photograph 40. View of the existing fly ash reservoir (Conner Run). Photograph taken facing east toward the Phase II Haul Road expanded survey area on the western portion of the Project Area.

Photograph 41. View of Stream E-3. Photograph taken facing upstream.

Photograph 42. View of Stream E-3. Photograph taken facing downstream.

Photograph 43. View of Stream I-2. Photograph taken facing upstream.

Photograph 44. View of Stream I-2. Photograph taken facing downstream.

Photograph 45. View of Stream E-4. Photograph taken facing upstream.

Photograph 46. View of Stream E-4. Photograph taken facing downstream.

Photograph 47. View of Stream E-5. Photograph taken facing upstream.

Photograph 48. View of Stream E-5. Photograph taken facing downstream.

Photograph 49. View of Stream E-5a. Photograph taken facing upstream.

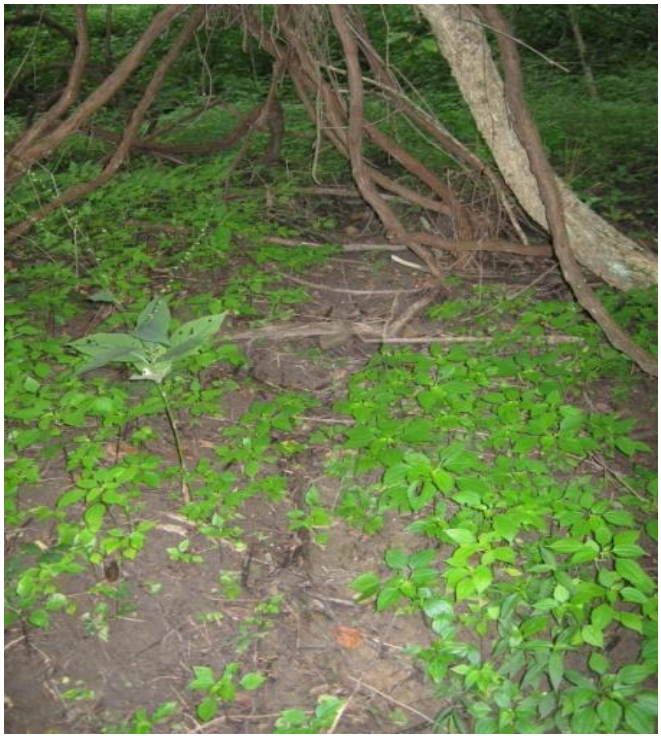
Photograph 50. View of Stream E-5a. Photograph taken facing downstream.

Photograph 51. View of Stream E-5b. Photograph taken facing upstream

Photograph 52. View of Stream E-5b. Photograph taken facing downstream

Photograph 53. View of Stream E-1. Photograph taken facing upstream (Stantec 2011).

Photograph 54. View of Stream E-1. Photograph taken facing downstream (Stantec 2011).



Photograph 55. View of Stream E-6. Photograph taken facing upstream (Stantec 2011).

Photograph 56. View of Stream E-6. Photograph taken facing downstream (Stantec 2011).

Photograph 57. View of Stream E-8. Photograph taken facing upstream (Stantec 2011).

Photograph 58. View of Stream E-8. Photograph taken facing downstream (Stantec 2011).

Photograph 59. View of Stream E-10. Photograph taken facing upstream (Stantec 2011).

Photograph 60. View of Stream E-10. Photograph taken facing downstream (Stantec 2011).

Photograph 61. View of Stream E-11. Photograph taken facing upstream (Stantec 2011).

Photograph 62. View of confluence of Stream E-11 and Stream E-12. Photograph taken facing downstream (Stantec 2011).

Photograph 63. View of Stream E-12. Photograph taken facing upstream (Stantec 2011).

Photograph 64. View of Stream E-13. Photograph taken facing upstream (Stantec 2011).

Photograph 65. View of Stream E-13. Photograph taken facing downstream (Stantec 2011).

APPENDIX C

USEPA RAPID BIOASSESSMENT PROTOCOL STREAM DATA FORMS

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 17	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'51.818" LONG 80°46'42.440"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 4/6/2012 TIME 1040 AM PM / REASON FOR SURVEY Mitchell Land fill Phase II Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. Ephemeral No flow
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. No flow
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). No flow
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. No flow
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

pg2-Stream17

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
No flow SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Parameters to be evaluated broader than sampling reach

Total Score 108

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 17	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39° 49'51.818 LONG 80°46'42.440"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 1047 AM PM / REASON FOR SURVEY Haul Road Mitchell Land Fill Phase II

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
95% ☒	%cloud cover	☐ ___%
☐	clear/sunny	☒

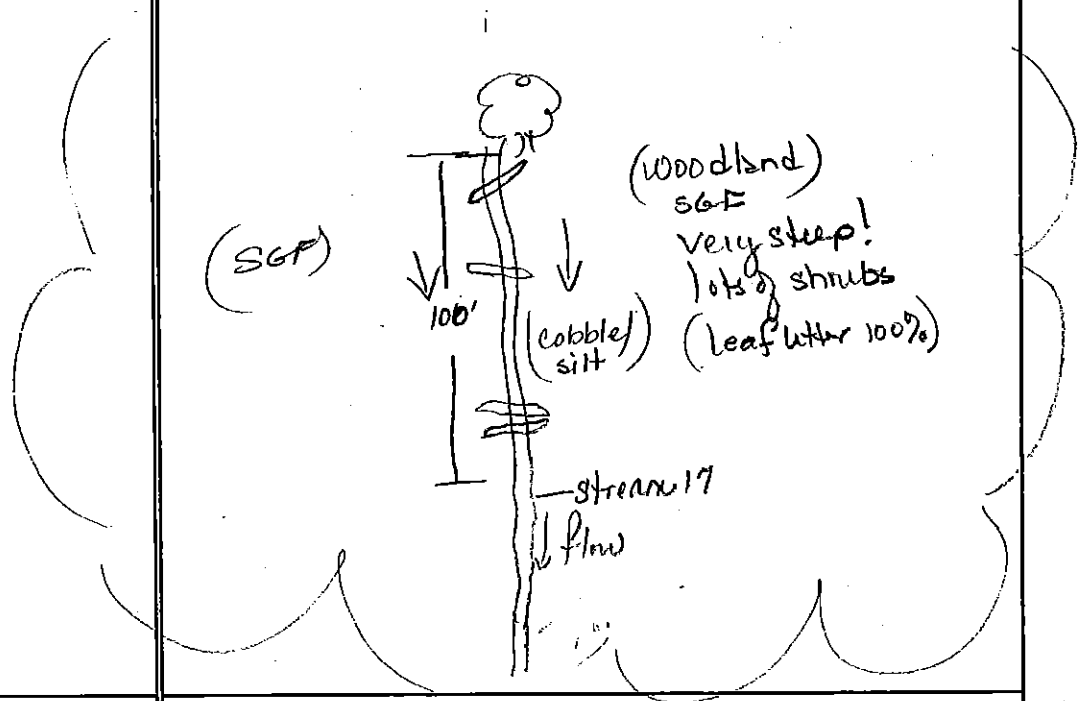
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ .5"

Air Temperature -1 °C 30°F

Other 1-2" snow

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other_____

Catchment Area_____ km²

pg. 2 stream 17

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☒ Field/Pasture ☒ Agricultural ☒ Residential ☐ Commercial ☐ Industrial ☐ Other _____ **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources Ash + Open pasture **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Tulip poplar, Sugar Maple, white ash, b. cherry, red oak
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** .61 m 2' **Sampling Reach Area** 18.59 m² **Area in km² (m²x1000)** 18,590 km² **Estimated Stream Depth** Ø m Ø **Surface Velocity (at thalweg)** Ø m/sec Ø **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m Ø **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle 0 % ☐ Run 0 % - No water ☐ Pool 0 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** ~3 m² **Density of LWD** _____ m²/km² (LWD/ reach area) ~15%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ N/A **Turbidity** _____ NO H2O **WQ Instrument Used** _____ **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☐ No N/A

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	20%
Boulder	> 256 mm (10")	5			
Cobble	64-256 mm (2.5"-10")	60	Muck-Mud	black, very fine organic (FPOM)	—
Gravel	2-64 mm (0.1"-2.5")	15			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	—
Silt	0.004-0.06 mm	20			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 17	LOCATION Cresap, Marshall Co, WV
STATION # ____ RIVERMILE ____	STREAM CLASS Epi
LAT 39°49'51.810" LONG 80°46'42.440"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS DYork / M Gilmore	LOT NUMBER
FORM COMPLETED BY DYork / M. Gilmore	DATE 14 Feb 2012 TIME 1045 (AM) PM / REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☒ Cobble 60 % ☐ Snags 10 % ☒ Vegetated Banks 70 % ☐ Sand 0 % ☐ Submerged Macrophytes ____ % ☐ Other ( ) ____ %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other: flipped rocks How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	N/A NO FLOW/NO H2O

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 18	LOCATION Cresap, Marshall WV
STATION # / RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'51.304 LONG 80°46'35.449	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York – M Gilmore	
FORM COMPLETED BY M Gilmore / D York	DATE 14 Feb 2012 TIME 1104 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II – Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. No flow
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). No flow
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. No flow
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools. No water
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

20

pg2 -Stream 18

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

48

Total Score 95 marginal

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 18	LOCATION Cresap, Marshall Co WV	
STATION # 18 RIVERMILE ____	STREAM CLASS Ephemeral	
LAT 39°49'51.304" LONG 80°46'35.449"	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M. Gilmore		
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 1107 AM PM	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ___%
☐	clear/sunny	☒

Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No

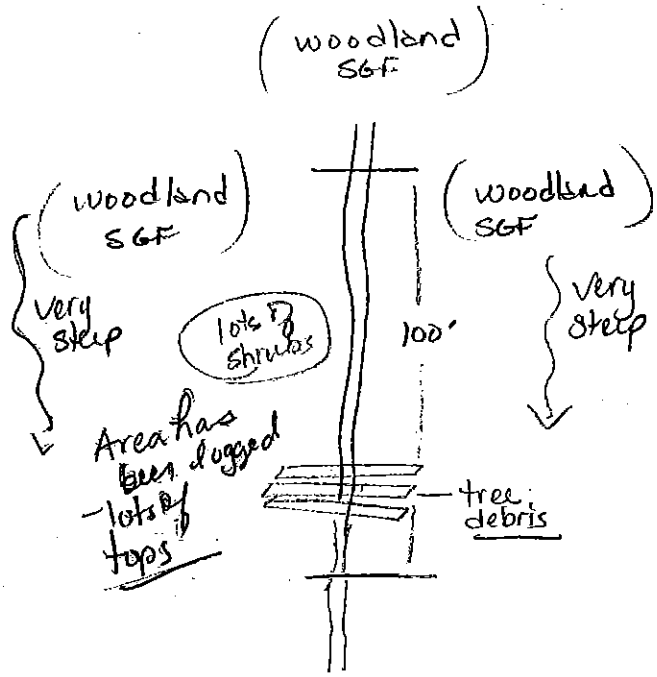
Air Temperature -1 °C 30 °F

Other ____

(.25" precip / 1-2" snow)

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal
ephemeral

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other ____

Stream Type
☒ Coldwater ☐ Warmwater

Catchment Area ____ km²

pg2 stream18

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☐ Industrial ☒ Agricultural ☐ Other ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources Fly Ash/Open pasture **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** A. saccharum?
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** .61 m 2' **Sampling Reach Area** 18.59 m² 200' **Area in km² (m²x1000)** 18,590 km² **Estimated Stream Depth** Ø m Ø **Surface Velocity (at thalweg)** Ø m/sec **Canopy Cover** ☒ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** Ø m – N/A **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ___ % ☐ Run ___ % ☐ Pool ___ % N/A **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 7 m² **Density of LWD** ___ m²/km² (LWD/ reach area) 40%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** Ø %
WATER QUALITY	**Temperature** ___ °C **Specific Conductance** ___ **Dissolved Oxygen** ___ N/A **pH** ___ **Turbidity** ___ No H_2O **WQ Instrument Used** ___ **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ___ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other ___ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other ___
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ___ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ___ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☐ No N/A

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	40%
Boulder	> 256 mm (10")	15			
Cobble	64-256 mm (2.5"-10")	40	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	15			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	30%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 18	LOCATION Cresap, Marshall Co. WV
STATION # 12 RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'51.364" LONG 80°46'35.449"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	LOT NUMBER
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 1107 AM PM — REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☑ Cobble 40 % ☑ Snags 5 % ☑ Vegetated Banks 50 % ☐ Sand — % ☐ Submerged Macrophytes — % ☐ Other ( ) ___ %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☐ Other ___ How were the samples collected? ☐ wading ☐ from bank ☐ from boat N/A Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ___ ☐ Snags ___ ☐ Vegetated Banks ___ ☐ Sand ___ ☐ Submerged Macrophytes ___ ☐ Other ( ) ___
GENERAL COMMENTS	No flow / No H_2O N/A

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 19	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS ephemeral
LAT 39°49'44.31" LONG 80°46'44.31"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS MGilmore / D.York	
FORM COMPLETED BY D.York/Gilmore	DATE 14 Feb 2012 TIME 1200 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

NO flow

N/A

P92 Stream 19

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 96

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 19	LOCATION Cresap, Marshall Co, WV
STATION # 1 RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'44.31" LONG 80°46'44.37"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	
FORM COMPLETED BY D. York / M. Gilmore	DATE 2/14/2012 TIME 1200 AM (PM) — REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ___%
☐	clear/sunny	☒

Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈.5"

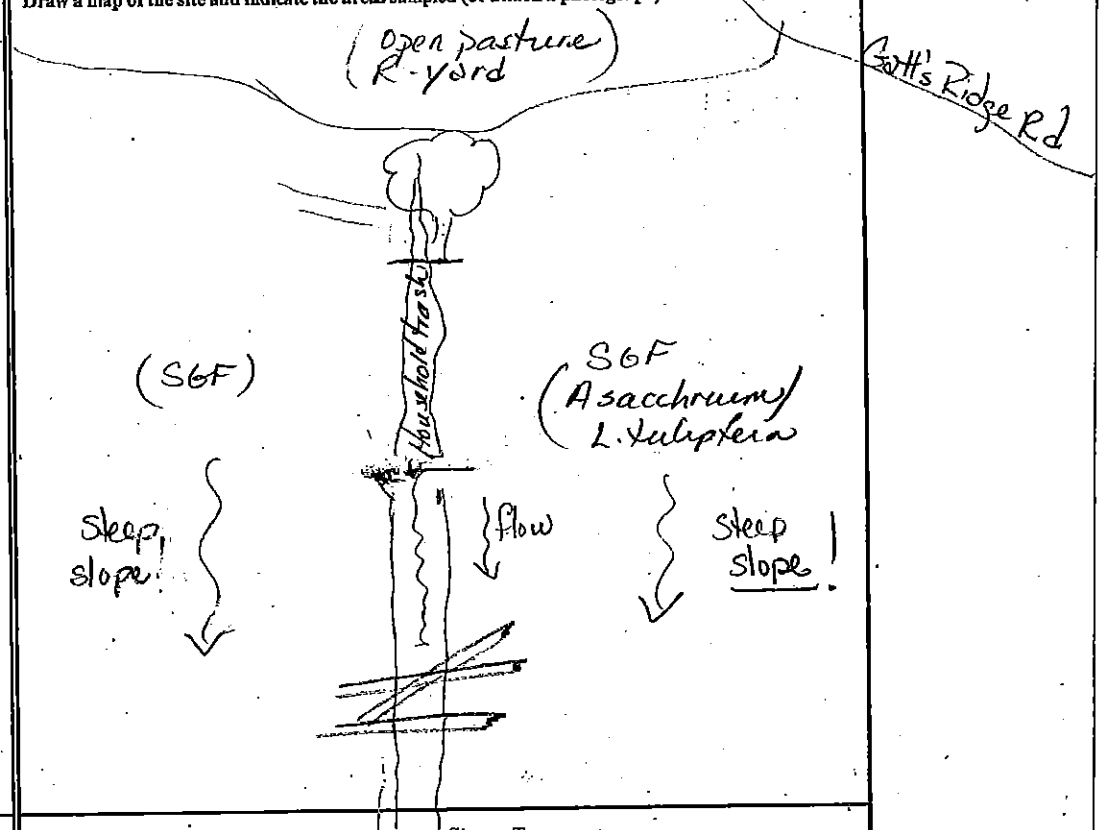
Air Temperature -1 °C 30°F

Other

1-2" snow!

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem ☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type ☒ Coldwater ☐ Warmwater

Stream Origin ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other

Catchment Area ____ km²

P92 -Stream 19

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☒ Field/Pasture ☒ Agricultural ☒ Residential ☐ Commercial ☐ Industrial ☐ Other _____ **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☐ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** A. saccharum / L. tulipifera, C. occidentalis, F. americana
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** .61 m 2' **Sampling Reach Area** 18.59 m² 200' **Area in km² (m²x1000)** 18,592.8 km² **Estimated Stream Depth** Ø m N/A **Surface Velocity (at thalweg)** Ø m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** Ø m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____% ☐ Run ____% ☐ Pool ____% **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No No H_2O
LARGE WOODY DEBRIS	**LWD** ~6 m² **Density of LWD** ____ m²/km² (LWD/ reach area) 30% of reach
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** ____%
WATER QUALITY No H2O	**Temperature** ____ °C **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ N/A **Turbidity** ____ **WQ Instrument Used** ____ **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other ____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	30%
Boulder	> 256 mm (10")	5			
Cobble	64-256 mm (2.5"-10")	10	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	—			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	60%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 19	LOCATION Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS ephemeral
LAT 39°49'44.31" LONG 80°46'44.37"	RIVER BASIN OH
STORET #	AGENCY
INVESTIGATORS D York / M. Gilmore	LOT NUMBER
FORM COMPLETED BY D York	DATE 14 Feb 2012 TIME 1200 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II – Hayl Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other √ substrate How were the samples collected? ☐ wading ☐ from bank ☐ from boat N/A Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	N/A

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	(0)	1	2	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	(0)	1	2	3	4	Macroinvertebrates	(0)	1	2	3	4
Macrophytes	(0)	1	2	3	4	Fish	(0)	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	(0)	1	2	3	4	Anisoptera	(0)	1	2	3	4	Chironomidae	(0)	1	2	3	4
Hydrozoa	(0)	1	2	3	4	Zygoptera	(0)	1	2	3	4	Ephemeroptera	(0)	1	2	3	4
Platyhelminthes	(0)	1	2	3	4	Hemiptera	(0)	1	2	3	4	Trichoptera	(0)	1	2	3	4
Turbellaria	(0)	1	2	3	4	Coleoptera	(0)	1	2	3	4	Other	(0)	1	2	3	4
Hirudinea	(0)	1	2	3	4	Lepidoptera	(0)	1	2	3	4						
Oligochaeta	(0)	1	2	3	4	Sialidae	(0)	1	2	3	4						
Isopoda	(0)	1	2	3	4	Corydalidae	(0)	1	2	3	4						
Amphipoda	(0)	1	2	3	4	Tipulidae	(0)	1	2	3	4						
Decapoda	(0)	1	2	3	4	Empididae	(0)	1	2	3	4						
Gastropoda	(0)	1	2	3	4	Simuliidae	(0)	1	2	3	4						
Bivalvia	(0)	1	2	3	4	Tabinidae	(0)	1	2	3	4						
						Culcidae	(0)	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 20	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'46.8" LONG 80°46'45.76"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York	DATE 14 Feb 2012 TIME 1240 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. No flow!
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

No flow

Stream 20 -pg 2

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

No flow steep

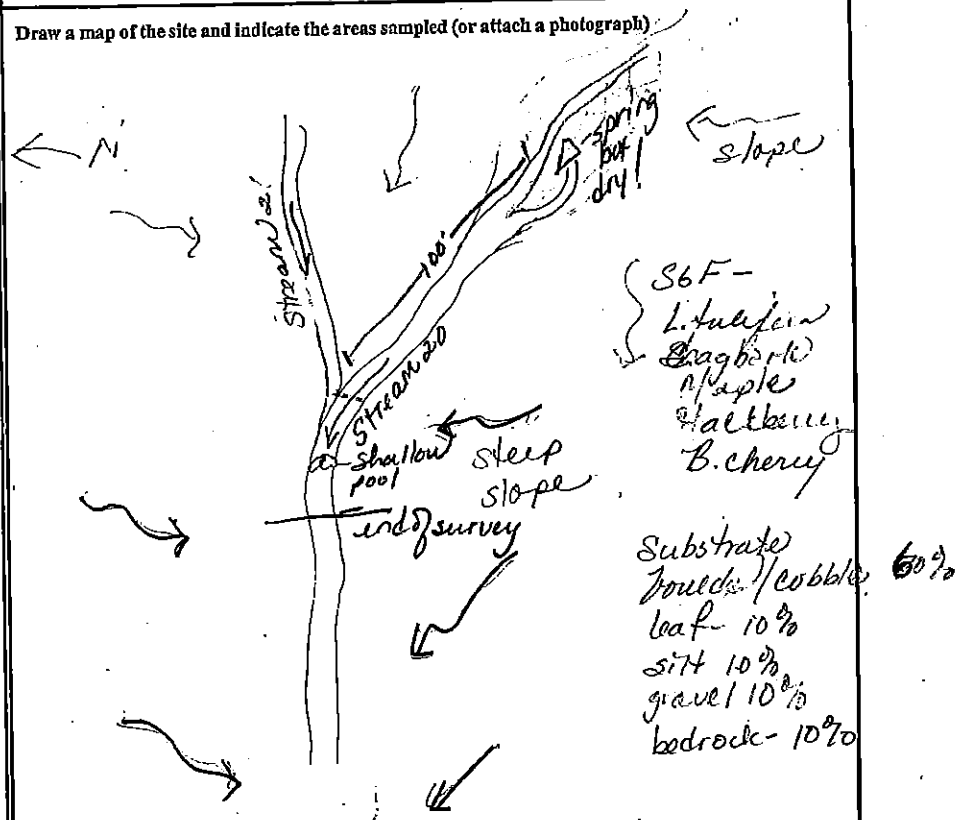
Total Score 108

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 20	LOCATION Cresap / Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'46.3" LONG 80°46'45.76"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 1240 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

WEATHER CONDITIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈.5"
	☐ storm (heavy rain)	☐	Air Temperature 0°C 32°F 1-2" snow
	☐ rain (steady rain)	☐	
	☐ showers (intermittent)	☐	Other Raining / snowing
	100% ☒ %cloud cover	☐ ___%	
	☐ clear/sunny	☒	

SITE LOCATION/MAP — Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION	Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal Eph. Stream Type: ☒ Coldwater ☐ Warmwater Catchment Area _____ km² Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☒ Other Precip

Stream 20 - pg 2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☒ Field/Pasture ☐ Agricultural ☐ Residential ☐ Commercial ☒ Industrial ☐ Other _____ **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Sugar maple, shagbark hickory, black oak, tulip poplar
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 1.22 m 4' **Sampling Reach Area** 37.19 m² 400' **Area in km² (m²x1000)** 37,185.6 km² **Estimated Stream Depth** _____ m Ø **Surface Velocity (at thalweg)** _____ m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle _____ % ☐ Run _____ % ☐ Pool _____ % Ø **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 1.86 m² 5% **Density of LWD** _____ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** _____ % N/A
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ N/A **WQ Instrument Used** _____ **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No N/A

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		5%	Detritus	sticks, wood, coarse plant materials (CPOM)	15%
Boulder	> 256 mm (10")	35%			
Cobble	64-256 mm (2.5"-10")	40%	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	10%			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	10%			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 20	LOCATION Cresap, Marshall Co, WV	
STATION # ____ RIVERMILE ____	STREAM CLASS Ephemeral	
LAT 39°49'46.3" LONG 80°46'45.76"	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D York / M Gilmore		LOT NUMBER
FORM COMPLETED BY D York / M Gilmore	DATE 14 Feb 2012 TIME 1240 AM (PM)	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble 40 % ☐ Snags 5 % ☐ Vegetated Banks 20 % ☐ Sand ____ % ☐ Submerged Macrophytes 0 % ☐ Other ( ) ____ %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other √ Substrates How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	No flow. Ø

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

Ø

0 Salamanders

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Hammed Jnb		LOCATION AEP Mitchell Landfill Phase II Haul Rd Proj	
STATION # Stream 20 RIVERMILE		STREAM CLASS Intermittent	
LAT 39°44'46.278 LONG 80°46'45.889		RIVER BASIN OHIO	
STORET #		AGENCY	
INVESTIGATORS D. Godec / D. York			
FORM COMPLETED BY D. York	DATE 20 Mar 2012 TIME 1630 AM PM	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Rd	

I-20

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Very little flow

Pg 2
Stream (I-2) 20
20 Mar 2012

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 119

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

I-20

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill haul Road
STATION # 20 RIVERMILE _____	STREAM CLASS Intermittent
LAT 39 49 46.278 LONG 80 46 45.887	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / D. Godec	
FORM COMPLETED BY D. York / D. Godec	DATE 20 Mar 2012 TIME _____ AM PM
REASON FOR SURVEY Mitchell landfill Phase II haul Rd	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
5 % ☒	%cloud cover	☒ 30%
☐	clear/sunny	☐

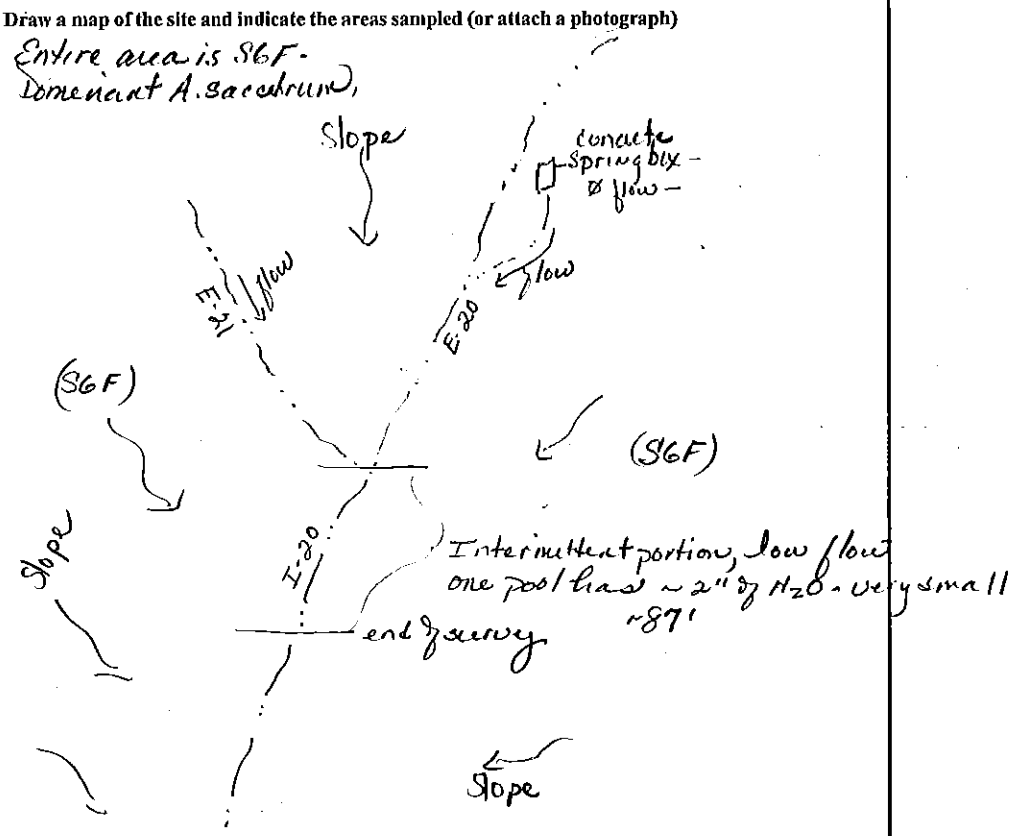
Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature ____ °C ~84°F

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☒ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☒ Other Urban

Catchment Area _____ km²

Pg 2
Stream 20 – INT Portion (cont.) 3/21/12

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Copy over other data from Feb 2012? SNe VBNS

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest 80% ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other ☒ Residential Fly Ash Reservior down-stream **Local Watershed NPS Pollution** ☐ No evidence ☒ Some potential sources ☐ Obvious sources **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☐ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** _____
INSTREAM FEATURES	**Estimated Reach Length** 36.48 m 100 ft **Estimated Stream Width** 1.37 m 4.5' **Sampling Reach Area** 41.76 m² **Area in km² (m²x1000)** 41758 km² **Estimated Stream Depth** 0.15 m 0.5-2in **Surface Velocity (at thalweg)** <1 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m (4') **Proportion of Reach Represented by Stream Morphology Types** ☒ Riffle 90 % ☐ Run ___ % ☒ Pool 10 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** ~4 m² **Density of LWD** _____ m²/km² (LWD/ reach area) 10%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** 17.73 °C **Specific Conductance** 0.292 ms/cm **Dissolved Oxygen** 5.65 mg/L **pH** 7.15 **Turbidity** 13.2 NTU **WQ Instrument Used** Horiba U-52 **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	> 256 mm (10")	40			
Cobble	64-256 mm (2.5"-10")	30	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	10			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm	15			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib Stream 20 (I-20)		LOCATION AEP Mitchell Landfill Phase II Haul Road	
STATION # I-20	RIVERMILE	STREAM CLASS Intermittent	
LAT 394946.278	LONG 8046 45.889	RIVER BASIN OHIO	
STORET #		AGENCY	
INVESTIGATORS D. Godee / D. York			LOT NUMBER
FORM COMPLETED BY D. Godee		DATE 3/21/12 TIME ~1630h AM (PM)	REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd.

HABITAT TYPES	Indicate the percentage of each habitat type present ☒ Cobble 80 % ☐ Snags ____ % ☐ Vegetated Banks ____ % ☐ Sand ____ % ☐ Submerged Macrophytes ____ % ☐ Other (Gravel) 10 %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other Aquarium Net; Hand Sorting How were the samples collected? ☒ wading ☒ from bank ☐ from boat - Sampled >1sq meter Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ (Not enough water) ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	One adult two lined Salamander observed

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	(0)	1	2	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	(0)	1	2	3	4	Macroinvertebrates	0	1	(2)	3	4
Macrophytes	(0)	1	2	3	4	Fish	(0)	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	(1)	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other (Stoneflies)	0	1	2	(3)	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4	→ 1 species					
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4	One specimen of stonefly (collected for ID)					
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

Intermittent Portion of Stream 20

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # Stream 20 (I-30) RIVERMILE	STREAM CLASS Intermittent
LAT 39.49946.278 LONG 80 46 45.887	RIVER BASIN Ohio
STORET #	AGENCY
COLLECTED BY DL/ORK DATE 20 Mar 13	LOT # _____ NUMBER OF SWEEPS _____
HABITATS: ☒ COBBLE ☐ SHOREZONE ☐ SNAGS ☐ VEGETATION	

1 meter covered Jerture reach

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera					
Decapoda											
Ephemeroptera											
						Gastropoda					
						Pelecypoda					
Plecoptera	Nemouridae	8	L	DY							
						Other					
Trichoptera											
Hemiptera											

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

	Site Value	Target Threshold	
Total No. Taxa	1		If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa	1		If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

Stream Score 12 - Poor
Total Tolerance - 28.6 - Poor

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 21	LOCATION Cresap, Marshall Co, WV
STATION # ____ RIVERMILE ____	STREAM CLASS Eph.
LAT 39°49'46.84" LONG 80°46'45.26"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS DYork MGilmore	
FORM COMPLETED BY DYork	DATE 14Feb2012 TIME 1400 AM (PM) — REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is >0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

pg2 Stream 21

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 0 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 0 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 105

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME 2	LOCATION Mishawaka co. WV
STATION # 2 RIVERMILE	STREAM CLASS 80h
LAT 39°49'46.84" LONG 80°46'45.26"	RIVER BASIN 04/10
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 140 AM (PM) REASON FOR SURVEY Mitchell Landfill Phase II — Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100 % ☒	%cloud cover	☐ ___ %
☐	clear/sunny	☒

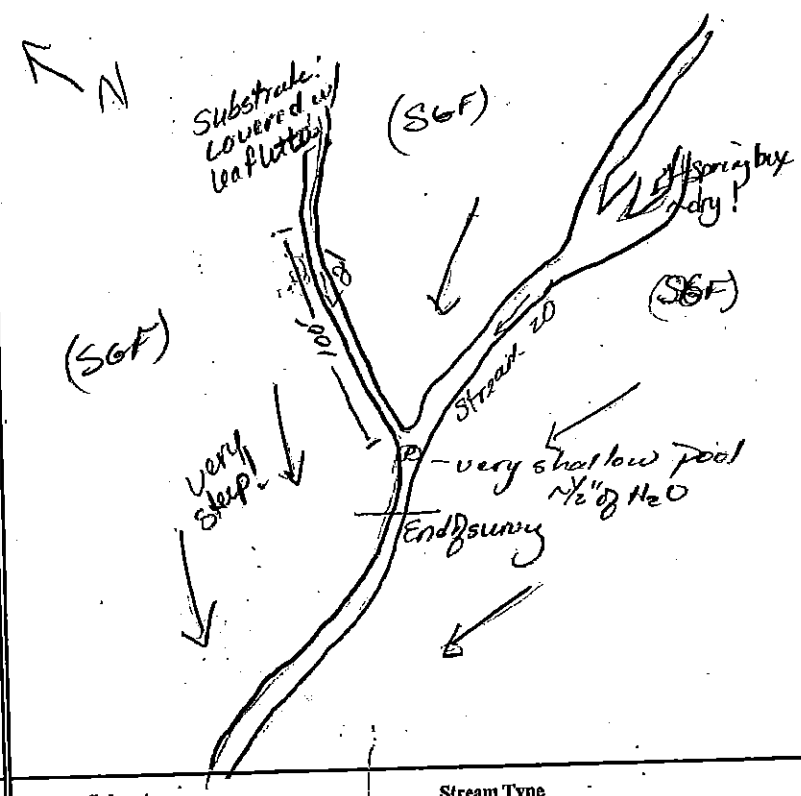
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No — (0.5" precip)

Air Temperature ___ °C 32° (1-2" snow on grd)

Other ___

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Catchment Area ___ km²

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other ___

p92-stream 21

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other _____ ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** sugar maple, black cherry, tulip poplar
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 30.48 m 1' **Sampling Reach Area** 9.29 m² 100' **Area in km² (m²x1000)** 9,290 km² **Estimated Stream Depth** 0 m **Surface Velocity (at thalweg)** 0 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ___ % ☐ Run ___ % 0 ☐ Pool ___ % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 0.18 m² **Density of LWD** ___ m²/km² (LWD/ reach area) (2%)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** ____ %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ N/A **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	> 256 mm (10")	30%			
Cobble	64-256 mm (2.5"-10")	20%	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	10%			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm	40%			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 21	LOCATION Cresap, Marshall Co, WV	
STATION # ____ RIVERMILE ____	STREAM CLASS Eph.	
LAT 39°49'46.84" LONG 80°46'45.26"	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M. Gilmore		LOT NUMBER
FORM COMPLETED BY D. York / G. Gilmore	DATE 14 Feb 2012 TIME 1440 AM (PM)	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☑ Cobble 80 % ☐ Snags 10 % ☐ Vegetated Banks 10 % ☐ Sand ____ % ☐ Submerged Macrophytes ____ % ☐ Other ( ) ____ %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☑ Other √ substrate How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	N/A No H_2O

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME I-4	LOCATION AEP Mitchell Landfill Cresap, Marshall Co. WV
STATION # _____ RIVERMILE _____	STREAM CLASS Intermittent
LAT 39 49 41.98 LONG 80 46 45.436	RIVER BASIN OH
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	
FORM COMPLETED BY D. York / M Gilmore	DATE 28 Feb 2012 TIME 1110 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). trickle
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Stream I-4 pg. 2

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

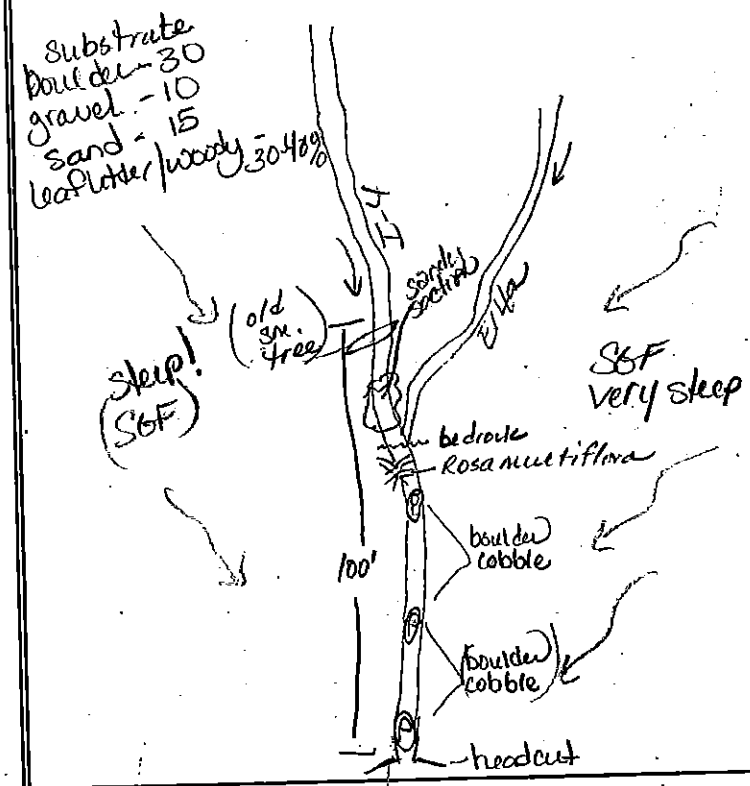
Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 95

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME I-4	LOCATION AEP Mitchell Landfill Cresap, Marshall Co, WV
STATION # ____ RIVERMILE ____	STREAM CLASS Intermittent
LAT 39 49 11.98 LONG 80 46 45.93	RIVER BASIN OH
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	
FORM COMPLETED BY D. York	DATE 28 Feb 2012 TIME 11:15 AM PM — REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

WEATHER CONDITIONS	Now: ☐ storm (heavy rain) ☐ rain (steady rain) ☐ showers (intermittent) ___% ☐ %cloud cover ☒ clear/sunny Past 24 hours: ☐ ☐ ☐ ☒ 25 % ☐ Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No Air Temperature 38 °F ~~°C~~ .09 – .05 – .02 – Other ____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION	Stream Subsystem: ☐ Perennial ☒ Intermittent ☐ Tidal Stream Type: ☒ Coldwater ☐ Warmwater Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other ____ Catchment Area ____ km²

Stream I-4 pg 2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial – AEP ☒ Agricultural ☐ Other _____ ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Sycamore
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 1.37 m 4.5' **Sampling Reach Area** 41.7 m² **Area in km² (m²x1000)** 41757 km² **Estimated Stream Depth** 0.02 m **Surface Velocity (at thalweg)** 2.5 m/sec low! **Canopy Cover** ☒ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** ~.5 m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle 70 % ☐ Run — % ☐ Pool 70 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 2.1 m² 5% **Density of LWD** ___ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** ___ %
WATER QUALITY	**Temperature** ___ °C 2.89°C **Specific Conductance** 490 (490) us/cm **Dissolved Oxygen** 22.66 mg/L **pH** 6.66 **Turbidity** 212 NTU **WQ Instrument Used** Horiba U52 **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☒ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		1%	Detritus	sticks, wood, coarse plant materials (CPOM)	30-40%
Boulder	> 256 mm (10")	30			
Cobble	64-256 mm (2.5"-10")	10	Muck-Mud	black, very fine organic (FPOM)	2%
Gravel	2-64 mm (0.1"-2.5")	40			
Sand	0.06-2mm (gritty)	15	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME I-4	LOCATION AEM Mitchell Landfill Cresap Marshall CO, WV	
STATION # RIVERMILE	STREAM CLASS Intermittent	
LAT 394941.98 LONG 80 46 45.43	RIVER BASIN OH	
STORET #	AGENCY	
INVESTIGATORS D. York / M. Gilmore		LOT NUMBER
FORM COMPLETED BY D. York / M. Gilmore	DATE 28 Feb 2012 TIME 1030 AM PM	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble 10 % ☐ Snags 10 % ☐ Vegetated Banks 5 % ☐ Sand 5 %/0 % ☐ Submerged Macrophytes 0 % ☐ Other ( ) %
SAMPLE COLLECTION	Gear used ☒ D-frame ☐ kick-net ☐ Other How were the samples collected? ☒ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ☐ Snags ☐ Vegetated Banks ☒ Sand disrupted substrate in 2 pools - 0 inverts & fish ☐ Submerged Macrophytes ☐ Other ( )
GENERAL COMMENTS	flow was a trickle! pools were sampled & substrate was flipped. Pools contained ≤2" or less of water. 1 salamander

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4	- Reddish & Gross
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4	
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4	

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

1 - Northern Dusky Salamander - adult -

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib E-14	LOCATION AEP Mitchell Landfill, Cresap, Marshall Co WV
STATION # _____ RIVERMILE _____	STREAM CLASS Eph.
LAT 39 49 41.01 LONG 80 46 43.68	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York / M. Gilmore	
FORM COMPLETED BY D York	DATE 28 Feb 2012 TIME 930 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

Stream E-14 pg 2

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration at road	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. Road -	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0

Total Score 65

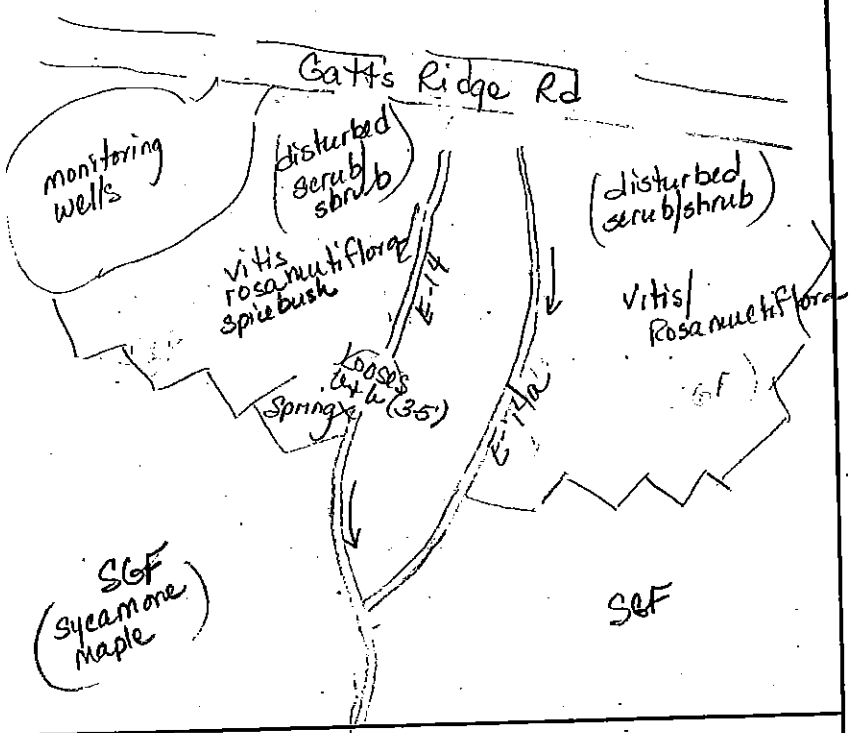
PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

STREAM NAME Unnamed Trib E-14	LOCATION AEP Mitchell Landfill Crescent Dist Paulco, WV
STATION # 11 RIVERMILE ____	STREAM CLASS Ephemeral
LAT 39 49 41.010 LONG 80 46 43.608	RIVER BASIN OH
STORET #	AGENCY
INVESTIGATORS D York / M Gilmore	
FORM COMPLETED BY D York / M Gilmore	DATE 28 Feb 2012 TIME 0930 AM PM	REASON FOR SURVEY Mitchell Landfill Phase II – Haul Road

WEATHER CONDITIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No
	☐ storm (heavy rain)	☐	Air Temperature ____ °C 38°F
	☐ rain (steady rain)	☐	
	☐ showers (intermittent)	☐	Other ____
	____% ☐ %cloud cover	☒ 25%	
	☒ clear/sunny	☐	

.09
.05
.02
.14

SITE LOCATION/MAP — Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal Eph.

Stream Type: ☒ Coldwater ☐ Warmwater

Catchment Area ____ km²

Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☐ Spring-fed ☐ Mixture of origins ☐ Other ____

Stream E-14 pg 2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☐ Trees ☒ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Vitis sp.
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m ~100' **Estimated Stream Width** 1.21 m 4' **Sampling Reach Area** 36.88 m² 400' **Area in km² (m²x1000)** 36880 km² **Estimated Stream Depth** _____ m Ø **Surface Velocity (at thalweg)** _____ m/sec Ø **Canopy Cover** ☒ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** _____ m Ø **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle 0 % ☐ Run 0 % ☐ Pool 0 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 14.75 m² **Density of LWD** _____ m²/km² (LWD/ reach area) 40%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** Ø **Portion of the reach with aquatic vegetation** Ø %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ N/A **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☐ No N/A

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		0	Detritus	sticks, wood, coarse plant materials (CPOM)	40%
Boulder	> 256 mm (10")	1			
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	4			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	90			
Clay	< 0.004 mm (slick)	5			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib E14	LOCATION AEP Mitchell Landfill near Sap, Marshall Co, WV	
STATION # ____ RIVERMILE ____	STREAM CLASS Ephemeral	
LAT 39.828658 LONG 80.778783	RIVER BASIN OH	
STORET #	AGENCY	
INVESTIGATORS D York, M. Gilmore		LOT NUMBER
FORM COMPLETED BY D York, M. Gilmore	DATE 28 Feb 2012 TIME 0930 (AM) PM	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other turning substrate How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	No water

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 14a	LOCATION Cresap, Marshall Co, WV	
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral	
LAT 39°49'41.044" LONG 80°46'44.127"	RIVER BASIN Ohio	
STORET #	AGENCY	
INVESTIGATORS D.York / M. Gilmore		
FORM COMPLETED BY D.York / M. Gilmore	DATE 2/28/12 TIME 1030 AM PM	REASON FOR SURVEY Mitchell Landfill Phase II

Haul Road

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

No flow

No flow

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 90

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 14a	LOCATION Cresap, Marshall Co, WV
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral
LAT 39°49'41.044" LONG 80°46'44.127"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS D. York, M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 2/28/12 TIME 1030 AM PM — REASON FOR SURVEY Mitchell Landfill Phase II — Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
___% ☐	%cloud cover	☒ 25%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No

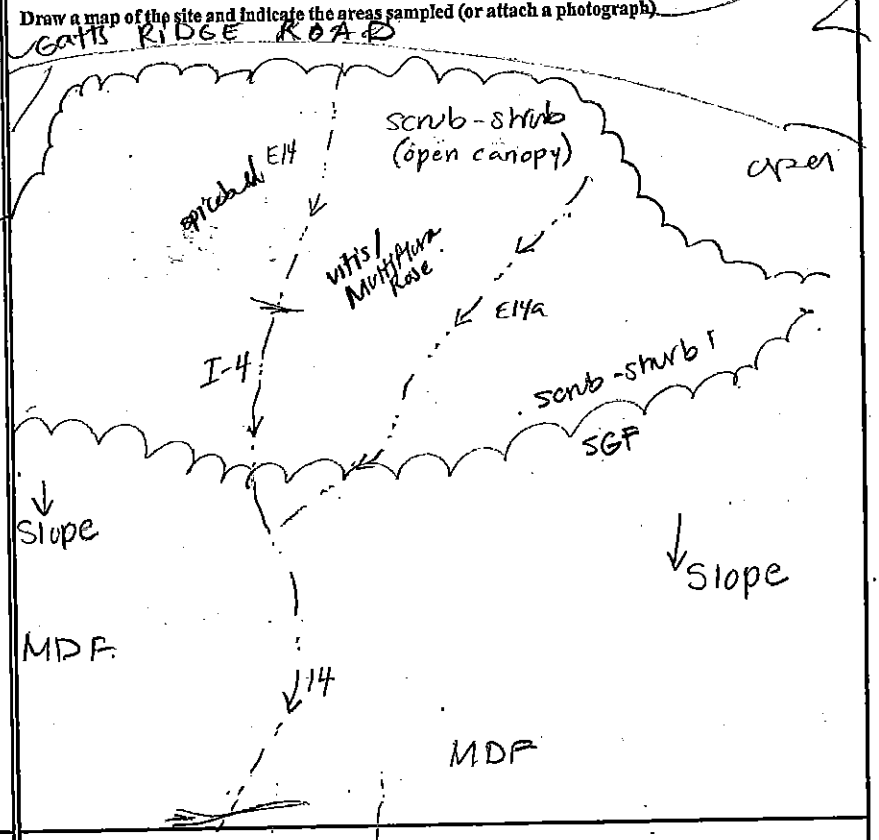
Air Temperature ___ °C 38°F

Other _____

.09
.05
.02

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph).



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal ☒ ephemeral

Stream Type: ☒ Coldwater ☐ Warmwater

Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☐ Spring-fed ☐ Mixture of origins ☒ Other road runoff/precipitation

Catchment Area _____ km²

Streamville pg 2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse
- ☒ Forest
- ☒ Field/Pasture
- ☒ Agricultural
- ☒ Residential
- ☐ Commercial
- ☒ Industrial
- ☐ Other _____

Local Watershed NPS Pollution
- ☐ No evidence ☐ Some potential sources
- ☒ Obvious sources

Local Watershed Erosion
- ☐ None ☒ Moderate ☐ Heavy

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present
- ☒ Trees ☒ Shrubs ☐ Grasses ☐ Herbaceous

dominant species present Maple, W. Ash

INSTREAM FEATURES

Estimated Reach Length 30.48 m

Estimated Stream Width 0.5 m 1.5'

Sampling Reach Area 15 m²

Area in km² (m²x1000) 15000 km²

Estimated Stream Depth 0 m

Surface Velocity (at thalweg) 0 m/sec

Canopy Cover
- ☒ Partly open ☐ Partly shaded ☐ Shaded

High Water Mark _____ m 6"

Proportion of Reach Represented by Stream Morphology Types
- ☐ Riffle 0 % ☐ Run 0 %
- ☐ Pool 0 %

Channelized ☐ Yes ☒ No

Dam Present ☐ Yes ☒ No

LARGE WOODY DEBRIS

LWD 3 m² 20%

Density of LWD .0002 m²/km² (LWD/ reach area)

AQUATIC VEGETATION

None

Indicate the dominant type and record the dominant species present
- ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating
- ☐ Floating Algae ☐ Attached Algae

dominant species present N/A

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

NO
H2O

Temperature _____ °C

Specific Conductance _____

Dissolved Oxygen _____

pH _____

Turbidity _____

WQ Instrument Used _____

Water Odors
- ☐ Normal/None ☐ Sewage
- ☐ Petroleum ☐ Chemical
- ☐ Fishy ☐ Other _____

Water Surface Oils
- ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks
- ☐ None ☐ Other _____

Turbidity (if not measured)
- ☐ Clear ☐ Slightly turbid ☐ Turbid
- ☐ Opaque ☐ Stained ☐ Other _____

SEDIMENT/ SUBSTRATE

Odors
- ☒ Normal ☐ Sewage ☐ Petroleum
- ☐ Chemical ☐ Anaerobic ☒ None
- ☐ Other _____

Oils
- ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse

Deposits
- ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand
- ☐ Relict shells ☐ Other _____

Looking at stones which are not deeply embedded, are the undersides black in color?
- ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	45
Boulder	> 256 mm (10")	5			
Cobble	64-256 mm (2.5"-10")	10	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	15			
Sand	0.06-2mm (gritty)	✓	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	70			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 14a	LOCATION Cresap, Marshall Co, WV
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral
LAT 39°49'41.044" LONG 80°46'44.127	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York / M. Gilmore	LOT NUMBER
FORM COMPLETED BY D. York / M. Gilmore	DATE 2/28/14 TIME 1030 (AM) PM — REASON FOR SURVEY Mitchell Landfill Phase II - haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other flip rocks & leaf pack How were the samples collected? ☒ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	No flow, None observed no salamanders no macros

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 22	LOCATION Cresap, Marshall Co, WV
STATION # 1 RIVERMILE	STREAM CLASS Intermittent
LAT 39°49'35.14" LONG 80°47'5.66"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 2:19 AM PM REASON FOR SURVEY Mitchell Landfill Phase II - haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). Shallow -
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Stream 22

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 110

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME unnamed tributary	LOCATION Marshall Co, WV
STATION 22 RIVERMILE ____	STREAM CLASS Int.
LAT 39°49'35.16" LONG 80°47'5.66"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. [illegible]	
FORM COMPLETED BY D. York	DATE 14 Feb 2012 TIME 2:00 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II – Hani Road

WEATHER CONDITIONS

Now
- ☐ storm (heavy rain)
- ☐ rain (steady rain)
- ☐ showers (intermittent)
- 100% ☒ %cloud cover
- ☐ clear/sunny

Past 24 hours
- ☐
- ☐
- ☐
- ☐ %
- ☒

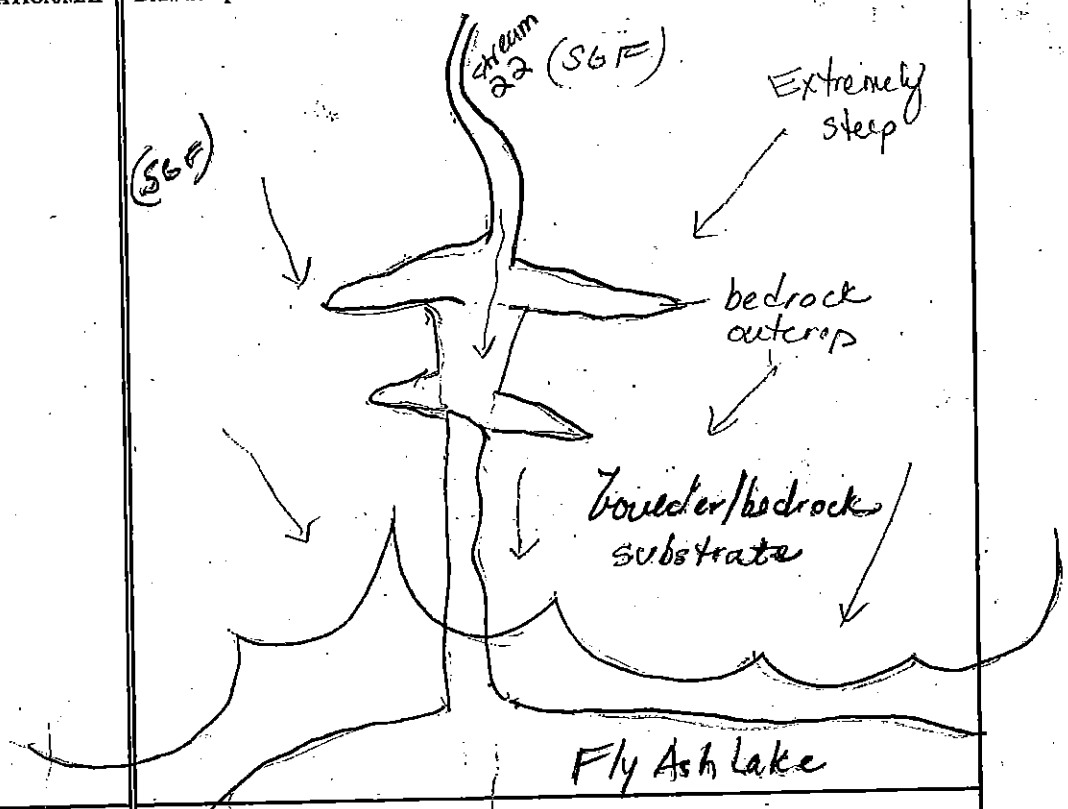
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈.5"

Air Temperature 0°C 32°F

Other ____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
- ☐ Perennial
- ☒ Intermittent
- ☐ Tidal

Stream Type
- ☒ Coldwater
- ☐ Warmwater

Catchment Area ____ km²

Stream Origin
- ☐ Glacial
- ☐ Non-glacial montane
- ☐ Swamp and bog
- ☒ Spring-fed
- ☐ Mixture of origins
- ☐ Other ____

Stream 22

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources Fly Ash **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Tulip poplar / Beech / Sycamore / red oak
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 3.048 m 10' **Sampling Reach Area** 92 m² 1000' **Area in km² (m²x1000)** 92,903 km² **Estimated Stream Depth** 15.3 m 2-1' **Surface Velocity (at thalweg)** <1 m/sec deep **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** 3.144 m **Proportion of Reach Represented by Stream Morphology Types** ☒ Riffle 60 % ☒ Run [redacted] % 10 ☒ Pool 30 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 4.6 m² **Density of LWD** ___ m²/km² (LWD/ reach area) 5 %
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** Ø **Portion of the reach with aquatic vegetation** ___ %
WATER QUALITY	**Temperature** 2.59 °C **Specific Conductance** 412 µ **Dissolved Oxygen** 8.8 g/m **pH** 7.88 **Turbidity** 5.0 NTU **WQ Instrument Used** Horiba U52 **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other **Turbidity (if not measured)** ☒ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	> 256 mm (10")	50			
Cobble	64-256 mm (2.5"-10")	30	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	10%			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	10%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME	Stream 22	LOCATION	Grosip, Marshall Co, WV
STATION #	RIVERMILE	STREAM CLASS	Int.
LAT 39°49'35.16"	LONG 80°47'5.66"	RIVER BASIN	OHO
STORET #		AGENCY	
INVESTIGATORS	M. Gilmore / D. York	LOT NUMBER	
FORM COMPLETED BY	D. York / M. Gilmore	DATE 14 Feb 2012 TIME 2:49 AM (PM)	REASON FOR SURVEY Mitchell Landfill Phase II — haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other flipped substrate How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☒ Other turned substrate
GENERAL COMMENTS	mostly bedrock disrupted pools Ø macros - Ø fish! Ø salamanders icy - very cold

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

on rocks

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream E-9	LOCATION Cresap, Marshall Co. WV
STATION # ___ RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'33.17" LONG 80°47'7.46"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York, M. Gilmore	
FORM COMPLETED BY D York / M Gilmore	DATE 14 Feb 2012 TIME 1410 AM (PM) / REASON FOR SURVEY Mitchell Land Fill Phase II — Haul Road

No flow

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 20	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 (0)
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
NA				
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream E-9	LOCATION Cresap, Marshall Co. WV
STATION # ___ RIVERMILE ___	STREAM CLASS Ephemeral
LAT 39°49'33.17" LONG 80°47'7.46"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York, M. Gilmore	
FORM COMPLETED BY D York / M Gilmore	DATE 14 Feb 2012 TIME 1410 AM (PM) / REASON FOR SURVEY Mitchell Land All Phase II - Haul Road

No flow

	Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 20	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 (0)
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	NA				
	SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

pg 2, Stream E-9

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

No flow
all bedrock

Fly Ash ?

Total Score 105

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream E-9	LOCATION Cresap, Marshall Co, WV
STATION # ___ RIVERMILE ___	STREAM CLASS Ephemeral
LAT 39°49'33.17" LONG 80°47'7.46"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York / M Gilmore	
FORM COMPLETED BY D York / M Gilmore	DATE 14 Feb 2012 TIME 4:10 AM (PM) — REASON FOR SURVEY Mitchell LandFill Phase II — Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☐ ___%
☐	clear/sunny	☒

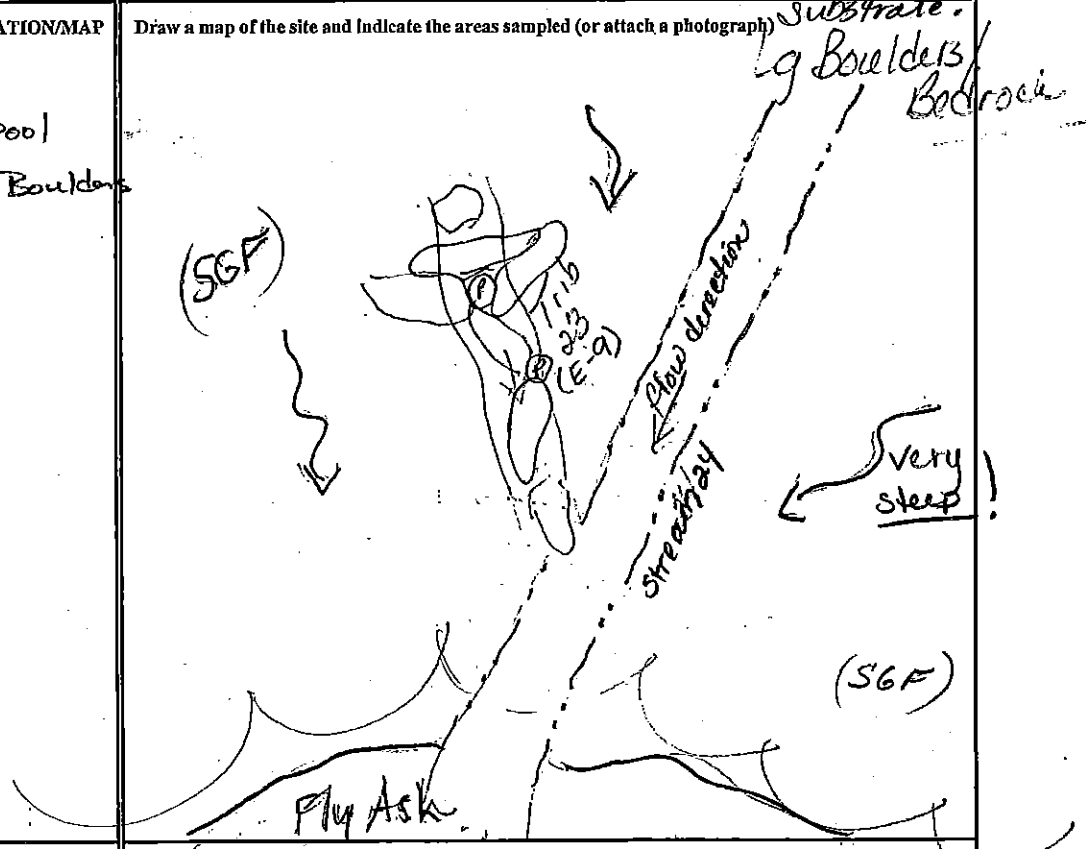
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ .5"

Air Temperature 0 °C 32°F

Other ___

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☒ Intermittent ☐ Tidal

Stream Type: ☒ Coldwater ☐ Warmwater

Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other ___

Catchment Area ___ km²

pg. 2, stream E-9

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other ____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** L. tulipifera, Sycamore, Sugar maple, Am. beech
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** .42 m 12' **Sampling Reach Area** 12.8 m² **Area in km² (m²x1000)** 12,801.6 km² **Estimated Stream Depth** 0 m **Surface Velocity (at thalweg)** 0 m/sec **Canopy Cover** ☐ Partly open ☒ Partly shaded ☐ Shaded **High Water Mark** .3048 m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ___ % ☐ Run — % ☐ Pool 2 % **Channelized** ☒ Yes ☐ No **Dam Present** ☒ Yes ☐ No
LARGE WOODY DEBRIS	**LWD** .64 m² 5% **Density of LWD** ___ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☒ Attached Algae **dominant species present** ____ **Portion of the reach with aquatic vegetation** ____ % 5%
WATER QUALITY	**Temperature** ____ °C Not enough H2O for sample. **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ **Turbidity** ____ **WQ Instrument Used** ____ N/A **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☒ Turbid ☐ Opaque ☐ Stained ☐ Other ____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		✓ 10%	Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	> 256 mm (10")	✓ 25%			
Cobble	64-256 mm (2.5"-10")	✓ 25%	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	✓ 5%			
Sand	0.06-2mm (gritty)	✓ —	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	✓ 25%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream E-9	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'33.17" LONG 80°47'7.46"	RIVER BASIN OH
STORET #	AGENCY
INVESTIGATORS D York / M. Gilmore	LOT NUMBER
FORM COMPLETED BY D York / M Gilmore	DATE 14 Feb 2012 TIME 410 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☑ Cobble 5 % ☐ Snags 5 % ☐ Vegetated Banks____% ☐ Sand____% Bare clay/Bedrock 25% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☑ Other Flipped Rocks How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	N/A Moist channel No flow

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 24	LOCATION Cresap, Marshall Co, WV
STATION # c.1 RIVERMILE	STREAM CLASS Int.
LAT 39°49'32.66" LONG 80°47'8.92"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. Work / M. Gilmore	
FORM COMPLETED BY D. Work / M. Gilmore	DATE 14 Feb 2012 TIME 500 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is >0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). Shallow-riffles shallow pools
SCORE ~~8~~ 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel; and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0

pg 2 - stream 24

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

?

Total Score 124

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 24	LOCATION Cresap, Marshall Co, WV
STATION # 01 RIVERMILE	STREAM CLASS Intermediate
LAT 39°49'32.66" LONG 80°47'0.92"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / Gilmore	DATE 14 Feb 2012 TIME 500 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100 % ☒	%cloud cover	☐ ___%
☐	clear/sunny	☒

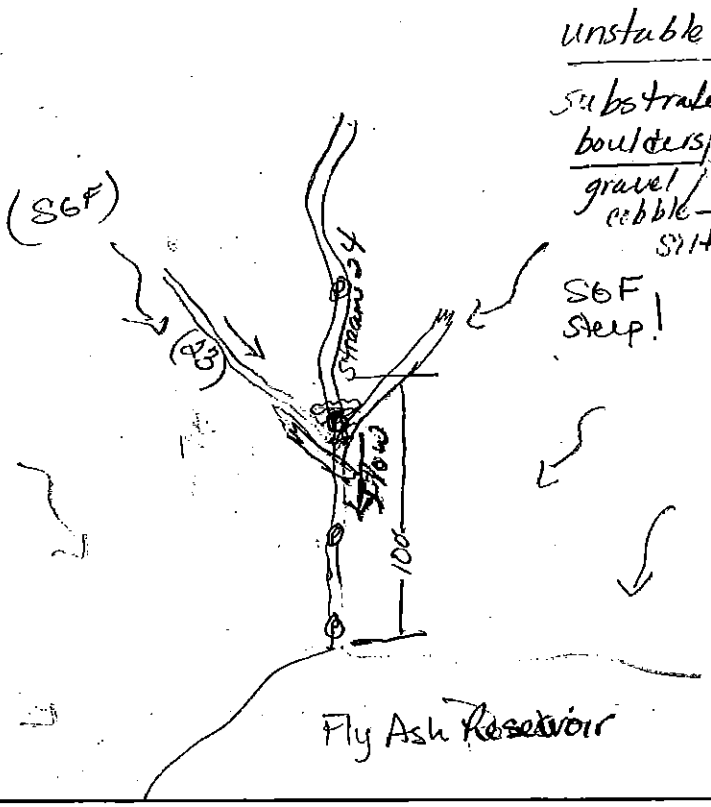
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ .5" (12" snow on gr.)

Air Temperature 0 °C

Other

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☒ Intermittent ☐ Tidal

Stream Type: ☒ Coldwater ☐ Warmwater

Stream Origin: ☐ Glacial ☒ Spring-fed ☐ Non-glacial montane ☐ Mixture of origins ☐ Swamp and bog ☐ Other

Catchment Area ____ km²

PQ2 stream 24

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy Fly Ash
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** sugar maple / tulip poplar
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 2.44 m 8' **Sampling Reach Area** 74.37 m² 800' **Area in km² (m²x1000)** 74,371.2 km² **Estimated Stream Depth** 1524 m ½" depth **Surface Velocity (at thalweg)** 4.5 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** 1.5 m 5 **Proportion of Reach Represented by Stream Morphology Types** ☒ Riffle 60 % ☐ Run ____ % ☒ Pool 30 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 22 m² **Density of LWD** ____ m²/km² (LWD/ reach area) 30%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☒ Attached Algae **dominant species present** on rocks **Portion of the reach with aquatic vegetation** ____ % 5%
WATER QUALITY	**Temperature** 1.8 °C **Specific Conductance** 252 **Dissolved Oxygen** 8.22 **pH** 7.58 **Turbidity** 27.9 **WQ Instrument Used** Horiba U52 **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other ____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		~~10~~ ~~40~~ 5	Detritus	sticks, wood, coarse plant materials (CPOM)	20%
Boulder	> 256 mm (10")	55			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	0%
Gravel	2-64 mm (0.1"-2.5")	10			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	0%
Silt	0.004-0.06 mm	10			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 24	LOCATION Cresap, Marshall Co, WV
STATION # 01 RIVERMILE	STREAM CLASS Int.
LAT 39°49'32.66" LONG 80°47'8.92"	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	LOT NUMBER
FORM COMPLETED BY D. York / M. Gilmore	DATE 14 Feb 2012 TIME 500 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II - haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☒ Cobble ____ % ☒ Snags ____ % ☐ Vegetated Banks ____ % ☐ Sand ____ % ☐ Submerged Macrophytes ____ % ☐ Other ( ) ____ %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other turned rocks How were the samples collected? ☒ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	

½" water pools ½" flowing

- disrupted substrate in 3 pools

Ø - Pools are very small

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	(0)	1	2	3	4	Slimes	0	(1)	2	3	4
Filamentous Algae	0	(1)	2	3	4	Macroinvertebrates	(0)	1	2	3	4
Macrophytes	(0)	1	2	3	4	Fish	(0)	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	(0)	1	2	3	4	Anisoptera	(0)	1	2	3	4	Chironomidae	(0)	1	2	3	4
Hydrozoa	(0)	1	2	3	4	Zygoptera	(0)	1	2	3	4	Ephemeroptera	(0)	1	2	3	4
Platyhelminthes	(0)	1	2	3	4	Hemiptera	(0)	1	2	3	4	Trichoptera	(0)	1	2	3	4
Turbellaria	(0)	1	2	3	4	Coleoptera	(0)	1	2	3	4	Other	(0)	1	2	3	4
Hirudinea	(0)	1	2	3	4	Lepidoptera	(0)	1	2	3	4						
Oligochaeta	(0)	1	2	3	4	Sialidae	(0)	1	2	3	4						
Isopoda	(0)	1	2	3	4	Corydalidae	(0)	1	2	3	4						
Amphipoda	(0)	1	2	3	4	Tipulidae	(0)	1	2	3	4						
Decapoda	(0)	1	2	3	4	Empididae	(0)	1	2	3	4						
Gastropoda	(0)	1	2	3	4	Simuliidae	(0)	1	2	3	4						
Bivalvia	(0)	1	2	3	4	Tabinidae	(0)	1	2	3	4						
						Culcidae	(0)	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream E-7	LOCATION Cresap, Marshall Co, WV
STATION # ___ RIVERMILE ___	STREAM CLASS Ephemeral
LAT 39°49'32.44" LONG 80°47'7.58"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M Gilmore	DATE 15 Feb 2012 TIME 1040 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II – Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is >0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

No flow Ephemeral Channel

pg2, stream 3E·7

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

No flow

Total Score 112

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream E-7	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'32.44" LONG 80°47'7.58"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS DYork / M. Gilmore	
FORM COMPLETED BY DYork / M Gilmore	DATE 15 Feb 2010 TIME ~~1040~~ AM PM / REASON FOR SURVEY Mitchell Landfill Phase II — Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100% ☒	%cloud cover	☒ 100%
☐	clear/sunny	☐

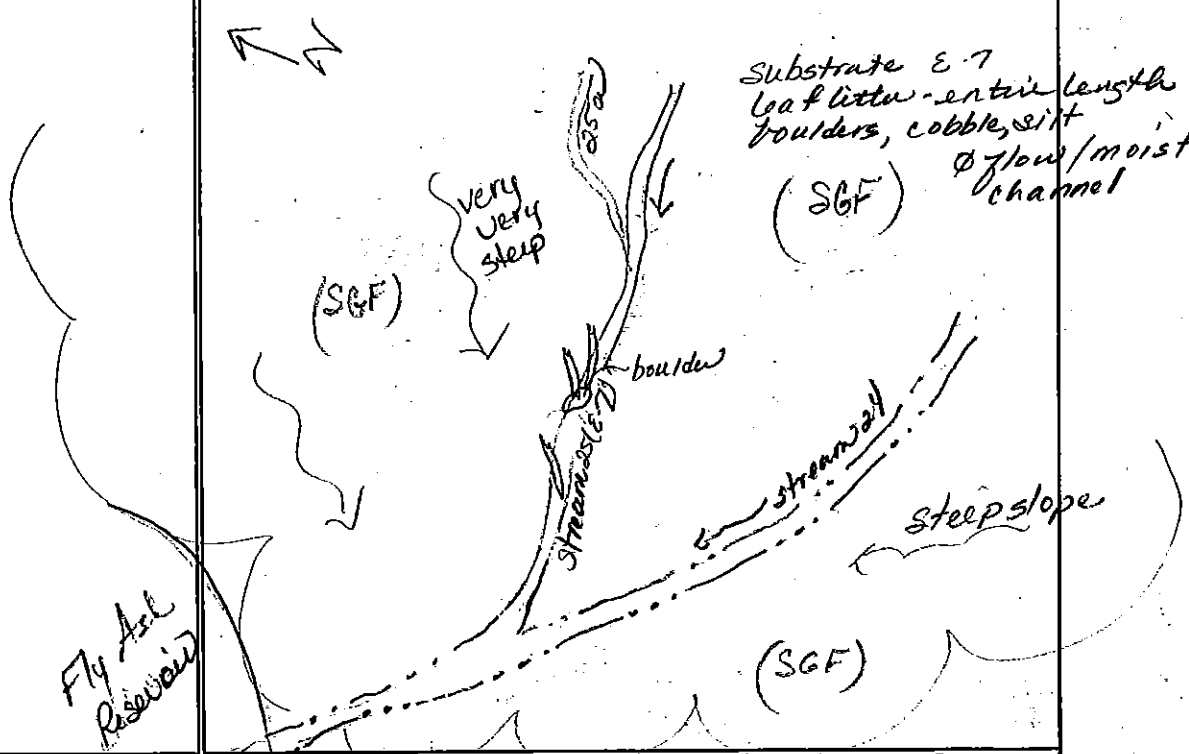
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ .5"

Air Temperature 1 °C 34°F

Other _____ (1-2" snow on grd)

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type: ☒ Coldwater ☐ Warmwater — Ephemeral

Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other _____

Catchment Area _____ km²

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream E-7	LOCATION Cresap, Marshall Co, WV	
STATION # ____ RIVERMILE ____	STREAM CLASS Ephemeral	
LAT 39°49'32.44" LONG 80°47'7.58"	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M. Gilmore		LOT NUMBER
FORM COMPLETED BY D. York / M. Gilmore	DATE 15 Feb 2012 TIME 1040 (AM) PM	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble ____% ☐ Snags 5 % ☐ Vegetated Banks ____% ☐ Sand ____% ☐ Submerged Macrophytes 0 % ☐ Other ( ) ____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other walk stream How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ N/A ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	N/A - No flow - Ephemeral stream

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0 1 2 3 4	Slimes	0 1 2 3 4
Filamentous Algae	0 1 2 3 4	Macroinvertebrates	0 1 2 3 4
Macrophytes	0 1 2 3 4	Fish	0 1 2 3 4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0 1 2 3 4	Anisoptera	0 1 2 3 4	Chironomidae	0 1 2 3 4
Hydrozoa	0 1 2 3 4	Zygoptera	0 1 2 3 4	Ephemeroptera	0 1 2 3 4
Platyhelminthes	0 1 2 3 4	Hemiptera	0 1 2 3 4	Trichoptera	0 1 2 3 4
Turbellaria	0 1 2 3 4	Coleoptera	0 1 2 3 4	Other	0 1 2 3 4
Hirudinea	0 1 2 3 4	Lepidoptera	0 1 2 3 4		
Oligochaeta	0 1 2 3 4	Sialidae	0 1 2 3 4		
Isopoda	0 1 2 3 4	Corydalidae	0 1 2 3 4		
Amphipoda	0 1 2 3 4	Tipulidae	0 1 2 3 4		
Decapoda	0 1 2 3 4	Empididae	0 1 2 3 4		
Gastropoda	0 1 2 3 4	Simuliidae	0 1 2 3 4		
Bivalvia	0 1 2 3 4	Tabinidae	0 1 2 3 4		
		Culcidae	0 1 2 3 4		

Pg 2 - Stream E.7

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other Coal Ash ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Sugar Maple, Am beech, White ash, tulip poplar
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 1.22 m 4' **Sampling Reach Area** 37.19 m² **Area in km² (m²x1000)** 3,185.6 km² **Estimated Stream Depth** Ø m **Surface Velocity (at thalweg)** Ø m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** .9144 m 3' **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ___ % ☐ Run 0 % ☐ Pool 0 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 3.7 m² **Density of LWD** ___ m²/km² (LWD/ reach area) 10%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☒ Attached Algae **dominant species present** ___ **Portion of the reach with aquatic vegetation** ___ % Ø 2%
WATER QUALITY	**Temperature** ___ °C **Specific Conductance** ___ NA **Dissolved Oxygen** ___ No flow **pH** ___ **Turbidity** ___ **WQ Instrument Used** ___ **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ___ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other N/A **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other N/A
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ___ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ___ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		10%	Detritus	sticks, wood, coarse plant materials (CPOM)	30%
Boulder	> 256 mm (10")	10%			
Cobble	64-256 mm (2.5"-10")	20%	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	15%			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	45%			
Clay	< 0.004 mm (slick)	—			

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 25a	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'32.175" LONG 80°47'06.908"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS M Gilmore / D York	
FORM COMPLETED BY D York/M. Gilmore	DATE 15 Feb 2012 TIME 10:50 (AM) PM	REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Photos

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 12	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is >0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) (0)
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

pg2-stream 25a

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 88

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 25a	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'32.175" LONG 80°47'6.908"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York / M. Gilmore	
FORM COMPLETED BY D York / M Gilmore	DATE 15 Feb 2012 TIME 1050 (AM) PM — REASON FOR SURVEY Mitchell Landfill Phase II haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
100%	%cloud cover	☒ 100%
☐	clear/sunny	☐

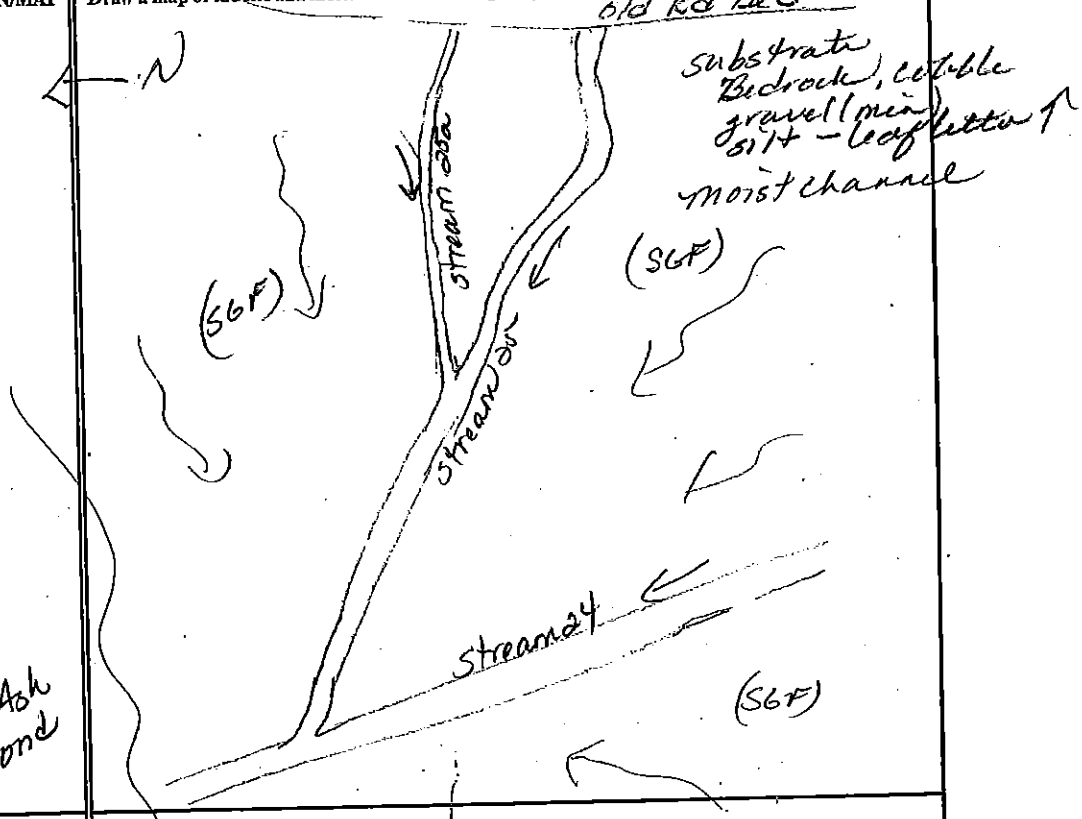
Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ 0.5"

Air Temperature .5 °C 33 °F (1-2" snow on grd)

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type: ☒ Coldwater ☐ Warmwater

Catchment Area _____ km²

Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other _____

pg 2 - stream 25a

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Field/Pasture ☐ Agricultural ☐ Residential ☐ Commercial ☒ Industrial ☐ Other Fly Ash **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Sugar Maple, American Beech, Tulip popular
INSTREAM FEATURES	**Estimated Reach Length** 30.480 m 100' **Estimated Stream Width** 1.21 m 4' **Sampling Reach Area** 3688 m² **Area in km² (m²x1000)** 36,880.8 km² **Estimated Stream Depth** NA m **Surface Velocity (at thalweg)** NA m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** .6096 m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle — % ☐ Run — % ☐ Pool — % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** ~1.9 m² **Density of LWD** ____ m²/km² (LWD/ reach area) 5%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** ____ **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY NO flow	**Temperature** ____ °C **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ **Turbidity** ____ **WQ Instrument Used** ____ N/A **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other ____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		5%	Detritus	sticks, wood, coarse plant materials (CPOM)	60%
Boulder	> 256 mm (10")	15%			
Cobble	64-256 mm (2.5"-10")	40%	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	5%			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	35%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 25a		LOCATION Cresap, Marshall Co, WV	
STATION # _____	RIVERMILE _____	STREAM CLASS Ephemeral	
LAT 39°49'32.175"	LONG 80°47'6.908"	RIVER BASIN OHIO	
STORET #		AGENCY	
INVESTIGATORS DYork, M Gilmore			LOT NUMBER
FORM COMPLETED BY DYork, M Gilmore	DATE 15 Feb 2012 TIME 1050 AM PM		REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% N/A ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other WALK/turnover substrate How were the samples collected? ☐ wading ☐ from bank ☐ from boat N/A Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	NO WATER

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 26	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'33.019" LONG 80°47'9.49"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 15 Feb 2012 TIME 1136 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 10	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

No flow / No water

P92-Stream 26

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

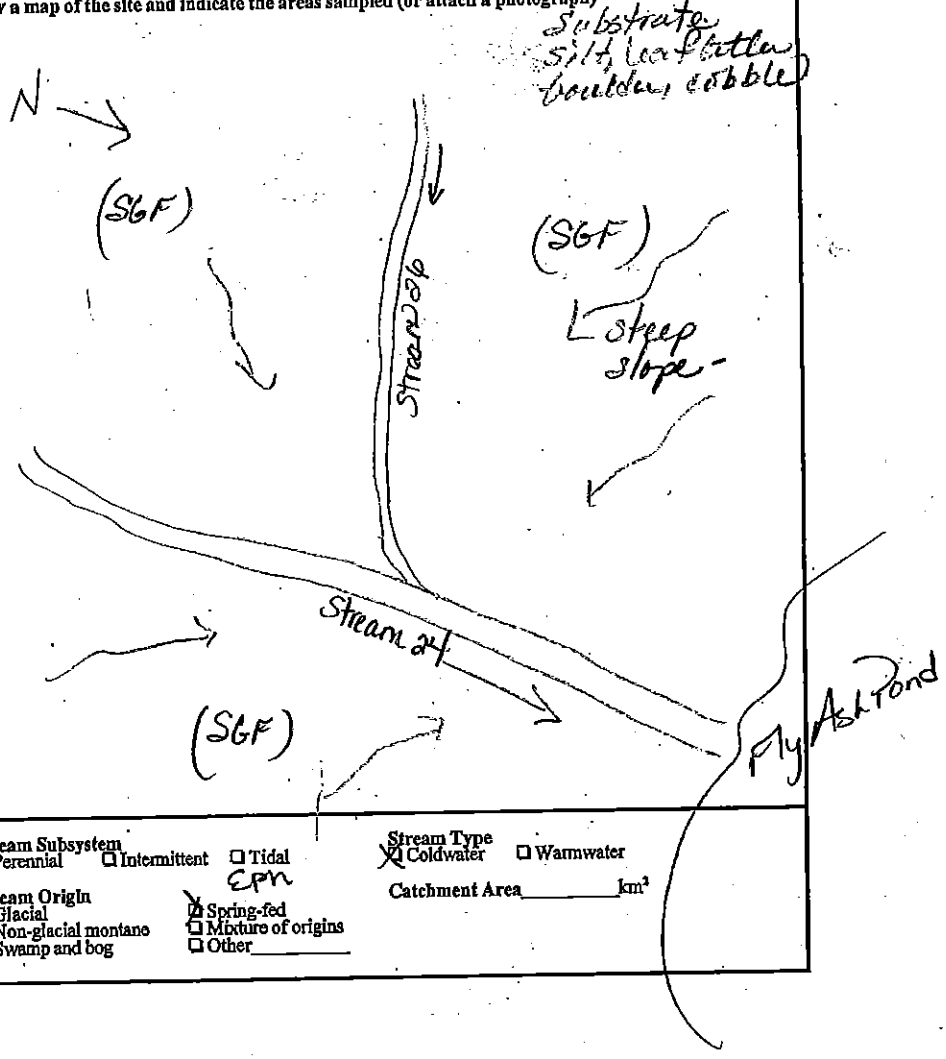
Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ~~2~~ 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ~~2~~ 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 75

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 26	LOCATION Cresap, Marshall Co, WV
STATION # ____ RIVERMILE ____	STREAM CLASS Ephemeral
LAT 39°49'33.019" LONG 80°47'9.480"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS M Gilmore / D. York	
FORM COMPLETED BY M Gilmore / D. York	DATE 15 Feb 2012 TIME 1120 (AM) PM / REASON FOR SURVEY Mitchell Lanfill Phase II - Haul Road

WEATHER CONDITIONS	Now: ☐ storm (heavy rain) ☐ rain (steady rain) ☐ showers (intermittent) 100% ☒ %cloud cover ☐ clear/sunny Past 24 hours: ☐ ☐ ☐ ☒ 100% ☐ Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ .5" Air Temperature 2 °C 36°F (1-2" snow on gnd) Other ____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
STREAM CHARACTERIZATION	Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal Eph Stream Type: ☒ Coldwater ☐ Warmwater Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other ____ Catchment Area ____ km²



pg2-stream 24

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☐ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other Fly Ash ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Ash + sugar maple, red oak, tulip poplar
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** .61 m 2' **Sampling Reach Area** 18.3 m² 200 **Area in km² (m²x1000)** 18.288 km² **Estimated Stream Depth** Ø m **Surface Velocity (at thalweg)** Ø m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** Ø m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle 0 % ☐ Run 0 % NA ☐ Pool 0 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No No flow
LARGE WOODY DEBRIS	**LWD** ~.4 m² **Density of LWD** ____ m²/km² (LWD/ reach area) <2%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** ____ N/A **Portion of the reach with aquatic vegetation** ____ %
WATER QUALITY	**Temperature** ____ °C **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ **Turbidity** ____ **WQ Instrument Used** ____ No flow N/A **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other ____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	40%
Boulder	> 256 mm (10")	5%			
Cobble	64-256 mm (2.5"-10")	20%	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	10%			
Sand	0.06-2mm (gritty)	5%	Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	60%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 26	LOCATION Cresap, Marshall Co, WV
STATION # ___ RIVERMILE ___	STREAM CLASS Ephemeral
LAT 39°49'33.019" LONG 80°47'9.48"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	LOT NUMBER
FORM COMPLETED BY D York / M. Gilmore	DATE 15 Feb 2012 TIME 1107 (AM) PM / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble 20 % ☐ Snags 2 % ☐ Vegetated Banks 80 % ☐ Sand ___ % ☐ Submerged Macrophytes 0 % ☐ Other ( ) ___ %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other walk stream How were the samples collected? ☒ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ___ ☐ Snags ___ ☐ Vegetated Banks ___ ☐ Sand ___ ☐ Submerged Macrophytes ___ ☐ Other ( ) ___
GENERAL COMMENTS	No flow

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Stream 27	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS ephemeral
LAT 39°49'34.916 LONG 80°47'10.997"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS B. York / M. Gilmore	
FORM COMPLETED BY B. York / M. Gilmore	DATE 15 Feb 2012 TIME 1150 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II - Haul Road

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

N/A
No water

pg 2 - Stream 27

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 95

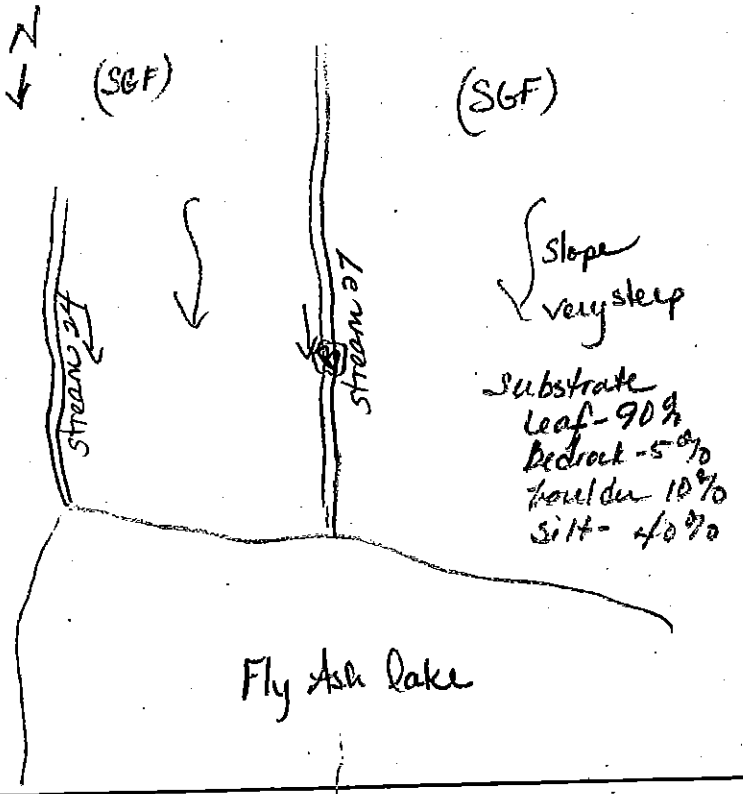
PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 27	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'34.916" LONG 80°47'10.997"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	
FORM COMPLETED BY D. York / M. Gilmore	DATE 15 Feb 2012 TIME 1150 (AM) PM	REASON FOR SURVEY Mitchell Landfill Phase II – haul road

WEATHER CONDITIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days? ☐ Yes ☒ No ≈ .5"
	☐ storm (heavy rain)	☐	Air Temperature 1.1 °C 34°F (1-2" snow on grd)
	☐ rain (steady rain)	☐	
	☐ showers (intermittent)	☐	Other _____
	100 % ☒ %cloud cover	☒ 100 %	
	☐ clear/sunny	☐	

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type: ☒ Coldwater ☐ Warmwater

Catchment Area _____ km²

Stream Origin: ☐ Glacial ☐ Non-glacial montane ☐ Swamp and bog ☒ Spring-fed ☐ Mixture of origins ☐ Other _____

pg2-stream27

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☐ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Sugar maple / Tulip poplar, white Ash, Am. beech, red oak
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** .3048 m 1' **Sampling Reach Area** 9.29 m² 100 **Area in km² (m²x1000)** 9,290.3 km² Ø **Estimated Stream Depth** Ø m Ø **Surface Velocity (at thalweg)** Ø m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** ____ m Ø **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____ % ☐ Run Ø % ☐ Pool Ø % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** ~.1 m² **Density of LWD** ____ m²/km² (LWD/ reach area) 1 %
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** Ø **Portion of the reach with aquatic vegetation** ____ % Ø
WATER QUALITY	**Temperature** ____ °C **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ **Turbidity** ____ **WQ Instrument Used** ____ N/A No flow **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other ____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other ____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		2%	Detritus	sticks, wood, coarse plant materials (CPOM)	100%
Boulder	> 256 mm (10")	10%			
Cobble	64-256 mm (2.5"-10")	35%	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	10%			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	Ø
Silt	0.004-0.06 mm	70%			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Stream 27	LOCATION Cresap, Marshall Co, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°49'34.916" LONG 80°47'10.997"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	LOT NUMBER
FORM COMPLETED BY D. York / M Gilmore	DATE 15 Feb 2012 TIME 1150 (AM) PM / REASON FOR SURVEY Mitchell Landfill Phase II - haul road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other Turn over substrate How were the samples collected? ☒ wading ☐ from bank ☐ from boat N/A Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	N/A - 0 flow

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3 = Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

FCA 0.65
0.66
0.57

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Stream	LOCATION AEP Mitchell Landfill Haul Rd	
STATION # E-3 RIVERMILE	STREAM CLASS Eph.	
LAT 39.82505 LONG 80.78785	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS Stantec		
FORM COMPLETED BY Stantec	DATE Aug 22, 2011 TIME AM PM	REASON FOR SURVEY Mitchell Landfill Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 104

Debit
Score - 348.95
length 609

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E3 RIVERMILE	STREAM CLASS Ephemeral
LAT 39 49 28.846 LONG 80 47 22.795	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS M. Gilmore, D. York	
FORM COMPLETED BY D. York / M. Gilmore	DATE 20 Mar 2012 TIME 1400 AM PM / REASON FOR SURVEY Mitchell landfill Phase II Haul Rd

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
30% ☒	%cloud cover	☒ ___%
☐	clear/sunny	☐

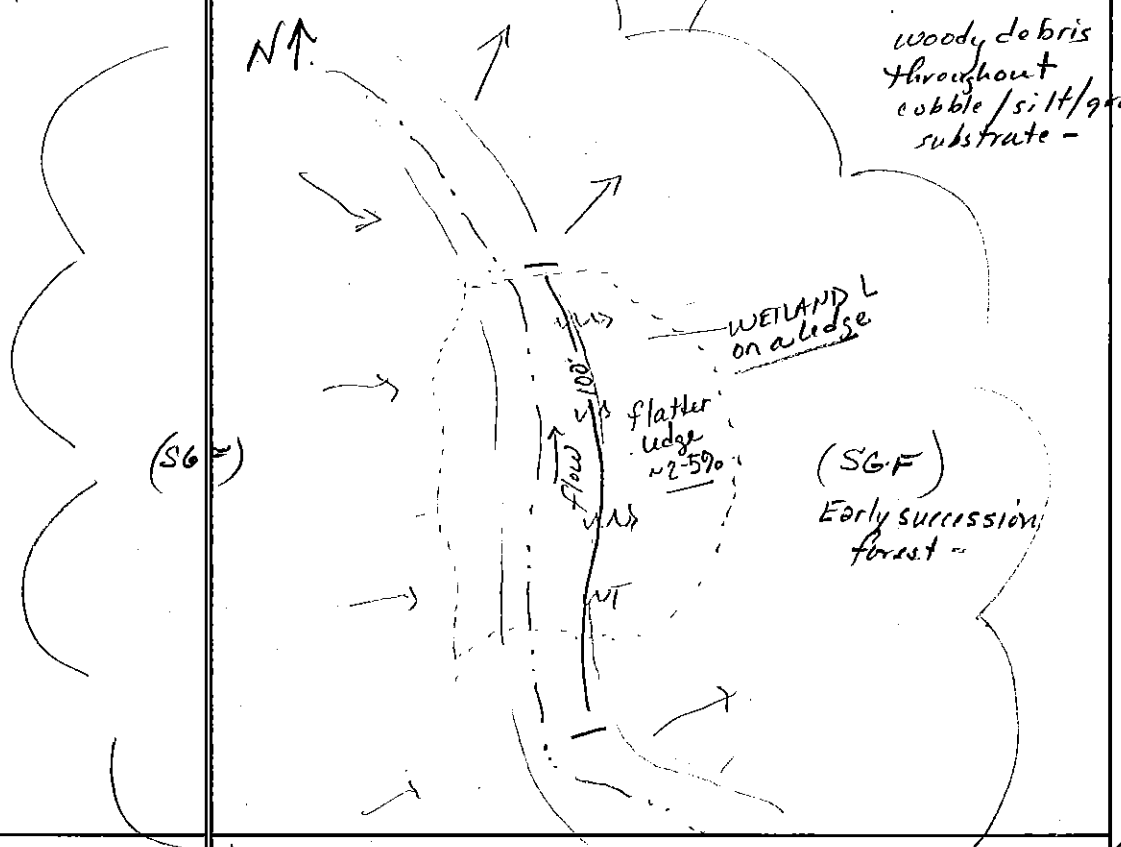
Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature ___ °C 75°F

Other Fly Ash Reservoir

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☐ Coldwater ☐ Warmwater

Ephemeral

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other_____

Catchment Area_____km²

Pg. 2
Stream E-3
20 Mar 2012

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☐ Forest ☐ Commercial ☐ Field/Pasture ☐ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☐ Moderate ☒ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☐ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** _____
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100' **Estimated Stream Width** 0.914 m 3' **Sampling Reach Area** 27.86 m² 300' **Area in km² (m²x1000)** 27869 km² **Estimated Stream Depth** 0.154 m .5' **Surface Velocity (at thalweg)** <1 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m 6" **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ___ % ☐ Run 0 % ☐ Pool 0 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 3 m² **Density of LWD** _____ m²/km² (LWD/ reach area) 30%
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ N/A **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	30%
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	17	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)	3	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	65			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION # E-3 RIVERMILE	STREAM CLASS Ephemeral	
LAT 39 49 28.814 LONG 80 47 22.795	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M. Gilmore		LOT NUMBER
FORM COMPLETED BY M Gilmore / D York	DATE 20 Mar 2012 TIME 1240 AM PM	REASON FOR SURVEY Mitchell landfill Phase II Haul Rd

HABITAT TYPES	Indicate the percentage of each habitat type present ☒ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☒ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____% N/A
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☐ Other disturbed substrate How were the samples collected? ☒ wading ☐ from bank ☐ from boat Ephemeral stream Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae 1/1	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

Eastern red backed salamander (1 juv) Not in stream / on bank near TP1

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # F-2 RIVERMILE	STREAM CLASS Intermittent
LAT 39 49 27.505 LONG 80 47 20.070	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York	
FORM COMPLETED BY	DATE 20 Mar 2012 TIME 1415 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd.

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 (4) 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 93 - marginal

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # I-2 RIVERMILE	STREAM CLASS Intermittent
LAT 39°49'27.505" LONG 80°47'20.070"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	
FORM COMPLETED BY D. York / M. Gilmore	DATE 20 Mar 2012 TIME 1415 AM (PM) / REASON FOR SURVEY Mitchell landfill Phase II Haul Rd

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
30%	%cloud cover	☒ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

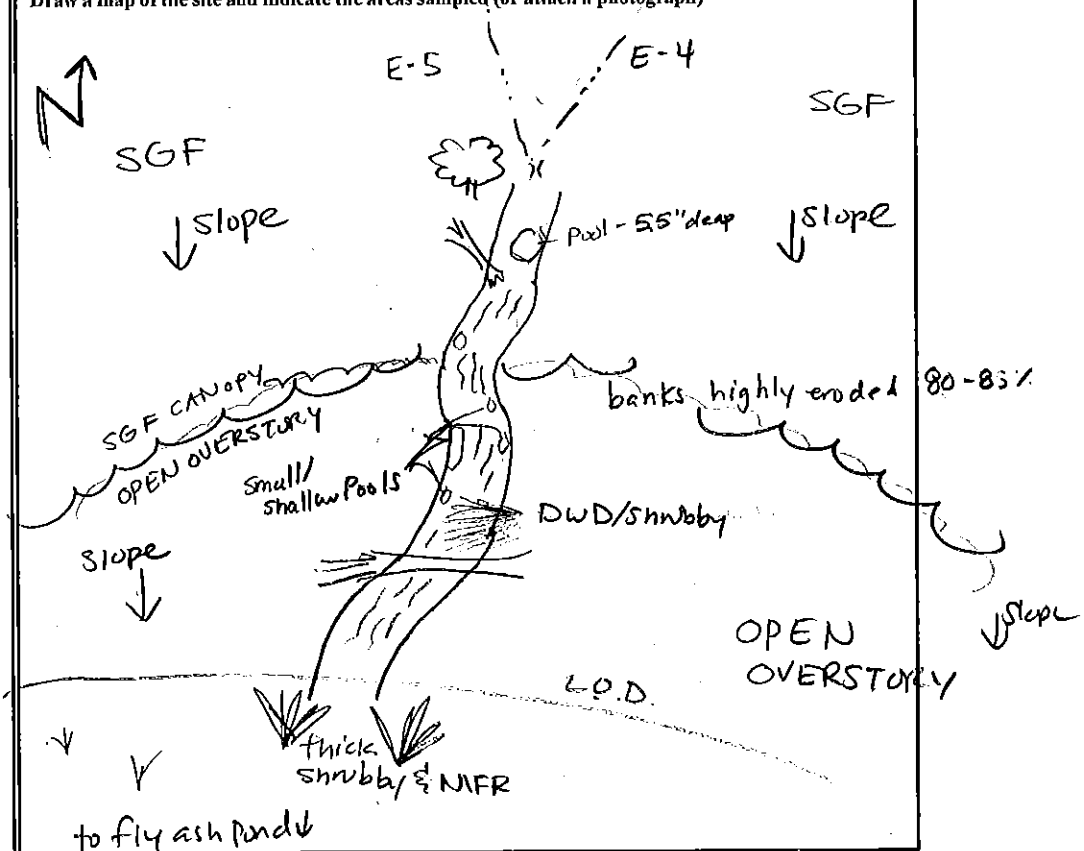
Air Temperature ____ °C 74°F

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

Top bank - T. bank = 10 ft
OHWM = 2.5'
width = 4'
bankheight = 5'
pool deph = 5.25"



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☒ Intermittent ☐ Tidal

Stream Type
☐ Coldwater ☒ Warmwater

Stream Origin
☐ Glacial ☒ Spring-fed
☐ Non-glacial montane ☐ Mixture of origins
☐ Swamp and bog ☐ Other _____

Catchment Area _____ km²

Pg 2
Stream I-2

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☐ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☒ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** _____
INSTREAM FEATURES	**Estimated Reach Length** _____ m **Estimated Stream Width** _____ m 4' **Sampling Reach Area** _____ m^2 **Area in km^2 (m^2x1000)** _____ km^2 **Estimated Stream Depth** _____ m **Surface Velocity (at thalweg)** 1 m/sec **Canopy Cover** ☒ Partly open ☐ Partly shaded ☐ Shaded — open canopy, sapling cover high over stream **High Water Mark** _____ m 2.5' **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle _____ % ☐ Run _____ % ☐ Pool _____ % **Channelized** ☐ Yes ☐ No **Dam Present** ☐ Yes ☐ No
LARGE WOODY DEBRIS	**LWD** _____ m^2 3% of reach **Density of LWD** _____ m^2/km^2 (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** 14.4 °C **Specific Conductance** 188 **Dissolved Oxygen** 7.70 **pH** 7.17 **Turbidity** 223 **WQ Instrument Used** HORIBA U52 **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☒ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	5%
Boulder	> 256 mm (10")	30			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	—
Gravel	2-64 mm (0.1"-2.5")	20			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	—
Silt	0.004-0.06 mm	30			
Clay	< 0.004 mm (slick)	—			

clay/hardpan - 70% (under)

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib	LOCATION ARP Mitchell Landfill Phase II Haul Rd
STATION # I-2 RIVERMILE	STREAM CLASS Intermittent
LAT 39°49'27.585 LONG 80°47'20.070"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS M. Gilmore / D. York	LOT NUMBER
FORM COMPLETED BY M Gilmore / D. York	DATE 20 Mar 2012 TIME _____ AM PM / REASON FOR SURVEY Mitchell

HABITAT TYPES	Indicate the percentage of each habitat type present ☒ Cobble 50 % ☐ Snags ____ % ☐ Vegetated Banks 0 % ☐ Sand 0 % ☐ Submerged Macrophytes 0 % ☒ Other (pool) 25 %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other hand net / disturb substrate How were the samples collected? ☒ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☒ Other (riffles/pools) 100% >1 m sq.
GENERAL COMMENTS	- flipped rocks / disturbed substrate Kick small hand net

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4	limnephilia					
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4	Rhyacophilidae					
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4	(1st nodum - sclerized, not rest)					
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4	nemouridae					
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

page 1 of 1

STREAM NAME		LOCATION AEP Mitchell Landfill Phase II Hanel Rd	
STATION # I-2	RIVERMILE	STREAM CLASS Intermittent	
LAT 39°49'27.505"	LONG 80°47'20.070"	RIVER BASIN OHIO	
STORET #		AGENCY	
COLLECTED BY D. York	DATE	LOT #	NUMBER OF SWEEPS
HABITATS: ☒ COBBLE	☐ SHOREZONE	☐ SNAGS ☐ VEGETATION	

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda		1									
Amphipoda						Diptera	blackfly larvae	5			
Decapoda											
Ephemeroptera	nemouridae	>10									
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera	Rhyacophilidae	1	I	DJ	1						
	Limnephilidae	1	I	DJ	1						
						Taxonomic certainty rating (TCR) 1-5: 1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials					
Hemiptera											

	Site Value	Target Threshold	
Total No. Taxa	4		If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa	1		If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

Score 30 - Marginal
TT - 53.5 - Marginal

FCI - 0.67
0.54
0.61

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Stream	LOCATION AEP Mitchell landfill Haul Rd
STATION # E-4 RIVERMILE	STREAM CLASS Eph.
LAT 39.82413 LONG -80.78883	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS Stantec	
FORM COMPLETED BY Stantec	DATE Aug 22, 2011 TIME AM PM / REASON FOR SURVEY Mitchell landfill Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 14	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 (1) 0
SCORE 1 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 (1) 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

Total Score 95

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Hammed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION # E-4 RIVERMILE ____	STREAM CLASS Ephemeral	
LAT 39°49'26.807 LONG 80°47'19.739	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M. Gilmore		
FORM COMPLETED BY M. Gilmore / D. York	DATE 20 Mar 2012 TIME 1520 AM PM	REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
45 % ☒	%cloud cover	☐ ____ %
☐	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☐ Yes ☐ No

Air Temperature ____ °C 75°F

Other ____

SITE LOCATION/MAP

Bank-Bank = 1-1.5'

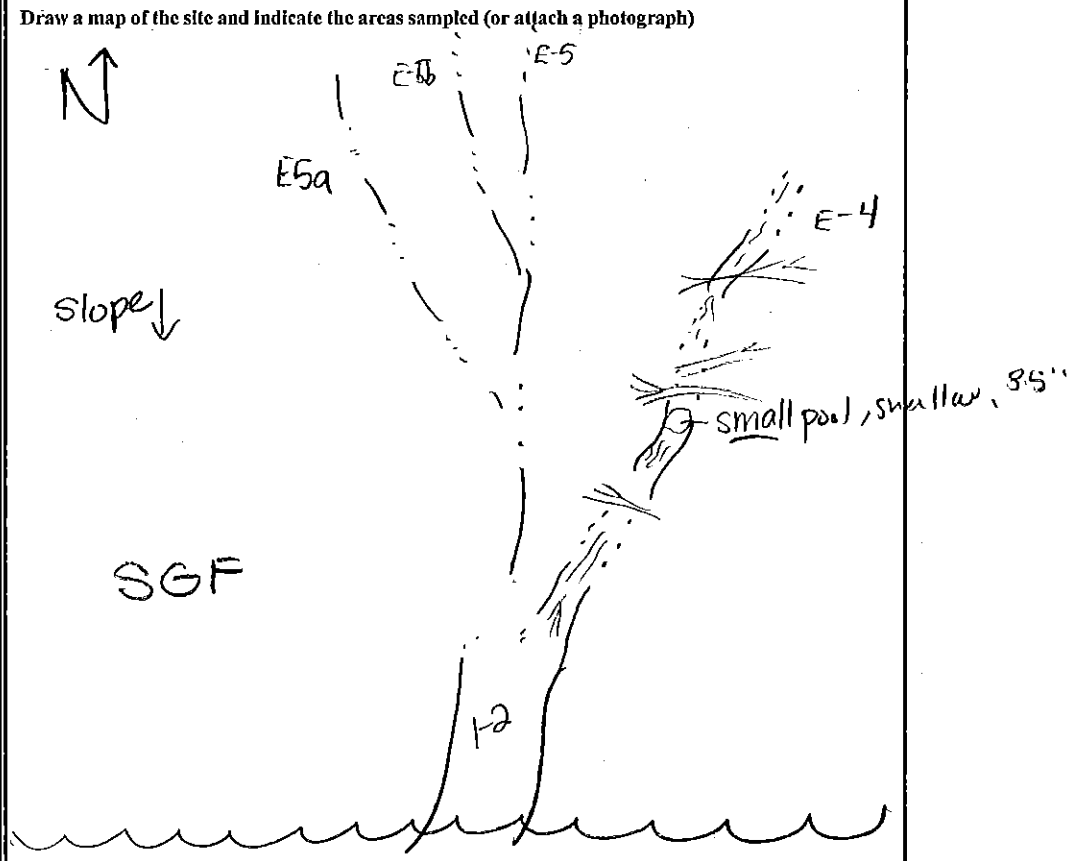
TopB-TopB = 2'

depth = .5"

b.height = 1-1.5'

pool = 3.5"

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal ☒ Ephemeral

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other ____

Stream Type
☒ Coldwater ☐ Warmwater

Catchment Area ____ km²

pg 2
Stream E-4
Mar 20, 2012

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Ulmus, Acer negundo, Acer sacc., MFR
INSTREAM FEATURES	**Estimated Reach Length** 27.43 m 90' **Estimated Stream Width** 0.61 m 2' **Sampling Reach Area** 16.73 m² **Area in km² (m²x1000)** 16.7323 km² **Estimated Stream Depth** 0.152 m .5" **Surface Velocity (at thalweg)** <1 m/sec **Canopy Cover** ☒ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** _____ m 1ft **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle _____ % ☐ Run _____ % ☐ Pool _____ % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** _____ m² 5% **Density of LWD** _____ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** Ø %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ Not enough H2O for sample **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☒ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

B-B = 1-1.5'
TB-TB = 2'
bank H = 1'-1.5'

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	15
Boulder	> 256 mm (10")	5			
Cobble	64-256 mm (2.5"-10")	5	Muck-Mud	black, very fine organic (FPOM)	—
Gravel	2-64 mm (0.1"-2.5")	10			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	—
Silt	0.004-0.06 mm	80			
Clay	< 0.004 mm (slick)	—			

hardpan.

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION # E-4 RIVERMILE	STREAM CLASS ephemeral	
LAT 39°49'26.807 LONG 80°47'19.739	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M Gilmore		LOT NUMBER
FORM COMPLETED BY D York / M. Gilmore	DATE 26 Mar 2012 TIME 1530 AM (PM)	REASON FOR SURVEY Mitchell landfill Phase II Haul Rd

HABITAT TYPES	**Indicate the percentage of each habitat type present** ☒ Cobble 5 % ☐ Snags 5 % ☐ Vegetated Banks ____ % ☐ Sand ____ % ☐ Submerged Macrophytes ____ % ☒ Other (Pool) .5 %
SAMPLE COLLECTION	**Gear used** ☐ D-frame ☐ kick-net ☒ Other flip substrate 100% reach **How were the samples collected?** ☐ wading ☐ from bank ☐ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	Dry Stream

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4	crayfish holes					
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME E-5	LOCATION Mitchell Power Plant - Cresap, WV
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39.82389 LONG -80.78858	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY J. Edwards, A. Sjollema	DATE 8/22/2011 TIME 2:00 AM (PM) / REASON FOR SURVEY JD survey

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 (1) 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

Total Score 97

E-5 RBP
- 97

length 109
PCI - 0.65
0.76
0.50

Debt score
63.62

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed Trib	LOCATION ACD Mitchell Landfill Phase III Haul Rd	
STATION # E-5 RIVERMILE ____	STREAM CLASS ephemeral	
LAT 39°49'26.275 LONG 80°47'19.096"	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. York / M Gilmore		
FORM COMPLETED BY M Gilmore / D. York	DATE 20 Mar 2012 TIME ____ AM PM	REASON FOR SURVEY Mitchell Landfill Phase III Haul Rd

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
5 % ☒	%cloud cover	☒ 30%
☐	clear/sunny	☐

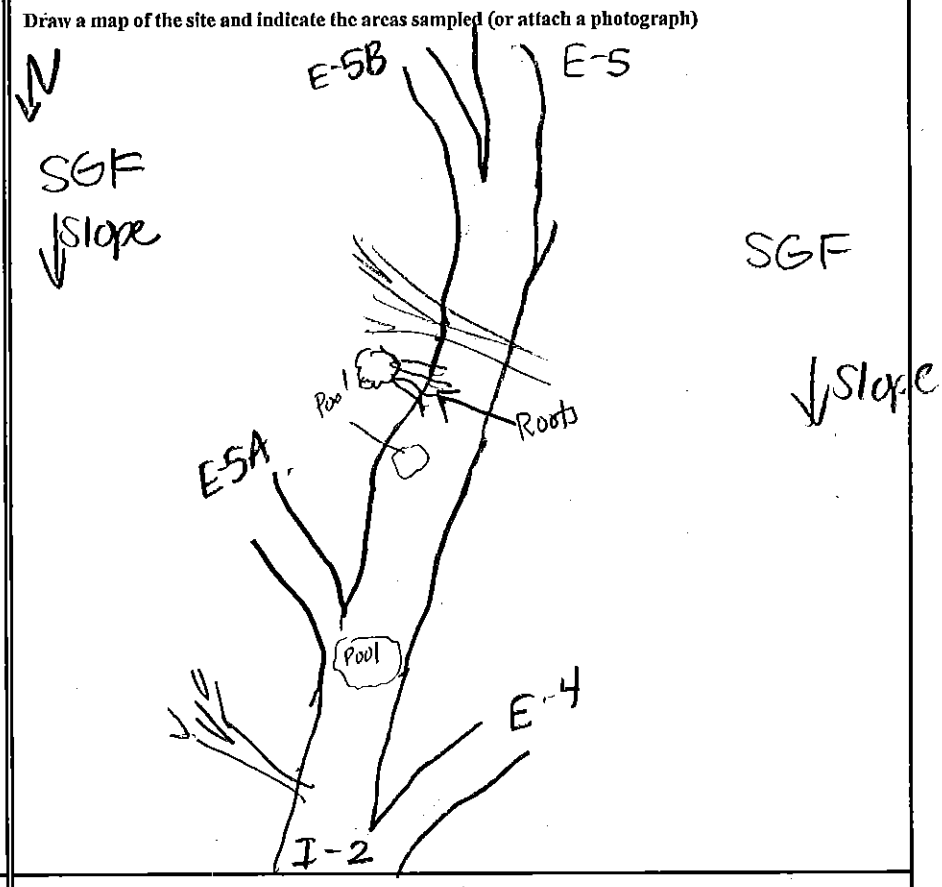
Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature ____ °C 80°F

Other ____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal ☒ ephemeral

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial ☒ Spring-fed
☐ Non-glacial montane ☒ Mixture of origins
☐ Swamp and bog ☐ Other ____

Catchment Area ____ km²

Pg. 2
Stream E5
Mar 20, 2012

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other flyash pond ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☒ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Ulmus, Acer negundo, MFR
INSTREAM FEATURES	**Estimated Reach Length** 33.22 m 109' **Estimated Stream Width** 0.46 m 1'-1.5' **Sampling Reach Area** 15.28 m² **Area in km² (m²x1000)** 15281.2 km² **Estimated Stream Depth** 0.152 m .5" **Surface Velocity (at thalweg)** Ø m/sec **Canopy Cover** ☒ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** _____ m 1' **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle _____ % ☐ Run _____ % ☐ Pool _____ % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** _____ m² 2% **Density of LWD** _____ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY Not enough H_2O	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☒ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

Tobant = 1.5'

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	60
Boulder	> 256 mm (10")	30			
Cobble	64-256 mm (2.5"-10")	10	Muck-Mud	black, very fine organic (FPOM)	Ø
Gravel	2-64 mm (0.1"-2.5")	9			
Sand	0.06-2mm (gritty)	1	Marl	grey, shell fragments	1
Silt	0.004-0.06 mm	50			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION # E-5 RIVERMILE _____	STREAM CLASS ephemeral	
LAT 39°49'26.275 LONG 80°47'19.096	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS M. Gilmore / D. York		LOT NUMBER
FORM COMPLETED BY M Gilmore / D. York	DATE 20 Mar 2012 TIME _____ AM PM	REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

HABITAT TYPES	**Indicate the percentage of each habitat type present** ☒ Cobble 10 % ☐ Snags 2 % ☐ Vegetated Banks ____ % ☐ Sand ____ % ☐ Submerged Macrophytes ____ % ☐ Other (leaf pack) 1 %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other disturb substrate / handnet **How were the samples collected?** ☐ wading ☐ from bank ☐ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☒ Other ( ) ____
GENERAL COMMENTS	waded stream, flipped rocks / leaf packs whole reach (100ft)

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4	Ephemerodilla III = 3 1					
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4	?					
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4	Capnridae					
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Land Fill Phase II Haul Rd
STATION # E-5 RIVERMILE	STREAM CLASS Ephemeral
LAT 39 49 26.275 LONG 80°47'19.094	RIVER BASIN OH
STORET #	AGENCY
COLLECTED BY D. York DATE 20 March	LOT # NUMBER OF SWEEPS
HABITATS: ☒ COBBLE ☐ SHOREZONE	☐ SNAGS ☐ VEGETATION

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera					
Decapoda											
Ephemeroptera	Nemouridae	3	I	DY	1						
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera											
						Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials					
Hemiptera											

	Site Value	Target Threshold	
Total No. Taxa			If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa			If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

Stream score 36 - ~~Poor~~ suboptimal
Tolerance - ~~Poor~~ Marginal

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II/Haul Rd
STATION # E5a RIVERMILE	STREAM CLASS Ephemeral
LAT 39 49 26.946 LONG 80 47 19.243	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS DYork M Gilmore	
FORM COMPLETED BY DYork	DATE 20 Mar 2012 TIME 1545 AM PM / REASON FOR SURVEY Mitchell landfill Phase II Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. leaf pack
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
2. Embeddedness substrate silt!	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
3. Velocity/Depth Regime 1	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). trickle!
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
4. Sediment Deposition 1	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. All silt moving when rained
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
5. Channel Flow Status 1	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0

Pg 2
Stream E-5a
March 20, 2011

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

20
20
20

All flat! No substrate for riffles

Total Score 82 – Marginal

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed trib	LOCATION AEP Mitchell landfill Phase II Haul Rd
STATION # E5a RIVERMILE_____	STREAM CLASS ephemeral
LAT 39 49 26.9416 LONG 80 47 19.243	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. York / M. Gilmore	
FORM COMPLETED BY D. York / M. Gilmore	DATE 3/20-2012 TIME 1545 AM PM
REASON FOR SURVEY Mitchell landfill Phase II Haul Rd	

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
45 %	%cloud cover	☐ ___ %
☐	clear/sunny	☐

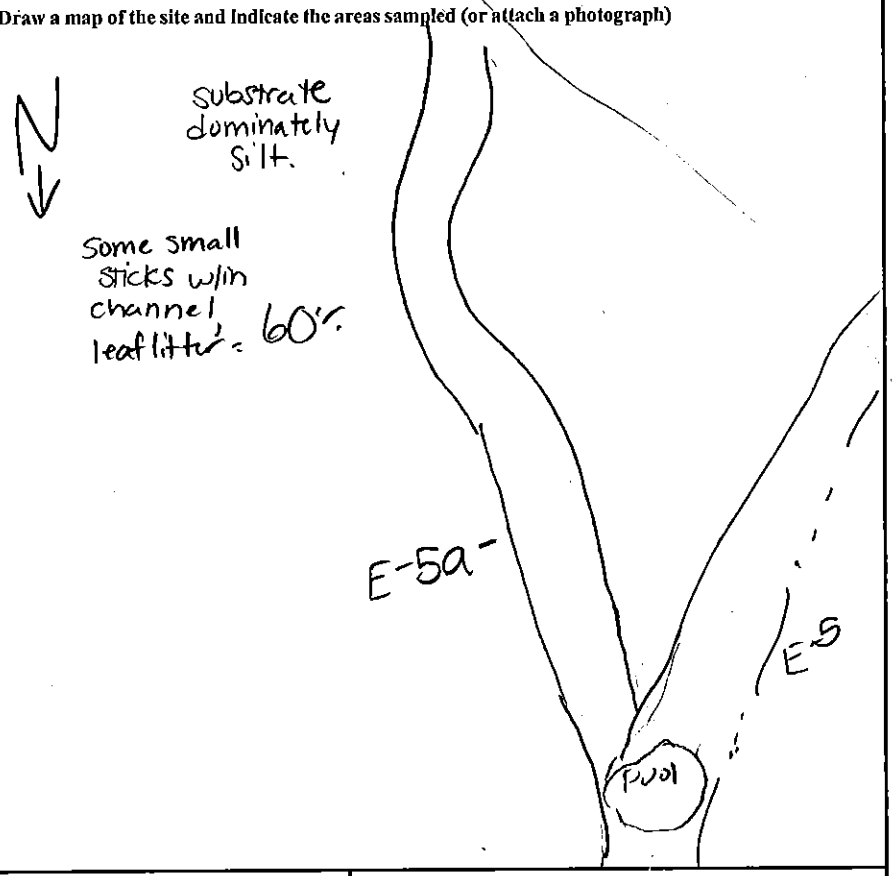
Has there been a heavy rain in the last 7 days? ☐ Yes ☐ No

Air Temperature____ °C 80°F

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



B-B = 1-1.5'
TB-TB = 1.5'
Actwm = 0-1'
depth = .5"
BH = 6"

STREAM CHARACTERIZATION

Stream Subsystem ~~☐ Perennial ☐ Intermittent ☐ Tidal~~ epremeral

Stream Type ☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other_____

Catchment Area_____ km^2

Pg2
Stream E-5a
20 Mar 2011

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☒ Other fly ash ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** Fraxinus, maple, MFR, ulmus
INSTREAM FEATURES	**Estimated Reach Length** 17.98 m 59' **Estimated Stream Width** 0.457 m 1.5' **Sampling Reach Area** 8.22 m² **Area in km² (m²x1000)** 8220.9 km² **Estimated Stream Depth** 0.154 m .5" **Surface Velocity (at thalweg)** <1 m/sec trickle **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m 1' **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____ % ☐ Run ____ % ☐ Pool ____ % > all silt, none present **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 0.08 m² 1% **Density of LWD** _____ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY Not enough H2O for sample	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☒ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	60
Boulder	> 256 mm (10")	—			
Cobble	64-256 mm (2.5"-10")	—	Muck-Mud	black, very fine organic (FPOM)	—
Gravel	2-64 mm (0.1"-2.5")	1			
Sand	0.06-2mm (gritty)	1	Marl	grey, shell fragments	—
Silt	0.004-0.06 mm	98			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Stream		LOCATION AEP Mitchell Landfill Phase II haul Rd	
STATION # E-5a RIVERMILE		STREAM CLASS ephemeral	
LAT 39 49 26.9416 LONG 80 47 19.243		RIVER BASIN Ohio	
STORET #		AGENCY	
INVESTIGATORS D. York / M. Colmore			LOT NUMBER
FORM COMPLETED BY D. York / M. Colmore	DATE 20 March 2012 TIME 1545 AM (PM)		REASON FOR SURVEY Mitchell Landfill Phase II haul rd

HABITAT TYPES	**Indicate the percentage of each habitat type present** ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	**Gear used** ☐ D-frame ☐ kick-net ☒ Other disturb substrate / hand net / leafpacks **How were the samples collected?** ☐ wading ☐ from bank ☐ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other (wade whole stream / flipping
GENERAL COMMENTS	No flow - all 3 (E-5, E5a, E-5b) begin ~ 20-25 feet downstream of spring box.

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	(0)	1	2	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	(0)	1	2	3	4	Macroinvertebrates	(0)	1	2	3	4
Macrophytes	(0)	1	2	3	4	Fish	(0)	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	(0)	1	2	3	4	Anisoptera	(0)	1	2	3	4	Chironomidae	(0)	1	2	3	4
Hydrozoa	(0)	1	2	3	4	Zygoptera	(0)	1	2	3	4	Ephemeroptera	(0)	1	2	3	4
Platyhelminthes	(0)	1	2	3	4	Hemiptera	(0)	1	2	3	4	Trichoptera	(0)	1	2	3	4
Turbellaria	(0)	1	2	3	4	Coleoptera	(0)	1	2	3	4	Other	(0)	1	2	3	4
Hirudinea	(0)	1	2	3	4	Lepidoptera	(0)	1	2	3	4						
Oligochaeta	(0)	1	2	3	4	Sialidae	(0)	1	2	3	4						
Isopoda	(0)	1	2	3	4	Corydalidae	(0)	1	2	3	4						
Amphipoda	(0)	1	2	3	4	Tipulidae	(0)	1	2	3	4						
Decapoda	(0)	1	2	3	4	Empididae	(0)	1	2	3	4						
Gastropoda	(0)	1	2	3	4	Simuliidae	(0)	1	2	3	4						
Bivalvia	(0)	1	2	3	4	Tabinidae	(0)	1	2	3	4						
						Culcidae	(0)	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Stream	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E5b RIVERMILE	STREAM CLASS Ephemeral
LAT 39 49 26.587 LONG 80 47 19.352	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D York / M Gilmore	
FORM COMPLETED BY D York	DATE 20 Dec 2012 TIME 1545 AM PM
REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd	

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. leaf pack only
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. silty
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
4. Sediment Deposition Almost all silt	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0

Stream E5b

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat, distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent, more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 88

marginal

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-5b RIVERMILE_____	STREAM CLASS ephemeral
LAT 39 49 26.587 LONG 80 47 19.352	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS York / Gilmore	
FORM COMPLETED BY York/Gilmore	DATE 3-20-2012 TIME 1605 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
45 % ☐	%cloud cover	☐ ____ %
☐	clear/sunny	☐

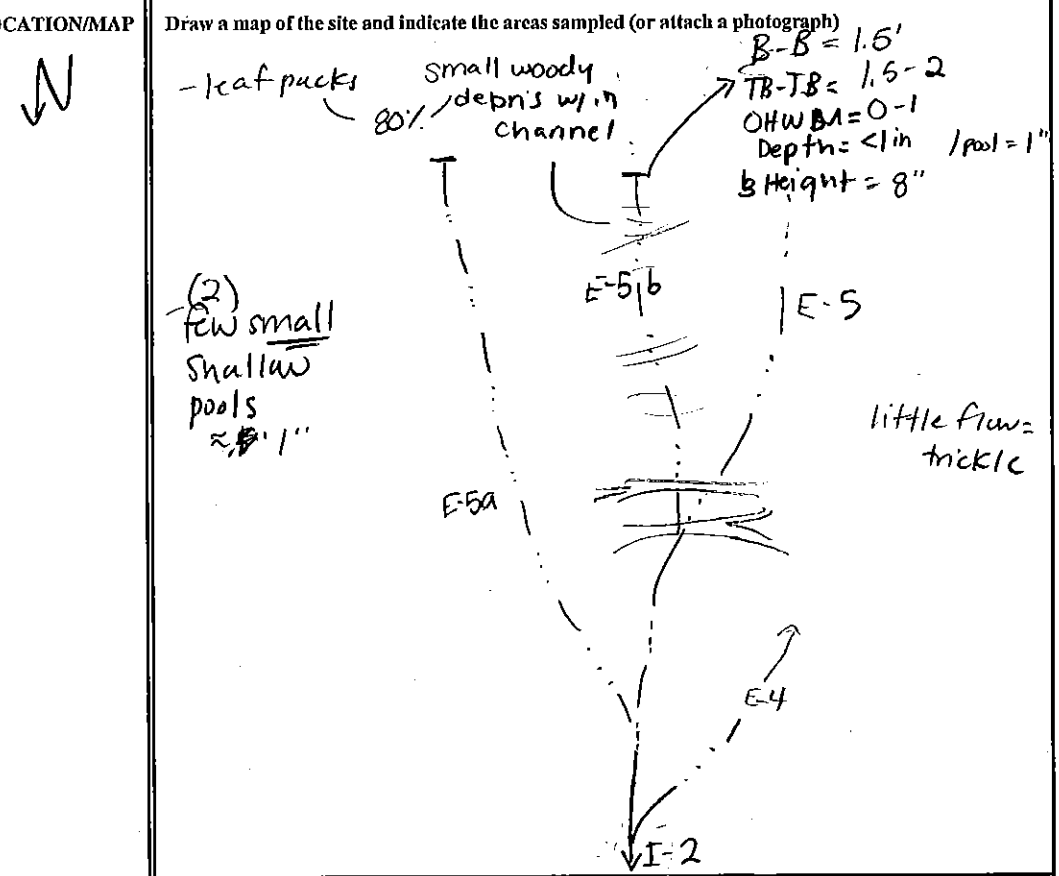
Has there been a heavy rain in the last 7 days? ☐ Yes ☐ No

Air Temperature____ °C 75° F

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem ephemeral
~~☐ Perennial~~ ~~☐ Intermittent~~ ~~☐ Tidal~~

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☐ Other_____

Catchment Area_____ km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

E-5b

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☒ Industrial ☐ Agricultural ☒ Other flyash ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☒ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** ash, maple, boxelder, MFR, Ulmus
INSTREAM FEATURES	**Estimated Reach Length** 16.15 m 53' **Estimated Stream Width** 0.61 m 2' **Sampling Reach Area** 9.85 m² **Area in km² (m²x1000)** 9851.5 km² **Estimated Stream Depth** 0.152 m .5' pool=1' **Surface Velocity (at thalweg)** <1 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m 0-1' **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____ % ☐ Run ____ % ☒ Pool 2 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** ~2.5 m² 25% **Density of LWD** _____ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY Not enough H2O for sample	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☒ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		—	Detritus	sticks, wood, coarse plant materials (CPOM)	80%
Boulder	> 256 mm (10")	—			
Cobble	64-256 mm (2.5"-10")	1	Muck-Mud	black, very fine organic (FPOM)	—
Gravel	2-64 mm (0.1"-2.5")	9			
Sand	0.06-2mm (gritty)	—	Marl	grey, shell fragments	—
Silt	0.004-0.06 mm	90			
Clay	< 0.004 mm (slick)	—			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed Trib	LOCATION ACP Mitchell Land Fill Phase II Haul Rd	
STATION # E-56 RIVERMILE	STREAM CLASS ephemeral	
LAT 39 49 26.587 LONG 80 47 19.352	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS M. Gilmore / D. York		LOT NUMBER
FORM COMPLETED BY D. York / M. Gilmore	DATE 3/20/2012 TIME 1545 AM (PM)	REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other hand net, flip substrate How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☒ Other (survey entire length, distrb substrate, hand net
GENERAL COMMENTS	No flow.

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME E-1	LOCATION Mitchell Power Plant	
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral	
LAT 39.82471 LONG -80.79235	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS J. Edwards, A. Sjolkma		
FORM COMPLETED BY	DATE 8/22/2011 TIME 10:00 AM PM	REASON FOR SURVEY JD Survey

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0

Total Score 108

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

Cresap, West Virginia

STREAM NAME E-1	LOCATION Mitchell Power Plant Phase II
STATION #_____ RIVERMILE_____	STREAM CLASS Ephemeral
LAT 39.82471 LONG -80.79235	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS J. Edwards, A. Siollema	
FORM COMPLETED BY	DATE 8/22/2011 TIME 10:00 (AM) PM — REASON FOR SURVEY Jurisdictional Determination

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
15 % ☑	%cloud cover	☑ 15 %
☑	clear/sunny	☑

Has there been a heavy rain in the last 7 days? ☑ Yes ☐ No

Air Temperature 88 °C

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

STREAM CHARACTERIZATION

Stream Subsystem: ☐ Perennial ☑ Intermittent ☐ Tidal

Stream Type: ☐ Coldwater ☑ Warmwater

Stream Origin: ☐ Glacial ☑ Non-glacial montane ☐ Swamp and bog ☐ Spring-fed ☐ Mixture of origins ☐ Other_____

Catchment Area .0006 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☐ Forest ☑ Field/Pasture ☐ Agricultural ☐ Residential ☐ Commercial ☐ Industrial ☐ Other _____ **Local Watershed NPS Pollution** ☐ No evidence ☑ Some potential sources ☐ Obvious sources **Local Watershed Erosion** ☐ None ☑ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☐ Trees ☐ Shrubs ☑ Grasses ☐ Herbaceous **dominant species present** Dicanthelium clandestinum
INSTREAM FEATURES	**Estimated Reach Length** 23 m **Estimated Stream Width** 1 m **Sampling Reach Area** 23 m² **Area in km² (m²x1000)** 23×10^{-5} km² **Estimated Stream Depth** .15 m **Surface Velocity (at thalweg)** no water m/sec **Canopy Cover** ☑ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** .2 m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____ % ☑ Run 100 % ☐ Pool ____ % **Channelized** ☑ Yes ☐ No **Dam Present** ☐ Yes ☑ No
LARGE WOODY DEBRIS	**LWD** 0 m² **Density of LWD** 0 m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** none **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** ____ °C no water **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ **Turbidity** ____ **WQ Instrument Used** ____ **Water Odors** ☑ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☑ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☑ Other no H_2O
SEDIMENT/ SUBSTRATE	**Odors** ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☑ None ☐ Other ____ **Oils** ☑ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☑ Other none **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		0	Detritus	sticks, wood, coarse plant materials (CPOM)	5
Boulder	> 256 mm (10")	0			
Cobble	64-256 mm (2.5"-10")	0	Muck-Mud	black, very fine organic (FPOM)	95
Gravel	2-64 mm (0.1"-2.5")	15			
Sand	0.06-2mm (gritty)	10	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	75			
Clay	< 0.004 mm (slick)	0			

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME E-1	LOCATION Mitchell Power Plant	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT 39.82471 LONG -80.79235	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS J. Edwards	A. Sjollema	LOT NUMBER
FORM COMPLETED BY	DATE 8/22/2011 TIME 10:00 AM PM	REASON FOR SURVEY JD survey

HABITAT TYPES	**Indicate the percentage of each habitat type present** ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☑ Other (grass)100 %
SAMPLE COLLECTION	**Gear used** ☐ D-frame ☐ kick-net ☐ Other _____ **How were the samples collected?** ☐ wading ☐ from bank ☐ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	A benthic macroinvertebrate survey was not conducted

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

page ____ of ____

STREAM NAME E-1	LOCATION Mitchell Power Plant
STATION # ____ RIVERMILE ____	STREAM CLASS Ephemeral
LAT 39.82471 LONG -80.79235	RIVER BASIN
STORET #	AGENCY
COLLECTED BY DATE ____	LOT # ____ NUMBER OF SWEEPS ____
HABITATS: ☐ COBBLE ☐ SHOREZONE ☐ SNAGS ☐ VEGETATION	

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera					
Decapoda											
Ephemeroptera											
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera											
Hemiptera											

Taxonomic certainty rating (TCR) 1-5: 1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

	Site Value	Target Threshold	
Total No. Taxa			If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa			If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME E-2	LOCATION Mitchell Park Plat Phase II
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39.82485 LONG -80.79241	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS J. Edwards A. Siollema	
FORM COMPLETED BY	DATE 8/22/2011 TIME 10:30 AM PM / REASON FOR SURVEY J.D.

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

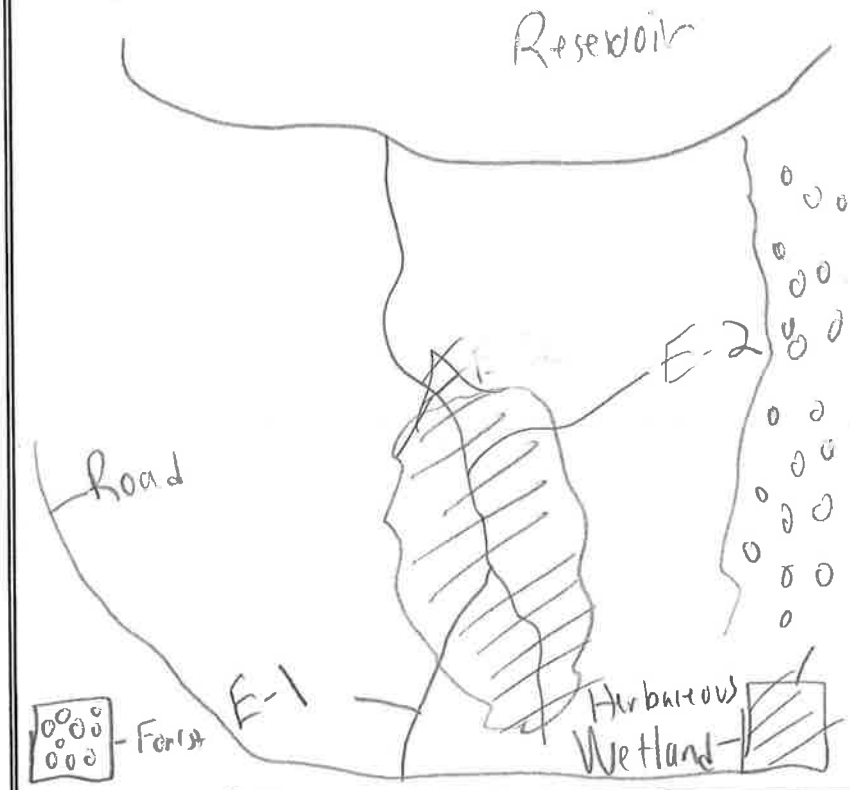
Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 81

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)

STREAM NAME E-2	LOCATION Mitchell Power Plant Phase II, Cresap, WV	
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral	
LAT 39.82485 LONG -80.79241	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY J. Edwards, A. Sjollema	DATE 2/22/2011 TIME 10:30 AM ☑ PM	REASON FOR SURVEY Jurisdictional Determination

WEATHER CONDITIONS	Now: ☐ storm (heavy rain) ☐ rain (steady rain) ☐ showers (intermittent) 15 % ☑ %cloud cover ☐ clear/sunny Past 24 hours: ☐ ☐ ☐ ☑ 15 % ☐ Has there been a heavy rain in the last 7 days? ☑ Yes ☐ No Air Temperature 88 °C Other _____
SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION	**Stream Subsystem** ☐ Perennial ☑ Intermittent ☐ Tidal **Stream Type** ☐ Coldwater ☑ Warmwater **Stream Origin** ☐ Glacial ☑ Non-glacial montane ☐ Swamp and bog ☐ Spring-fed ☐ Mixture of origins ☐ Other _____ **Catchment Area** .0035 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☐ Forest ☐ Commercial ☑ Field/Pasture ☐ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☑ Some potential sources ☐ Obvious sources **Local Watershed Erosion** ☐ None ☑ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☐ Trees ☐ Shrubs ☑ Grasses ☑ Herbaceous **dominant species present** Dicanthelium clandestinum
INSTREAM FEATURES	**Estimated Reach Length** 60 m **Estimated Stream Width** 1 m **Sampling Reach Area** 60 m² **Area in km² (m²x1000)** 6.0x10⁻⁵ km² **Estimated Stream Depth** .15 m **Surface Velocity (at thalweg)** no H_2O m/sec **Canopy Cover** ☑ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** .3 m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____ % ☑ Run 100 % ☐ Pool ____ % **Channelized** ☑ Yes ☐ No **Dam Present** ☐ Yes ☑ No
LARGE WOODY DEBRIS	**LWD** 0 m² **Density of LWD** 0 m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** none **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** ____ °C no H_2O **Specific Conductance** ____ **Dissolved Oxygen** ____ **pH** ____ **Turbidity** ____ **WQ Instrument Used** ____ **Water Odors** ☑ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other ____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☑ None ☐ Other ____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☑ Other no H_2O
SEDIMENT/ SUBSTRATE	**Odors** ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☑ None ☐ Other ____ **Oils** ☑ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☑ Other ____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☑ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock		0	Detritus	sticks, wood, coarse plant materials (CPOM)	10
Boulder	> 256 mm (10")	0			
Cobble	64-256 mm (2.5"-10")	0	Muck-Mud	black, very fine organic (FPOM)	90
Gravel	2-64 mm (0.1"-2.5")	5			
Sand	0.06-2mm (gritty)	10	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	75			
Clay	< 0.004 mm (slick)	10			

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib	LOCATION A&P Mitchell Landfill Haul Rd.	
STATION # E-6 RIVERMILE	STREAM CLASS Eph.	
LAT 39.84274 LONG 80.78564	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY STANTEC	DATE 8/22/2011 TIME ____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0

Stream E-6

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 14	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 1 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 (1) 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

Total Score 85

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME E-Collinsmuddrib	LOCATION AEP Mitchell Landfill Phase II Haul Road
STATION # E-6 RIVERMILE_____	STREAM CLASS Ephemeral
LAT 39°49'30.037 LONG 80°47'08.630	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D Godec / D York	
FORM COMPLETED BY D. Godec	DATE 3/21/12 TIME 4:35 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

WEATHER CONDITIONS	**Now**	**Past 24 hours**
	☐ storm (heavy rain)	☐
	☐ rain (steady rain)	☐
	☐ showers (intermittent)	☐
	5 % ☒ %cloud cover	☒ 30 %
	☐ clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature____°C 82°F

Other_____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

See Jurisdictional Waters Delineation Report for Phase II Haul Road

STREAM CHARACTERIZATION

Stream Subsystem (Ephemeral)
☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☒ Other Precipitation

Catchment Area_____km²

Stream E-6 (cont.) 3/21/12

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources (in Conner Run) **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☒ Shrubs ☐ Grasses ☒ Herbaceous **dominant species present** Acer negundo, Rosa multiflora, Basswood, Am. Elm, Garlic Mustard, Vitis sp., Stellaria media, Cardamine pensylvanica
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100 ft. **Estimated Stream Width** 0.762 m 2.5 ft **Sampling Reach Area** 23.23 m² **Area in km² (m²x1000)** 23236 km² **Estimated Stream Depth** 0.1524 m 1-2 in. **Surface Velocity (at thalweg)** <0.5 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** ____ m 1.5 ft. **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle 90 % ☐ Run 0 % ☐ Pool 10 % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 3 m² **Density of LWD** 0.00013 m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** 23.7 °C **Specific Conductance** 374 mS/cm **Dissolved Oxygen** 8.74 mg/L **pH** 6.84 **Turbidity** 231 NTU **WQ Instrument Used** Horiba U-52 **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other **Turbidity (if not measured)** ☐ Clear ☒ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** None ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	> 256 mm (10")	20%			
Cobble	64-256 mm (2.5"-10")	40%	Muck-Mud	black, very fine organic (FPOM)	0%
Gravel	2-64 mm (0.1"-2.5")	20%			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	0%
Silt	0.004-0.06 mm	20%			
Clay	< 0.004 mm (slick)				

320'
FCI 0.60
0.66
0.45

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

Debit score 157.07

STREAM NAME E-6	LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION # E-6 RIVERMILE	STREAM CLASS Ephemeral	
LAT 39°49'30.137 LONG 80°47'08.630	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. Godec / D. York		LOT NUMBER
FORM COMPLETED BY D. York, D. Godec	DATE 23 March 12 TIME 4:30 AM (PM)	REASON FOR SURVEY AEP Mitchell Landfill Phase II Haul Rd.

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble 40 % ☐ Snags 0 % ☐ Vegetated Banks 0 % ☐ Sand 0 % ☐ Submerged Macrophytes 0 % ☐ Other ( ) %
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other Aquarium Net; Hand Sorting How were the samples collected? ☒ wading ☒ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. NA ☐ Cobble ☐ Snags ☐ Vegetated Banks ☐ Sand ☐ Submerged Macrophytes ☐ Other ( )
GENERAL COMMENTS	Channel moist - one pool observed w/ ~ 1-2" of H_2O.

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	(0)	1	2	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	(0)	1	2	3	4	Macroinvertebrates	0	(1)	2	3	4
Macrophytes	(0)	1	2	3	4	Fish	(0)	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	(1)	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	(1)	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	(1)	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

Hemerodrilidae
only 1 of each found in deeper water areas

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-6 RIVERMILE	STREAM CLASS Ephemeral
LAT 39° 49' 30.037 LONG 80° 47' 08.630	RIVER BASIN 6H10
STORET #	AGENCY
COLLECTED BY D. York DATE	LOT # NUMBER OF SWEEPS
HABITATS: ☒ COBBLE ☐ SHOREZONE ☐ SNAGS ☐ VEGETATION	

sampled < 1 sq. meter

Not enough flow to Kick —

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta		1	I	DY	5	Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera	Chironomidae	I	I	DY	I
Decapoda											
Ephemeroptera	Nemouridae	1	I	DY	5						
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera											
						Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials					
Hemiptera											

	Site Value	Target Threshold	
Total No. Taxa	3		If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa	1		If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

Score 26 - Marginal
TT - 52.8 - Marginal

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION AEP Mitchell Landfill	
STATION # E-8 RIVERMILE	STREAM CLASS Ephemeral	
LAT 39.82550 LONG 80.78477	RIVER BASIN Ohio	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY Stantec	DATE 8/22/2011 TIME ____ AM PM	REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0

E-8

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 15	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

Total Score 76

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME E-8	LOCATION AEP Mitchell Landfill Phase II Haul Road
STATION # E-8 RIVERMILE _____	STREAM CLASS Ephemeral
LAT 39°19'31.702 LONG 80°47'05.127	RIVER BASIN Ohio
STORET #	AGENCY
INVESTIGATORS D. Godec; D. York	
FORM COMPLETED BY D. Godec	DATE 3/21/12 TIME 5:30 AM (PM) REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
___% ☐	%cloud cover	☒ 30%
☒	clear/sunny	☐

Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature ____ °C 82°F

Other _____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

See Jurisdiction Waters Delineation Report for Mitchell Landfill Phase II Haul Road

STREAM CHARACTERIZATION

Stream Subsystem Ephemeral
☐ Perennial ☐ Intermittent ☐ Tidal

Stream Type
☒ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed ?
☐ Mixture of origins
☒ Other Precipitation

Catchment Area _____ km²

Stream E-8 (cont.) 3/21/12

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other _____ ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources Corner Run Impoundment **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☒ Shrubs ☐ Grasses ☒ Herbaceous **dominant species present** Rosa multiflora, Acer saccharum, Ulmus americana, Basswood, Fraxinus americana, Aster sp.
INSTREAM FEATURES	**Estimated Reach Length** 17.68 m 58 ft **Estimated Stream Width** 0.61 m 2 ft. **Sampling Reach Area** 10.78 m² **Area in km² (m²x1000)** 10784.8 km² **Estimated Stream Depth** 0.1524 m 0.5 in **Surface Velocity (at thalweg)** <0.5 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☒ Shaded **High Water Mark** _____ m 1 ft. **Proportion of Reach Represented by Stream Morphology Types** ☒ Riffle 100 % ☐ Run — % ☐ Pool — % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 1 m² **Density of LWD** _____ m²/km² (LWD/ reach area)
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ Not Sampled; Not Enough Water **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☒ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** None ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	40%
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")	30%	Muck-Mud	black, very fine organic (FPOM)	0%
Gravel	2-64 mm (0.1"-2.5")	5%			
Sand	0.06-2mm (gritty)	5%	Marl	grey, shell fragments	0%
Silt	0.004-0.06 mm	60%			
Clay	< 0.004 mm (slick)				

581 Debit score. 31.47

FCI – 0.62
0.72
0.54

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME E-8		LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION #_____ RIVERMILE_____		STREAM CLASS Ephemeral	
LAT 39 49 31.702 LONG 80 47 05.127		RIVER BASIN OHIO	
STORET #		AGENCY	
INVESTIGATORS D. Godec; D. York			LOT NUMBER
FORM COMPLETED BY D. Godec	DATE 3/21/12 TIME 5:30 AM (PM)		REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☐ Cobble____% ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☒ Other Aquarium Net; Hand Sorting How were the samples collected? ☒ wading ☒ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☒ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	Assumed to be flowing wet year and recent heavy rains

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	(0)	1	2	3	4	Slimes	(0)	1	2	3	4
Filamentous Algae	(0)	1	2	3	4	Macroinvertebrates	0	(1)	2	3	4
Macrophytes	(0)	1	2	3	4	Fish	(0)	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	(1)	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	(1)	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4	Capniidae					
Oligochaeta	0	(1)	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4	Only 1 or 2 of each					
Amphipoda	0	1	2	3	4	Tipulidae	0	(1)	2	3	4	taxa and 1 species					
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4	of each noted					
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

PRELIMINARY ASSESSMENT SCORE SHEET
(PASS)

STREAM NAME Unnamed trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-8 RIVERMILE	STREAM CLASS Ephemeral
LAT 39 49 31.702 LONG 80° 47' 05.127	RIVER BASIN OH
STORET #	AGENCY
COLLECTED BY D. York DATE 21 Apr 12	LOT # NUMBER OF SWEEPS throughout entire reach
HABITATS: ☒ COBBLE ☐ SHOREZONE ☐ SNAGS ☐ VEGETATION	

Enter Family and/or Genus and Species name on blank line.

Organisms		No.	LS	TI	TCR	Organisms		No.	LS	TI	TCR
Oligochaeta						Megaloptera					
Hirudinea						Coleoptera					
Isopoda											
Amphipoda						Diptera					
Decapoda											
Ephemeroptera	Nemouridae	3	I	DY	1						
						Gastropoda					
						Pelecypoda					
Plecoptera											
						Other					
Trichoptera											
						Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials					
Hemiptera											

	Site Value	Target Threshold	
Total No. Taxa			If 2 or more metrics are ≥ target threshold, site is **HEALTHY**
EPT Taxa			If less than 2 metrics are within target range, site is **SUSPECTED IMPAIRED**
Tolerance Index			

Score · 36 - Suboptimal Total Tolerance 52.0 / Marginal
Integrity rating

134'

FCI
EPA - 111
SCI - 0

Debit 84
0.70
0.64
0.63

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-10 RIVERMILE	STREAM CLASS Ephemeral
LAT 39° 49 33.63 / LONG 81° 47 01.730	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D Godec / D. York	
FORM COMPLETED BY D. York	DATE 21 Mar 2012 TIME 530 AM PM — REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 10	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0

No WATER slightly moist channel

Pg. 2
stream E-10
3/21/2012

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 14 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 16 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 111

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Haul Road
STATION # E-70 RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'33.631 LONG 80°47'01.730	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS Godec / York	
FORM COMPLETED BY York /	DATE March 2012 TIME ____ AM PM / REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
5 % ☐	%cloud cover	☒ 30 %
☐	clear/sunny	☐

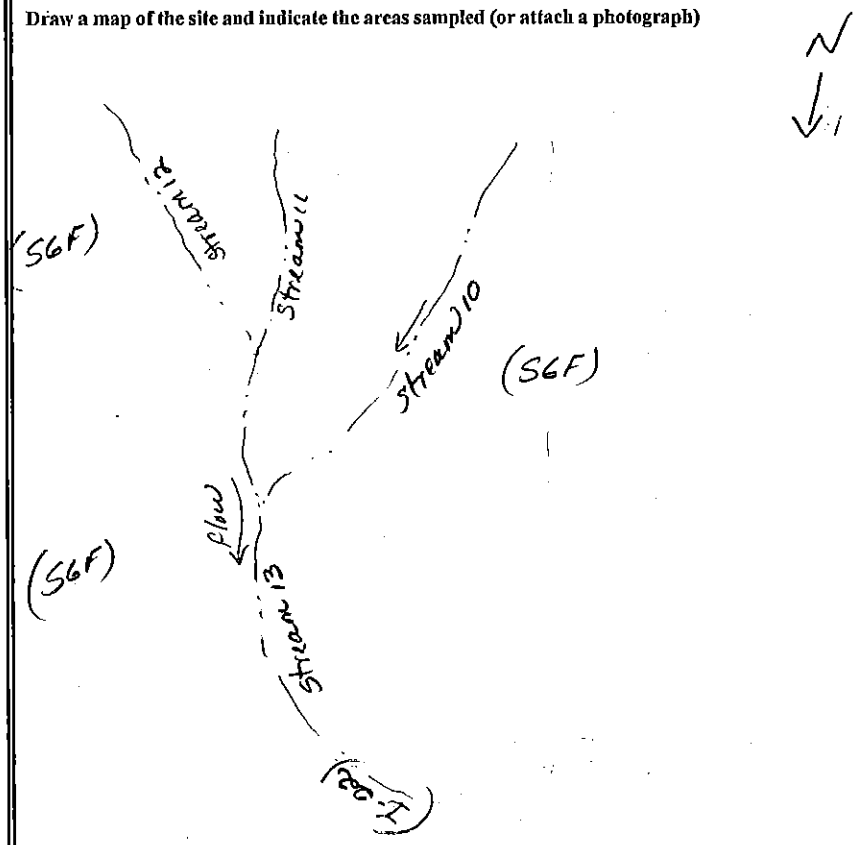
Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No

Air Temperature ____ °C 82°F

Other ____

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ ~~Perennial~~ ☐ ~~Intermittent~~ ☐ ~~Tidal~~ Ephemeral

Stream Type
☐ Coldwater ☐ Warmwater

Stream Origin
☐ Glacial
☐ Non-glacial montane
☐ Swamp and bog
☒ Spring-fed
☐ Mixture of origins
☒ Other Precipitation

Catchment Area ____ km²

Pg 2
Stream JE-10
Mar 21, 2012

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☐ Field/Pasture ☐ Industrial ☐ Agricultural ☐ Other _____ ☐ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources - Electrical, Powerplant, Fly Ash Reservoir, Coal **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous **dominant species present** _____
INSTREAM FEATURES	**Estimated Reach Length** 40.84 m 134' **Estimated Stream Width** 0.61 m 2' **Sampling Reach Area** 25 m² **Area in km² (m²x1000)** 25000 km² **Estimated Stream Depth** — m **Surface Velocity (at thalweg)** 0 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** _____ m **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle ____ % ☐ Run — % ☐ Pool — % **Channelized** ☐ Yes ☒ No **Dam Present** ☐ Yes ☒ No
LARGE WOODY DEBRIS	**LWD** 3 m² **Density of LWD** .00012 m²/km² (LWD/ reach area) 3sq-meter
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** N/A **Portion of the reach with aquatic vegetation** 0 %
WATER QUALITY	**Temperature** _____ °C **Specific Conductance** _____ **Dissolved Oxygen** _____ **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☐ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☐ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	90
Boulder	> 256 mm (10")	30			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	10			
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm	40			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME Unnamed trib	LOCATION AEP Mitchell Landfill Haul Road
STATION # E-10 RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'33.681 LONG 80°47'01.730	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. Goder / D. York	LOT NUMBER
FORM COMPLETED BY D York / M. Gilmore	DATE 21 Mar 2012 TIME 530 AM PM / REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

HABITAT TYPES	Indicate the percentage of each habitat type present ☑ Cobble 90 % ☐ Snags____% ☐ Vegetated Banks____% ☐ Sand____% ☐ Submerged Macrophytes____% ☐ Other ( )____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☐ Other _____ How were the samples collected? ☐ wading ☐ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☐ Cobble____ ☐ Snags____ ☐ Vegetated Banks____ ☐ Sand____ ☐ Submerged Macrophytes____ ☐ Other ( )____
GENERAL COMMENTS	Stream channel dry @ upper portion / moist near confluence w/ E-13

turned substrate

No flow Ephemeral stream

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Sub	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-11 RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'33.840" LONG 80°47'00.834"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS Godec / York	
FORM COMPLETED BY D. York	DATE 21 Mar 2012 TIME 500 AM (PM) REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)

No flow

Pg2 -
Stream E-11
3/21/2012

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

rocks have been dumped in vicinity to stream altering stream flow

Total Score 87

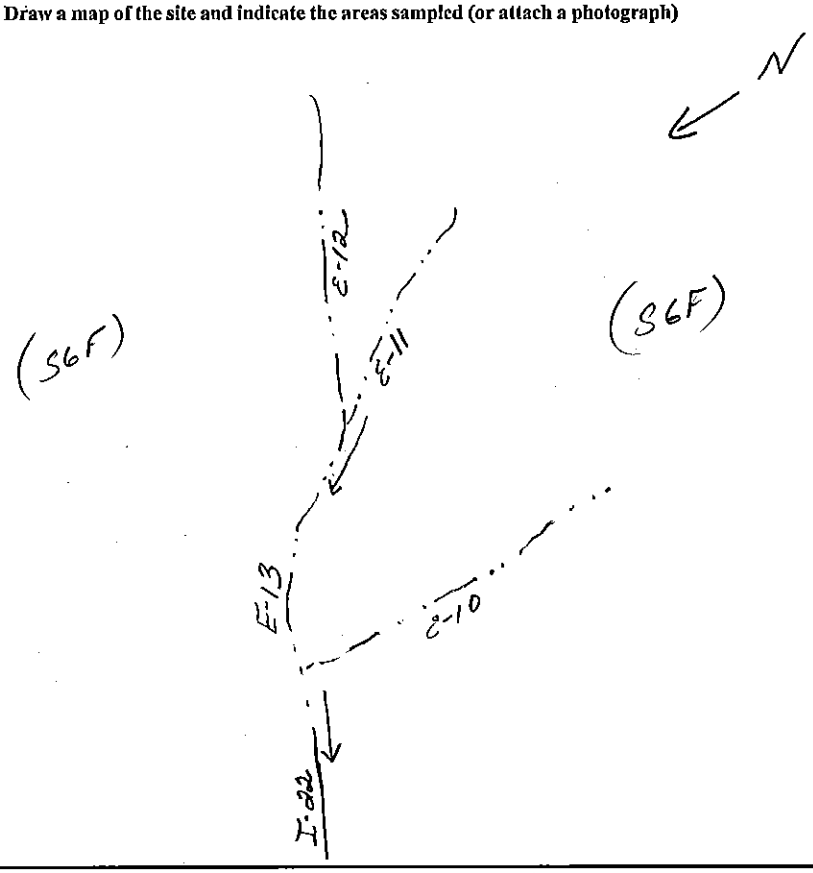
PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-11 RIVERMILE_____	STREAM CLASS Ephemeral
LAT 39°49'33.840 LONG 80°47'00.834"	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS D. Godec / D. York	
FORM COMPLETED BY D. York / D. Godec	DATE 21 Mar 2012 TIME 500 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

WEATHER CONDITIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days? ☒ Yes ☐ No
	☐ storm (heavy rain)	☐	Air Temperature____°C 85°F
	☐ rain (steady rain)	☐	
	☐ showers (intermittent)	☐	Other_____
	5 %☒ %cloud cover	☒ 30%	
	☐ clear/sunny	☐	

SITE LOCATION/MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)



STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☐ Intermittent ☐ Tidal

Stream Origin Ephemeral
☐ Glacial ☐ Spring-fed
☐ Non-glacial montane ☐ Mixture of origins
☐ Swamp and bog ☐ Other Precip

Stream Type
☒ Coldwater ☐ Warmwater

Catchment Area_____km²

Stream E-11 (cont.) 3/21/12

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	**Predominant Surrounding Landuse** ☒ Forest ☐ Commercial ☒ Field/Pasture ☒ Industrial ☐ Agricultural ☐ Other _____ ☒ Residential **Local Watershed NPS Pollution** ☐ No evidence ☐ Some potential sources ☒ Obvious sources Conner Run **Local Watershed Erosion** ☐ None ☒ Moderate ☐ Heavy
RIPARIAN VEGETATION (18 meter buffer)	**Indicate the dominant type and record the dominant species present** ☒ Trees ☒ Shrubs ☐ Grasses ☒ Herbaceous **dominant species present** _____
INSTREAM FEATURES	**Estimated Reach Length** 30.48 m 100 ft. **Estimated Stream Width** 0.304 m 1 ft. **Sampling Reach Area** 9.27 m² **Area in km² (m²x1000)** 9265.9 km² **Estimated Stream Depth** 0 m not flowing **Surface Velocity (at thalweg)** 0 m/sec **Canopy Cover** ☐ Partly open ☐ Partly shaded ☐ Shaded **High Water Mark** _____ m 1 ft. **Proportion of Reach Represented by Stream Morphology Types** ☐ Riffle _____ % ☐ Run _____ % ☐ Pool _____ % **Channelized** ☐ Yes ☐ No **Dam Present** ☐ Yes ☐ No
LARGE WOODY DEBRIS	**LWD** 1 m² **Density of LWD** .0001 m²/km² **(LWD/ reach area)**
AQUATIC VEGETATION	**Indicate the dominant type and record the dominant species present** ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating Algae ☐ Attached Algae **dominant species present** _____ **Portion of the reach with aquatic vegetation** _____ %
WATER QUALITY	**Temperature** _____ °C Not Sampled **Specific Conductance** _____ **Dissolved Oxygen** _____ Not Enough Water **pH** _____ **Turbidity** _____ **WQ Instrument Used** _____ **Water Odors** ☒ Normal/None ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ **Water Surface Oils** ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☒ None ☐ Other _____ **Turbidity (if not measured)** ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☒ Other No Flow
SEDIMENT/ SUBSTRATE	**Odors** ☒ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ **Oils** ☒ Absent ☐ Slight ☐ Moderate ☐ Profuse **Deposits** None ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other _____ **Looking at stones which are not deeply embedded, are the undersides black in color?** ☐ Yes ☒ No

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	75%
Boulder	> 256 mm (10")	40%			
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	0%
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	0%
Silt	0.004-0.06 mm	60%			
Clay	< 0.004 mm (slick)				

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME E-11	LOCATION AEP Mitchell Landfill Phase II Haul Road	
STATION # _____ RIVERMILE _____	STREAM CLASS Ephemeral	
LAT 39°49'33.840 LONG 80°47'00.834"	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. Godec; D. York		LOT NUMBER
FORM COMPLETED BY D. Godec	DATE 3/21/12 TIME 6:20 (AM) PM	REASON FOR SURVEY Mitchell Landfill Phase II Haul Road

HABITAT TYPES	Indicate the percentage of each habitat type present ☒ Cobble 10 % ☐ Snags ____% ☐ Vegetated Banks ____% ☐ Sand ____% ☐ Submerged Macrophytes ____% ☐ Other ( ) ____%
SAMPLE COLLECTION	Gear used ☐ D-frame ☐ kick-net ☐ Other Aquarium net, hand sorting How were the samples collected? ☒ wading ☒ from bank ☐ from boat Indicate the number of jabs/kicks taken in each habitat type. ☒ Cobble ____ ☐ Snags ____ ☐ Vegetated Banks ____ ☐ Sand ____ ☐ Submerged Macrophytes ____ ☐ Other ( ) ____
GENERAL COMMENTS	Very little water in this stream despite recent heavy rains - assumed ephemeral

QUALITATIVE LISTING OF AQUATIC BIOTA
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS
Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

Only 1 caddisfly observed — hydropsychidae
No stream salamanders or other benthic macroinvertebrates

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd
STATION # E-12 RIVERMILE	STREAM CLASS Ephemeral
LAT 39°49'34.002 LONG 80°47'00.763	RIVER BASIN OHIO
STORET #	AGENCY
INVESTIGATORS Godec / York	
FORM COMPLETED BY York	DATE 21 Mar 2012 TIME 415 AM (PM) / REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. in middle - is decent - remainder very very poor
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep). No water
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Stream E-12

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 19	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 0 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score 92

62 linear feet /
Debit - 49.46

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME Unnamed Trib	LOCATION AEP Mitchell Landfill Phase II Haul Rd	
STATION # E-13 RIVERMILE	STREAM CLASS Ephemeral	
LAT 39 49 34.133 LONG 80 49 02.164	RIVER BASIN OHIO	
STORET #	AGENCY	
INVESTIGATORS D. Godec / D. York		
FORM COMPLETED BY D. York	DATE 21 Mar 2012 TIME 530 AM (PM)	REASON FOR SURVEY Mitchell Landfill Phase II Haul Rd

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0

Most - Little flow

E-13

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 (3)	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score _____ 85

APPENDIX D

USACE HIGH-GRADIENT HEADWATER STREAM DATA FORMS

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site | Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 17

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.95
Biogeochemical Cycling	0.98
Habitat	0.98

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	86.00	0.97
V_{EMBED}	Average embeddedness of channel.	4.00	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.75	1.00
V_{BERO}	Total percent of eroded stream channel bank.	10.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	10.00	1.00
V_{TDBH}	Average dbh of trees.	10.73	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	2.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	3.60	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	91.88	1.00
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 51.818"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 46' 42.440"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: 17 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **86.0 %**

List the percent cover measurements at each point below:

100	95	60	20	95	95	95	100	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **4.0**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

3	2	3	4	3	5				
3	2	5	5	5	5				
5	5	3	4	5	4				
4	5	2	4	5	1				
4	4	5	5	5	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **3.75 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

7.75	4.50	8.00	5.25	6.57	1.00				
5.50	4.43	3.00	3.75	4.45	1.50				
7.70	0.75	4.40	0.75	3.75	6.80				
1.90	2.40	4.75	2.45	1.95	2.70				
1.37	4.20	0.50	0.70	3.00	9.50				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **10 %**

Left Bank: 10 ft Right Bank: 0 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 10	10.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.7

Left Side					Right Side				
11.5					13.5				
11.5					7.5				
11.2					8				
5					7.75				
9.5					17.25				
18.5					15.5				
4.2					10.7				
11.5					8.5				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 1	2.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 124 Right Side: 80	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.60

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☑	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☑	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		
5	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **91.88 %**

Left Side				Right Side			
80	90	100	100	100	90	95	80

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.86**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

Summary: SAA Number 17

Variable	Value	VSI
$V_{CCANOPY}$	86 %	0.97
V_{EMBED}	4.0	1.00
$V_{SUBSTRATE}$	3.75 in	1.00
V_{BERO}	10 %	1.00
V_{LWD}	10.0	1.00
V_{TDBH}	10.7	1.00
V_{SNAG}	2.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	3.60	1.00
$V_{DETRITUS}$	91.9 %	1.00
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Mitchell Landfill Project Site, Marshall CO, WV
Sampling Date: 02-14-2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: Stream 18

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.69
Habitat	0.65

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	39.50	0.36
V_{EMBED}	Average embeddedness of channel.	2.43	0.62
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	2.75	1.00
V_{BERO}	Total percent of eroded stream channel bank.	23.08	0.95
V_{LWD}	Number of down woody stems per 100 feet of stream.	10.77	1.00
V_{TDBH}	Average dbh of trees.	7.89	0.84
V_{SNAG}	Number of snags per 100 feet of stream.	4.62	0.84
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	3.20	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	76.88	0.94
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.58	0.61

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/ Mary Gilmore	Latitude/UTM Northing:	39 49' 51.304"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80 46' 35.449
Location:	Mitchell Landfill Project Site, Marshall CO, WV	Sampling Date:	02-14-2012

SAR Number: Stream 18 Reach Length (ft): 65 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **39.5 %**

List the percent cover measurements at each point below:

0	0	0	5	50	60	80	60	60	80

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.4**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

2	5	1	2	2	3				
1	5	1	1	2	1				
1	1	3	2	2	4				
3	5	1	1	2	5				
1	5	1	2	3	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **2.75 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

4.47	1.50	0.08	2.90	12.50	3.50				
0.08	2.20	8.50	5.50	10.00	0.08				
0.08	0.08	16.50	20.00	0.08	1.20				
3.50	2.60	0.08	15.00	6.20	2.50				
0.08	1.90	9.33	4.75	2.90	1.50				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **23 %**

Left Bank: 5 ft Right Bank: 10 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 7	10.8
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.9

Left Side					Right Side				
10					5				
7					9				
5.9					6.3				
6					13				
5					5.4				
8.8					9.9				
11.25									

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 2 Right Side: 1	4.6
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 74 Right Side: 120	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.20

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☑	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☑	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		
5	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☑	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
2	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **76.88 %**

Left Side				Right Side			
5	80	100	100	100	90	50	90

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			
20	40	10	0	2	10	10	10

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.58**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Residential districts, 2 acres (12% cover)	0.3	5	5
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	25	30
Forest and native range (50% to 75% ground cover)	0.7	70	100

Stream 18

Variable	Value	VSI
$V_{CCANOPY}$	40 %	0.36
V_{EMBED}	2.4	0.62
$V_{SUBSTRATE}$	2.75 in	1.00
V_{BERO}	23 %	0.95
V_{LWD}	10.8	1.00
V_{TDBH}	7.9	0.84
V_{SNAG}	4.6	0.84
V_{SSD}	Not Used	Not Used
V_{SRICH}	3.20	1.00
$V_{DETRITUS}$	76.9 %	0.94
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.58	0.61

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 19

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.81
Biogeochemical Cycling	0.96
Habitat	0.87

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	69.00	0.75
V_{EMBED}	Average embeddedness of channel.	3.67	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.90	0.95
V_{BERO}	Total percent of eroded stream channel bank.	100.00	0.54
V_{LWD}	Number of down woody stems per 100 feet of stream.	7.00	0.88
V_{TDBH}	Average dbh of trees.	9.02	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	6.00	0.70
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.80	0.86
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	73.13	0.89
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 46' 44.37"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 46' 44.37"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: 19 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **69.0 %**

List the percent cover measurements at each point below:

75	50	60	40	50	60	80	95	90	90

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.7**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

5	3	4	5	5	3				
5	5	5	5	3	1				
4	4	4	1	2	1				
5	5	5	5	5	1				
3	5	3	4	3	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **1.90 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.25	14.00	1.00	6.25	1.60	11.20				
6.00	6.50	2.00	1.30	1.80	0.00				
6.90	2.80	1.20	0.08	2.20	0.00				
0.75	0.70	5.00	3.50	1.70	0.00				
1.60	6.95	17.30	8.10	5.50	0.00				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **100 %**

Left Bank: 100 ft Right Bank: 0 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 7	7.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.0

Left Side					Right Side				
7.2					12.5	8.3			
8.5					9.5	4.2			
9.5					7				
9.1					15.6				
9.4					10				
6.9					5.6				
8					5.5				
					10				
					15.5				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 2 Right Side: 4	6.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 110 Right Side: 182	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.80

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

3 Species in Group 1	1 Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	73.13 %

Left Side				Right Side			
40	90	100	65	75	70	45	100

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.86

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

Summary: SAA Number 19

Variable	Value	VSI
$V_{CCANOPY}$	69 %	0.75
V_{EMBED}	3.7	1.00
$V_{SUBSTRATE}$	1.90 in	0.95
V_{BERO}	100 %	0.54
V_{LWD}	7.0	0.88
V_{TDBH}	9.0	1.00
V_{SNAG}	6.0	0.70
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.80	0.86
$V_{DETRITUS}$	73.1 %	0.89
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site | Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 20

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.88
Habitat	0.85

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	84.50	0.95
V_{EMBED}	Average embeddedness of channel.	3.50	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.50	1.00
V_{BERO}	Total percent of eroded stream channel bank.	21.55	0.96
V_{LWD}	Number of down woody stems per 100 feet of stream.	1.72	0.22
V_{TDBH}	Average dbh of trees.	8.23	0.91
V_{SNAG}	Number of snags per 100 feet of stream.	1.72	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.36	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	68.75	0.84
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 44.31"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 46' 44.37"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: 20 Reach Length (ft): 116 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **84.5 %**

List the percent cover measurements at each point below:

90	90	95	80	80	60	70	80	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.5**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

3	4	1	3	3	4				
3	4	1	3	4	3				
5	3	3	5	2	5				
3	3	3	3	5	3				
5	2	5	5	4	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **3.50 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

17.50	9.00	3.00	3.90	1.60	1.30				
3.50	4.00	0.08	0.60	5.97	4.20				
6.00	1.60	0.90	7.50	1.75	0.40				
16.50	2.00	32.50	3.40	99.00	4.90				
0.50	10.60	3.00	99.00	3.50	1.00				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **22 %**

Left Bank: 15 ft Right Bank: 10 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	1.7
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	8.2
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 1	1.7
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 58 Right Side: 96	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.36

Left Side					Right Side				
15.3	4.1				12.2				
6.5	17				4.9				
5	18				4.3				
5.9	4.25								
6.5	4.2								
5	5.5								
5.5									
18									
6									

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☑	*Carya ovata*	☑	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
4	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **68.75 %**

Left Side				Right Side			
85	90	75	50	80	90	10	70

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.86**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

Summary: SAA Number 20

Variable	Value	VSI
$V_{CCANOPY}$	85 %	0.95
V_{EMBED}	3.5	1.00
$V_{SUBSTRATE}$	3.50 in	1.00
V_{BERO}	22 %	0.96
V_{LWD}	1.7	0.22
V_{TDBH}	8.2	0.91
V_{SNAG}	1.7	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.36	1.00
$V_{DETRITUS}$	68.8 %	0.84
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 21 March 2012

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: I-20

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.74
Biogeochemical Cycling	0.83
Habitat	0.84

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	93.50	1.00
V_{EMBED}	Average embeddedness of channel.	3.17	0.88
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.70	1.00
V_{BERO}	Total percent of eroded stream channel bank.	22.99	0.95
V_{LWD}	Number of down woody stems per 100 feet of stream.	2.30	0.29
V_{TDBH}	Average dbh of trees.	7.38	0.75
V_{SNAG}	Number of snags per 100 feet of stream.	2.30	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	4.07	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	76.25	0.93
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Dan Godec	Latitude/UTM Northing:	39° 49' 46.278"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 46' 45.889"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	21 March 2012

SAR Number: I-20 Reach Length (ft): 87 Stream Type: Intermittent Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **93.5 %**

List the percent cover measurements at each point below:

90	90	90	100	90	100	95	100	90	90

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.2**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

3	1	1	2	5	5				
3	1	4	3	3	3				
5	1	4	3	1	4				
3	3	3	5	4	5				
5	1	3	3	5	3				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **3.70 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

17.50	0.08	0.08	10.60	99.00	99.00				
3.50	0.08	9.00	3.90	3.90	1.50				
6.00	0.50	4.00	0.50	0.60	6.00				
16.50	2.25	1.60	7.00	7.50	99.00				
0.50	0.08	2.00	3.00	99.00	1.70				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **23 %**

Left Bank: 10 ft Right Bank: 10 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	2.3
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.4
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 1	2.3
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	4.07

Left Side					Right Side				
15.3	4.1				4.3				
6.5					6				
5					4.3				
5.9					16.6				
6.5					6.5				
5					4				
5.5					6				
18									
6									

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☑	*Carya ovata*	☑	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☑	*Ulmus americana*				
☐	*Magnolia acuminata*						
5	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	76.25 %

Left Side				Right Side			
75	50	100	95	45	70	100	75

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.86

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

I-20

Variable	Value	VSI
$V_{CCANOPY}$	94 %	1.00
V_{EMBED}	3.2	0.88
$V_{SUBSTRATE}$	3.70 in	1.00
V_{BERO}	23 %	0.95
V_{LWD}	2.3	0.29
V_{TDBH}	7.4	0.75
V_{SNAG}	2.3	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	4.07	1.00
$V_{DETRITUS}$	76.3 %	0.93
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 21

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.78
Biogeochemical Cycling	0.81
Habitat	0.74

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	57.00	0.59
V_{EMBED}	Average embeddedness of channel.	2.97	0.81
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.20	1.00
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	4.00	0.50
V_{TDBH}	Average dbh of trees.	8.01	0.87
V_{SNAG}	Number of snags per 100 feet of stream.	1.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.80	0.86
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	66.25	0.81
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 46.84"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 46' 45.26"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: 21 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **57.0 %**

List the percent cover measurements at each point below:

10	40	40	50	50	40	60	90	95	95

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.0**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

2	2	1	3	3	2				
2	2	1	2	4	4				
4	3	3	5	2	4				
5	4	1	3	2	3				
3	5	3	5	3	3				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **3.20 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

30.50	8.50	2.50	1.20	3.20	10.00				
2.70	3.20	6.30	2.60	7.90	14.00				
16.90	3.50	2.00	5.50	5.90	0.90				
6.00	1.10	0.08	1.00	1.50	1.40				
2.90	1.00	8.50	0.40	6.50	5.80				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **0 %**

Left Bank: 0 ft Right Bank: 0 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 4	4.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	8.0
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 0	1.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 81 Right Side: 86	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.80

Left Side					Right Side				
4.5					17				
					8.7				
					5.5				
					5.3				
					6				
					16.6				
					6.5				
					4				
					6				

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☑	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
3	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **66.25 %**

Left Side				Right Side			
50	60	85	90	45	60	50	90

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.86**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

Summary: SAA Number 21

Variable	Value	VSI
$V_{CCANOPY}$	57 %	0.59
V_{EMBED}	3.0	0.81
$V_{SUBSTRATE}$	3.20 in	1.00
V_{BERO}	0 %	1.00
V_{LWD}	4.0	0.50
V_{TDBH}	8.0	0.87
V_{SNAG}	1.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.80	0.86
$V_{DETRITUS}$	66.3 %	0.81
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 28Feb2012

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: I-4

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.54
Biogeochemical Cycling	0.82
Habitat	0.74

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	80.80	0.90
V_{EMBED}	Average embeddedness of channel.	3.60	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.35	0.68
V_{BERO}	Total percent of eroded stream channel bank.	70.00	0.70
V_{LWD}	Number of down woody stems per 100 feet of stream.	2.00	0.25
V_{TDBH}	Average dbh of trees.	10.45	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	6.00	0.70
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	4.50	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	97.25	1.00
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.58	0.61

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39.828328
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80.779288
Location:	Cresap, Marshall County, WV	Sampling Date:	28Feb2012

SAR Number: I-4 Reach Length (ft): 100 Stream Type: Intermittent Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **80.8 %**

List the percent cover measurements at each point below:

90	90	90	100	100	100	98	90	10	40

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.6**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

4	3	3	1	3	4				
5	4	3	5	4	4				
4	5	2	4	5	5				
3	1	3	5	4	5				
1	3	4	4	2	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **1.35 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

3.25	10.00	0.50	0.08	3.00	1.25				
2.33	1.12	2.45	2.25	1.10	1.45				
0.55	2.00	0.60	1.12	2.50	0.25				
6.45	0.08	6.00	10.00	1.45	0.20				
0.08	0.75	0.75	1.65	2.33	0.50				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **70 %**

Left Bank: 60 ft Right Bank: 10 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	2.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.5

Left Side					Right Side				
10.2					20.5				
12.7					7.8				
12.5									
10.2									
5.5									
4.2									

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 2 Right Side: 4	6.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	4.50

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☑	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☑	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		
6	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **97.25 %**

Left Side				Right Side			
100	100	100	80	98	100	100	100

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.58**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	55	55
Residential districts, 2 acres (12% cover)	0.3	5	60
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	70
Urban districts, Commercial and business (>70% cover)	0	30	100

I-4

Variable	Value	VSI
$V_{CCANOPY}$	81 %	0.90
V_{EMBED}	3.6	1.00
$V_{SUBSTRATE}$	1.35 in	0.68
V_{BERO}	70 %	0.70
V_{LWD}	2.0	0.25
V_{TDBH}	10.5	1.00
V_{SNAG}	6.0	0.70
V_{SSD}	Not Used	Not Used
V_{SRICH}	4.50	1.00
$V_{DETRITUS}$	97.3 %	1.00
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.58	0.61

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 28Feb2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-14

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.57
Biogeochemical Cycling	0.48
Habitat	0.63

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	82.50	0.93
V_{EMBED}	Average embeddedness of channel.	1.60	0.32
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	32.97	0.90
V_{LWD}	Number of down woody stems per 100 feet of stream.	8.79	1.00
V_{TDBH}	Average dbh of trees.	7.21	0.71
V_{SNAG}	Number of snags per 100 feet of stream.	3.30	0.97
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	3.91	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	67.50	0.82
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.58	0.61

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39.828068
Project Name:	AEP Mitchell Phase II Haul Road Project	Longitude/UTM Easting:	80.778924
Location:	Cresap, Marshall County, WV	Sampling Date:	28Feb2012

SAR Number: E-14 Reach Length (ft): 91 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **82.5 %**

List the percent cover measurements at each point below:

90	50	90	90	95	90	75	80	75	90

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **1.6**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	1	1	4	1	3				
1	4	1	4	1	4				
1	4	1	1	1	1				
1	1	1	1	1	1				
1	1	1	2	1	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.08 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	0.08	0.08	0.62	0.08	1.40				
0.08	1.60	0.08	0.65	0.08	0.25				
0.08	3.00	0.08	0.08	0.08	0.08				
0.08	0.08	0.08	0.08	0.08	0.08				
0.08	0.08	0.08	0.60	0.08	0.08				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **33 %**

Left Bank: 20 ft Right Bank: 10 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 8	8.8
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.2

Left Side					Right Side				
7.8					6				
6.9					7.2				
9					4				
9.5					5.1				
9.3					6.5				
5.3					9				
8					7.25				
					7.25				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 2	3.3
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.91

Group 1 = 1.0			
☑	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☑	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		
5	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **67.50 %**

Left Side				Right Side			
40	10	45	95	85	90	85	90

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.58**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	55	55
Residential districts, 2 acres (12% cover)	0.3	5	60
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	70
Urban districts, Commercial and business (>70% cover)	0	30	100

E-14

Variable	Value	VSI
$V_{CCANOPY}$	83 %	0.93
V_{EMBED}	1.6	0.32
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	33 %	0.90
V_{LWD}	8.8	1.00
V_{TDBH}	7.2	0.71
V_{SNAG}	3.3	0.97
V_{SSD}	Not Used	Not Used
V_{SRICH}	3.91	1.00
$V_{DETRITUS}$	67.5 %	0.82
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.58	0.61

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 28Feb2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-14a

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.66
Biogeochemical Cycling	0.82
Habitat	0.59

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	54.50	0.56
V_{EMBED}	Average embeddedness of channel.	2.97	0.81
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.50	0.25
V_{BERO}	Total percent of eroded stream channel bank.	50.00	0.81
V_{LWD}	Number of down woody stems per 100 feet of stream.	6.00	0.75
V_{TDBH}	Average dbh of trees.	8.09	0.88
V_{SNAG}	Number of snags per 100 feet of stream.	3.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	3.60	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	73.75	0.90
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.78	0.82

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39.828068
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80.778924
Location:	Cresap, Marshall County, WV	Sampling Date:	28Feb2012

SAR Number: E-14a Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **54.5 %**

List the percent cover measurements at each point below:

45	75	70	80	10	10	20	65	80	90

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.0**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

5	5	4	5	1	4				
1	5	3	4	1	1				
5	4	3	3	1	1				
5	5	3	3	1	1				
5	4	3	1	1	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.50 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

5.50	0.40	2.53	0.50	0.08	1.50				
0.08	2.50	1.75	7.50	0.08	0.08				
0.10	3.44	4.95	9.80	0.08	0.08				
0.50	0.51	5.75	6.40	0.08	0.08				
0.40	1.00	1.80	0.08	0.08	0.08				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **50 %**

Left Bank: 25 ft Right Bank: 25 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 6	6.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	8.1

Left Side					Right Side				
11.4	5.5				7.8				
8.5	5.6				6.9				
4.9	5.6				9				
5.5					9.5				
11					9.3				
7									
13.5									
8.5									

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 2 Right Side: 1	3.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	3.60

Group 1 = 1.0			
☑	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☑	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		
5	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **73.75 %**

Left Side				Right Side			
100	100	90	15	70	90	75	50

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.78**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	75	75
Residential districts, 2 acres (12% cover)	0.3	5	80
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	90
Urban districts, Commercial and business (>70% cover)	0	10	100

E-14a

Variable	Value	VSI
$V_{CCANOPY}$	55 %	0.56
V_{EMBED}	3.0	0.81
$V_{SUBSTRATE}$	0.50 in	0.25
V_{BERO}	50 %	0.81
V_{LWD}	6.0	0.75
V_{TDBH}	8.1	0.88
V_{SNAG}	3.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	3.60	1.00
$V_{DETRITUS}$	73.8 %	0.90
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.78	0.82

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 22

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.60
Biogeochemical Cycling	0.82
Habitat	0.64

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	85.00	0.96
V_{EMBED}	Average embeddedness of channel.	3.90	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	13.90	0.49
V_{BERO}	Total percent of eroded stream channel bank.	110.00	0.48
V_{LWD}	Number of down woody stems per 100 feet of stream.	1.00	0.13
V_{TDBH}	Average dbh of trees.	8.36	0.93
V_{SNAG}	Number of snags per 100 feet of stream.	1.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.70	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	23.13	0.28
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 35.16"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 47' 5.66"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: 22 Reach Length (ft): 100 Stream Type: Intermittent Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **85.0 %**

List the percent cover measurements at each point below:

90	95	80	80	90	95	95	90	70	65

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.9**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

2	3	4	5	4	5				
3	5	4	5	4	3				
4	3	4	3	4	5				
2	5	4	4	2	5				
2	3	5	5	5	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **13.90 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

29.20	21.00	12.70	0.50	1.60	99.00				
26.50	99.00	6.63	69.00	22.50	8.30				
7.90	27.00	4.23	7.90	13.30	5.90				
27.90	5.90	25.33	11.90	28.40	99.00				
3.50	24.50	6.00	11.30	99.00	14.50				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **110 %**

Left Bank: 60 ft Right Bank: 50 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 1	1.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	8.4
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 0 Right Side: 1	1.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 35 Right Side: 52	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.70

Left Side					Right Side				
10					14.5				
4.5					12.1				
14					7.9				
4.5					4				
4.5					5				
14.5					5.5				
4.6					9				
5					4.5				
					18				

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☑	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☑	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
4	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **23.13 %**

Left Side				Right Side			
0	0	5	40	50	10	20	60

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.86**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

Summary: SAA Number 22

Variable	Value	VSI
$V_{CCANOPY}$	85 %	0.96
V_{EMBED}	3.9	1.00
$V_{SUBSTRATE}$	13.90 in	0.49
V_{BERO}	110 %	0.48
V_{LWD}	1.0	0.13
V_{TDBH}	8.4	0.93
V_{SNAG}	1.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.70	1.00
$V_{DETRITUS}$	23.1 %	0.28
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-9

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.63
Biogeochemical Cycling	0.80
Habitat	0.64

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	74.00	0.81
V_{EMBED}	Average embeddedness of channel.	3.90	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	10.20	0.73
V_{BERO}	Total percent of eroded stream channel bank.	70.00	0.70
V_{LWD}	Number of down woody stems per 100 feet of stream.	0.00	0.00
V_{TDBH}	Average dbh of trees.	7.41	0.75
V_{SNAG}	Number of snags per 100 feet of stream.	4.00	0.90
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.80	0.86
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	28.75	0.35
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.86	0.91

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 33.17"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 47' 7.46"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: E-9 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **74.0 %**

List the percent cover measurements at each point below:

80	80	70	50	40	70	90	90	80	90

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.9**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

5	5	5	1	5	5				
3	5	3	4	2	4				
5	5	3	3	5	4				
3	4	4	3	5	2				
5	4	5	5	3	2				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **10.20 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

99.00	2.50	4.00	9.50	99.00	99.00				
18.00	99.00	6.10	4.50	38.90	6.40				
99.00	99.00	24.00	41.90	1.75	4.00				
6.70	12.40	48.50	3.90	2.30	14.90				
1.00	4.00	5.50	99.00	3.00	10.90				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **70 %**

Left Bank: 10 ft Right Bank: 60 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 0	0.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.4

Left Side					Right Side				
10.2					6.6				
9.9					7.4				
6					9				
					4				
					6.2				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 3	4.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 39 Right Side: 16	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.80

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☑	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

3	Species in Group 1	1	Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.

28.75 %

Left Side				Right Side			
40	20	0	10	80	30	30	20

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed:

0.86

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	10	90
Residential districts, 2 acres (12% cover)	0.3	10	100

E-9

Variable	Value	VSI
$V_{CCANOPY}$	74 %	0.81
V_{EMBED}	3.9	1.00
$V_{SUBSTRATE}$	10.20 in	0.73
V_{BERO}	70 %	0.70
V_{LWD}	0.0	0.00
V_{TDBH}	7.4	0.75
V_{SNAG}	4.0	0.90
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.80	0.86
$V_{DETRITUS}$	28.8 %	0.35
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.86	0.91

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 14 February 2012

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 24

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.63
Biogeochemical Cycling	0.77
Habitat	0.73

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	52.50	0.53
V_{EMBED}	Average embeddedness of channel.	3.20	0.89
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	5.80	1.00
V_{BERO}	Total percent of eroded stream channel bank.	80.00	0.65
V_{LWD}	Number of down woody stems per 100 feet of stream.	7.00	0.88
V_{TDBH}	Average dbh of trees.	9.91	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	3.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.00	0.95
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.63	0.62
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.48	0.51

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 32.66"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 47' 8.92"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	14 February 2012

SAR Number: 24 Reach Length (ft): 100 Stream Type: Intermittent Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.)

52.5 %

List the percent cover measurements at each point below:

60	90	50	10	5	50	80	50	50	80

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5.

3.2

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

2	4	5	3	3	3				
3	4	4	5	4	4				
1	1	5	4	4	4				
3	1	3	3	1	1				
4	3	3	4	2	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}.

5.80 in

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

15.20	2.30	6.50	0.20	6.50	6.40				
1.40	5.60	26.00	7.70	3.50	7.50				
0.50	12.50	5.50	0.90	6.00	4.00				
1.40	1.90	0.50	28.00	0.20	0.40				
5.00	29.30	19.30	24.00	19.60	99.00				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%.

80 %

Left Bank: 40 ft Right Bank: 40 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 7	7.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.9
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 2	3.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 12 Right Side: 17	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.00

Left Side					Right Side				
15					7				
12.8					9.7				
4									
11									
9.9									

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☐	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
2	Species in Group 1			0	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **50.63 %**

Left Side				Right Side			
90	60	85	5	40	80	40	5

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.48**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	40	40
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	20	60
Residential districts, 2 acres (12% cover)	0.3	5	65
Urban districts, Commercial and business (>70% cover)	0	35	100

Summary: SAA Number 24

Variable	Value	VSI
$V_{CCANOPY}$	53 %	0.53
V_{EMBED}	3.2	0.89
$V_{SUBSTRATE}$	5.80 in	1.00
V_{BERO}	80 %	0.65
V_{LWD}	7.0	0.88
V_{TDBH}	9.9	1.00
V_{SNAG}	3.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.00	0.95
$V_{DETRITUS}$	50.6 %	0.62
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.48	0.51

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 15 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-7

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.60
Biogeochemical Cycling	0.78
Habitat	0.83

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	87.00	0.99
V_{EMBED}	Average embeddedness of channel.	3.83	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	5.30	1.00
V_{BERO}	Total percent of eroded stream channel bank.	55.00	0.78
V_{LWD}	Number of down woody stems per 100 feet of stream.	5.00	0.63
V_{TDBH}	Average dbh of trees.	7.78	0.82
V_{SNAG}	Number of snags per 100 feet of stream.	2.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.70	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	56.88	0.69
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.48	0.51

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 32.44"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 47' 7.58"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	15 February 2012

SAR Number: E-7 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **87.0 %**

List the percent cover measurements at each point below:

40	90	90	90	80	90	90	100	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.8**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

2	3	3	2	5	4				
2	2	3	4	5	5				
3	4	2	5	5	5				
5	5	4	5	5	5				
5	2	4	5	2	4				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **5.30 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

48.00	21.50	0.20	15.00	99.00	1.50				
12.80	19.00	13.30	5.10	99.00	5.70				
1.70	0.90	24.50	1.10	0.50	0.60				
99.00	2.00	2.34	2.40	99.00	5.50				
99.00	11.60	4.20	1.50	4.50	1.30				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **55 %**

Left Bank: 25 ft Right Bank: 30 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 5	5.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.8
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 1	2.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 40 Right Side: 25	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.70

Left Side					Right Side				
14.1					10.5				
6.9					8				
4					9.1				
11					10.6				
4.4					5.25				
6.1									
6.9									
7.2									
4.9									

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☑	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☑	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*				
☐	*Magnolia acuminata*						
4	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **56.88 %**

Left Side				Right Side			
90	60	40	25	85	65	60	30

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.48**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	40	40
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	20	60
Residential districts, 2 acres (12% cover)	0.3	5	65
Urban districts, Commercial and business (>70% cover)	0	35	100

E-7

Variable	Value	VSI
$V_{CCANOPY}$	87 %	0.99
V_{EMBED}	3.8	1.00
$V_{SUBSTRATE}$	5.30 in	1.00
V_{BERO}	55 %	0.78
V_{LWD}	5.0	0.63
V_{TDBH}	7.8	0.82
V_{SNAG}	2.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.70	1.00
$V_{DETRITUS}$	56.9 %	0.69
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.48	0.51

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 15 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 25a

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.48
Biogeochemical Cycling	0.60
Habitat	0.68

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	83.20	0.94
V_{EMBED}	Average embeddedness of channel.	2.53	0.65
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	2.00	1.00
V_{BERO}	Total percent of eroded stream channel bank.	58.51	0.76
V_{LWD}	Number of down woody stems per 100 feet of stream.	2.13	0.27
V_{TDBH}	Average dbh of trees.	8.14	0.89
V_{SNAG}	Number of snags per 100 feet of stream.	1.06	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.90	0.90
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	50.00	0.61
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.48	0.51

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 32.175"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 47' 6.908"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	15 February 2012

SAR Number: 25a Reach Length (ft): 94 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.)

83.2 %

List the percent cover measurements at each point below:

85	80	90	85	80	75	40	100	98	99

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5.

2.5

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	3	3	4	2	1				
4	2	3	5	3	1				
2	2	2	5	1	1				
1	4	5	3	1	1				
3	3	1	2	2	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}.

2.00 in

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	1.70	13.40	3.50	1.00	11.10				
3.00	3.00	3.50	99.00	10.10	1.70				
8.63	7.90	10.00	2.30	0.08	0.70				
0.08	5.40	1.70	1.20	0.08	0.08				
0.40	0.70	0.08	3.40	0.70	2.90				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%.

59 %

Left Bank: 40 ft Right Bank: 15 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	2.1
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	8.1

Left Side					Right Side				
6.7					10.5				
5.2					4.1				
9.6					9.9				
					11				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 0 Right Side: 1	1.1
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 9 Right Side: 71	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.90

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☑	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

3	Species in Group 1	1	Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	50.00 %

Left Side				Right Side			
10	20	90	80	10	10	100	80

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.48

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	40	40
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	20	60
Residential districts, 2 acres (12% cover)	0.3	5	65
Urban districts, Commercial and business (>70% cover)	0	35	100

25a

Variable	Value	VSI
$V_{CCANOPY}$	83 %	0.94
V_{EMBED}	2.5	0.65
$V_{SUBSTRATE}$	2.00 in	1.00
V_{BERO}	59 %	0.76
V_{LWD}	2.1	0.27
V_{TDBH}	8.1	0.89
V_{SNAG}	1.1	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.90	0.90
$V_{DETRITUS}$	50.0 %	0.61
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.48	0.51

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 15 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 26

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.48
Biogeochemical Cycling	0.75
Habitat	0.74

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	84.30	0.95
V_{EMBED}	Average embeddedness of channel.	3.07	0.84
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	3.24	1.00
V_{BERO}	Total percent of eroded stream channel bank.	136.84	0.34
V_{LWD}	Number of down woody stems per 100 feet of stream.	2.11	0.26
V_{TDBH}	Average dbh of trees.	7.81	0.83
V_{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.83	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	71.88	0.88
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.63	0.66

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39° 49' 3.019"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80° 47' 069.480"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	15 February 2012

SAR Number: 26 Reach Length (ft): 95 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **84.3 %**

List the percent cover measurements at each point below:

60	70	75	80	90	90	90	95	95	98

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.1**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

5	4	4	3	3	3				
4	1	5	4	2	1				
5	3	3	5	1	3				
3	2	2	2	2	4				
1	5	5	3	2	2				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **3.24 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

3.50	0.80	3.57	2.50	4.10	0.70				
0.80	0.08	99.00	0.80	0.60	0.08				
6.70	3.50	4.70	4.00	0.08	3.90				
3.27	3.20	3.20	4.90	5.40	2.50				
0.08	7.90	0.50	0.40	30.30	14.20				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **137 %**

Left Bank: 70 ft Right Bank: 60 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	2.1
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.8

Left Side					Right Side				
7.2					8.7				
7.9					12.4				
7.4					5.3				
6.1					10.2				
					5.1				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 0 Right Side: 0	0.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 14 Right Side: 20	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.83

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☑	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☑	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☑	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		
4	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.

71.88 %

Left Side				Right Side			
10	90	90	100	90	60	60	75

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed:

0.63

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	60	60
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	5	65
Residential districts, 2 acres (12% cover)	0.3	5	70
Urban districts, Commercial and business (>70% cover)	0	30	100

Summary: SAA Number 26

Variable	Value	VSI
$V_{CCANOPY}$	84 %	0.95
V_{EMBED}	3.1	0.84
$V_{SUBSTRATE}$	3.24 in	1.00
V_{BERO}	137 %	0.34
V_{LWD}	2.1	0.26
V_{TDBH}	7.8	0.83
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.83	1.00
$V_{DETRITUS}$	71.9 %	0.88
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.63	0.66

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 15 February 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: 27

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.81
Habitat	0.86

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	88.50	1.00
V_{EMBED}	Average embeddedness of channel.	3.00	0.82
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	2.45	1.00
V_{BERO}	Total percent of eroded stream channel bank.	78.38	0.65
V_{LWD}	Number of down woody stems per 100 feet of stream.	29.73	0.88
V_{TDBH}	Average dbh of trees.	8.34	0.93
V_{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	13.51	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	81.88	1.00
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.63	0.66

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39 49' 34.916"
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	80 47' 10.997"
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	15 February 2012

SAR Number: 27 Reach Length (ft): 37 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **88.5 %**

List the percent cover measurements at each point below:

90	85	90	75	95	90	80	90	95	95

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.0**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

5	2	4	1	5	1				
4	1	1	5	4	5				
1	1	2	5	3	5				
2	3	1	4	5	2				
3	3	1	3	3	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **2.45 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

1.40	5.40	5.40	18.90	2.70	1.00				
1.30	0.08	0.08	2.40	5.00	99.00				
0.08	0.08	13.00	2.20	21.53	99.00				
4.20	4.40	0.08	3.10	99.00	0.50				
1.10	2.20	0.08	2.60	2.50	1.50				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **78 %**

Left Bank: 17 ft Right Bank: 12 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 11	29.7
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	8.3

Left Side					Right Side				
4.6					7.2				
5					5.5				
24.5					13.4				
5.6					15				
7.9					7.5				
6.7					6.8				
6.1					11.5				
5.9					4.5				
4.1									

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 0 Right Side: 0	0.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 59 Right Side: 54	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	13.51

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☑	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☑	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☑	*Liriodendron tulipifera*	☐	*Ulmus americana*
☐	*Magnolia acuminata*		
	5 Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☐	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
	0 Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **81.88 %**

Left Side				Right Side			
90	95	95	60	90	45	90	90

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.63**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	60	60
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	5	65
Residential districts, 2 acres (12% cover)	0.3	5	70
Urban districts, Commercial and business (>70% cover)	0	30	100

Summary: SAA Number 27

Variable	Value	VSI
$V_{CCANOPY}$	89 %	1.00
V_{EMBED}	3.0	0.82
$V_{SUBSTRATE}$	2.45 in	1.00
V_{BERO}	78 %	0.65
V_{LWD}	29.7	0.88
V_{TDBH}	8.3	0.93
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	13.51	1.00
$V_{DETRITUS}$	81.9 %	1.00
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.63	0.66

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Haul Road Improvements
Location: Cresap, WV
Sampling Date: 09/27/11

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: HGM3 (E3)

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.65
Biogeochemical Cycling	0.66
Habitat	0.57

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	65.00	0.70
V_{EMBED}	Average embeddedness of channel.	2.26	0.55
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.40	0.20
V_{BERO}	Total percent of eroded stream channel bank.	4.24	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	7.27	0.91
V_{TDBH}	Average dbh of trees.	9.15	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	4.24	0.88
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	55.00	0.67
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.70	0.74

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	J. Seamands & T. Chadwell	Latitude/UTM Northing:	39.824002
Project Name:	AEP Mitchell Haul Road Improvements	Longitude/UTM Easting:	-80.789366
Location:	Cresap, WV	Sampling Date:	09/27/11

SAR Number: HGM3 (E3) Reach Length (ft): 165 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **65.0 %**

List the percent cover measurements at each point below:

95	100	95	20	25	70	25	45	80	95

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.3**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	1	1	4	2	1	5	1	3	1
1	1	4	1	1	1	2	4	4	1
1	5	4	5	1	1	2	5	4	1
1									

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.40 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	0.08	0.30	2.30	0.40	0.08	0.40	0.08	7.00	0.08
0.08	0.40	2.80	0.08	0.08	0.10	3.00	9.00	30.00	0.08
0.08	1.30	3.00	3.30	0.08	0.08	26.00	12.10	4.30	0.50
0.08									

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **4 %**

Left Bank: 1 ft Right Bank: 6 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 12	7.3
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.2

Left Side					Right Side				
17.1	5.1	16.5	6	4.6	11.8	14.7	7.4	4.5	12.4
6.9	4.2	19.3	5	4.5	7.5	10.3	5.1	6.9	9.7
9	9.5	10.2	13.7	5.2	15	9.9	5.7	9.2	4.6
5.3	8.3				12.8	13.3	5	11.3	11.2

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: Right Side: 7	4.2
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	0.00

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		
	2 Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☑	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
	2 Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	55.00 %

Left Side				Right Side			
75	60	35	85	55	35	30	65

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.70

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (50% to 75% ground cover)	0.7	100	100

HGM3 (E3)		
Variable	Value	VSI
$V_{CCANOPY}$	65 %	0.70
V_{EMBED}	2.3	0.55
$V_{SUBSTRATE}$	0.40 in	0.20
V_{BERO}	4 %	1.00
V_{LWD}	7.3	0.91
V_{TDBH}	9.2	1.00
V_{SNAG}	4.2	0.88
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	55.0 %	0.67
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.7	0.74

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 20 March 2012

Project Site Before Project

Subclass for this SAR:
Intermittent Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: I-2

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.71
Biogeochemical Cycling	0.63
Habitat	0.75

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	80.80	0.90
V_{EMBED}	Average embeddedness of channel.	1.93	0.44
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.20	0.60
V_{BERO}	Total percent of eroded stream channel bank.	170.83	0.16
V_{LWD}	Number of down woody stems per 100 feet of stream.	5.56	0.69
V_{TDBH}	Average dbh of trees.	7.90	0.85
V_{SNAG}	Number of snags per 100 feet of stream.	1.39	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.20	0.57
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	73.75	0.90
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.94	0.99

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39 49 27.505
Project Name:	AEP Mitchell Phase II Haul Road Project	Longitude/UTM Easting:	80 47 20.070
Location:	Cresap, Marshall County, WV	Sampling Date:	20 March 2012

SAR Number: I-2 Reach Length (ft): 72 Stream Type: Intermittent Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **80.8 %**

List the percent cover measurements at each point below:

5	60	100	98	60	100	100	95	100	90

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **1.9**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	1	3	3	4	1				
1	1	5	3	2	1				
2	4	1	1	1	1				
1	1	1	1	5	5				
1	3	1	1	1	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **1.20 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	0.08	7.75	1.43	3.85	0.60				
2.25	1.10	1.15	9.00	1.75	0.08				
75.00	5.15	2.95	0.08	0.08	2.10				
5.50	1.72	0.08	0.08	1.25	6.42				
0.08	5.03	0.08	0.50	0.08	0.08				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **171 %**

Left Bank: 63 ft Right Bank: 60 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 4	5.6
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.9

Left Side					Right Side				
					7.9				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 0	1.4
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.20

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

2	Species in Group 1	1	Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	73.75 %

Left Side				Right Side			
65	90	95	90	80	60	90	20

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.94

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	93	93
Residential districts, 2 acres (12% cover)	0.3	1	94
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	2	96
Gravel	0	4	100

I-2

Variable	Value	VSI
$V_{CCANOPY}$	81 %	0.90
V_{EMBED}	1.9	0.44
$V_{SUBSTRATE}$	1.20 in	0.60
V_{BERO}	171 %	0.16
V_{LWD}	5.6	0.69
V_{TDBH}	7.9	0.85
V_{SNAG}	1.4	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.20	0.57
$V_{DETRITUS}$	73.8 %	0.90
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.94	0.99

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 20 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-4

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.67
Biogeochemical Cycling	0.54
Habitat	0.61

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	92.00	1.00
V_{EMBED}	Average embeddedness of channel.	1.73	0.36
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	16.67	0.99
V_{LWD}	Number of down woody stems per 100 feet of stream.	27.78	0.90
V_{TDBH}	Average dbh of trees.	9.26	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	8.89	0.50
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.98	0.94
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	20.63	0.25
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.83	0.87

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39 49 26.807
Project Name:	AEP Mitchell Phase II Haul Road Project	Longitude/UTM Easting:	80 47 19.739
Location:	Cresap, Marshall County, WV	Sampling Date:	20 March 2012

SAR Number: E-4 Reach Length (ft): 90 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **92.0 %**

List the percent cover measurements at each point below:

85	90	95	100	100	85	75	90	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **1.7**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

2	5	1	1	1	1				
1	1	4	5	1	1				
5	3	1	1	1	1				
1	1	1	5	1	1				
1	1	1	1	1	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.08 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

5.25	11.25	0.08	0.08	0.08	1.30				
0.08	0.05	1.15	4.00	0.08	0.08				
4.60	0.75	0.08	0.25	0.08	0.08				
0.08	0.08	0.08	2.80	0.08	0.08				
0.08	3.90	0.08	0.08	0.08	0.08				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **17 %**

Left Bank: 10 ft Right Bank: 5 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 25	27.8
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.3
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 4 Right Side: 4	8.9
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.98

Left Side					Right Side				
					6.52				
					5.3				
					11.75				
					8.5				
					14.25				

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☑	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*				
☐	*Magnolia acuminata*						
3	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	20.63 %

Left Side				Right Side			
10	15	45	10	20	15	30	20

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.83

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	80	80
Residential districts, 2 acres (12% cover)	0.3	5	85
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	10	95
Gravel	0	5	100

E-4

Variable	Value	VSI
$V_{CCANOPY}$	92 %	1.00
V_{EMBED}	1.7	0.36
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	17 %	0.99
V_{LWD}	27.8	0.90
V_{TDBH}	9.3	1.00
V_{SNAG}	8.9	0.50
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.98	0.94
$V_{DETRITUS}$	20.6 %	0.25
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.83	0.87

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Haul Road Improvements
Location: Cresap, WV
Sampling Date: 09/26/11

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: HGM2 (E5)

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.65
Biogeochemical Cycling	0.76
Habitat	0.50

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	46.50	0.45
V_{EMBED}	Average embeddedness of channel.	2.67	0.70
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.29	0.15
V_{BERO}	Total percent of eroded stream channel bank.	3.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	9.33	1.00
V_{TDBH}	Average dbh of trees.	9.37	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	2.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	0.62	0.30
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.70	0.74

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	J. Seamands & T. Chadwell	Latitude/UTM Northing:	39.823967
Project Name:	AEP Mitchell Haul Road Improvements	Longitude/UTM Easting:	-80.788433
Location:	Cresap, WV	Sampling Date:	09/26/11

SAR Number: HGM2 (E5) Reach Length (ft): 300 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **46.5 %**

List the percent cover measurements at each point below:

75	80	50	80	75	0	0	0	10	95

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.7**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

4	5	1	5	5	5	5	5	1	1
5	2	2	3	5	1	4	5	5	1
1	1	1	1	1	1	1	1	1	1

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.29 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

1.50	2.40	0.08	3.25	13.00	5.90	32.00	5.70	0.08	0.08
5.20	0.90	3.00	0.50	4.30	0.08	16.00	6.30	5.50	0.08
0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **3 %**

Left Bank: 2 ft Right Bank: 7 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 28	9.3
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.4

Left Side					Right Side				
8.3	5.2	7.1	4.3	10.5	10	21.7	6.8	9.4	6.1
5.3	11.4	19.4	5.1	10.5	6.5	6.2	12.9	6.5	13.2
6.5	14.7	8.3	7.2	14.7	7.3	5.4	13.3	9.2	4.7
					12.8				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 6 Right Side:	2.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	0.62

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☑	*Asimina triloba*	☑	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☑	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

4	Species in Group 1	2	Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	65.00 %

Left Side				Right Side			
65	45	95	95	95	65	35	25

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.70

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (50% to 75% ground cover)	0.7	100	100

HGM2 (E5)		
Variable	Value	VSI
$V_{CCANOPY}$	47 %	0.45
V_{EMBED}	2.7	0.70
$V_{SUBSTRATE}$	0.29 in	0.15
V_{BERO}	3 %	1.00
V_{LWD}	9.3	1.00
V_{TDBH}	9.4	1.00
V_{SNAG}	2.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.62	0.30
$V_{DETRITUS}$	65.0 %	0.79
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.7	0.74

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 20 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-5a

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.61
Biogeochemical Cycling	0.45
Habitat	0.63

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	100.00	1.00
V_{EMBED}	Average embeddedness of channel.	1.40	0.24
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	8.47	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	3.39	0.42
V_{TDBH}	Average dbh of trees.	7.58	0.79
V_{SNAG}	Number of snags per 100 feet of stream.	5.08	0.79
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.82	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	61.25	0.75
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.94	0.99

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39 49 26.946
Project Name:	AEP Mitchell Phase II Haul Road Project	Longitude/UTM Easting:	80 47 19.243
Location:	Cresap, Marshall County, WV	Sampling Date:	20 March 2012

SAR Number: E-5a Reach Length (ft): 59 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **100.0 %**

List the percent cover measurements at each point below:

100	100	100	100	100	100	100	100	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **1.4**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	1	1	1	1	1				
1	5	1	1	1	1				
1	1	1	1	4	1				
1	1	1	1	1	2				
1	1	1	1	5	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.08 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

1.25	0.08	0.08	0.08	0.08	0.08				
0.08	2.70	0.08	0.85	0.08	0.08				
0.08	0.08	0.08	0.08	0.75	0.08				
0.08	0.40	0.08	0.35	0.08	0.05				
0.08	0.08	0.08	0.08	2.15	0.08				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **8 %**

Left Bank: 0 ft Right Bank: 5 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	3.4
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.6

Left Side					Right Side				
5.5	6	7.75			6.25				
10.5					5				
6.3					9.3				
11.25					4.5				
					11				

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 3 Right Side: 0	5.1
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.82

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☑	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*				
☐	*Magnolia acuminata*						
3	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.

61.25 %

Left Side				Right Side			
10	15	65	90	60	75	90	85

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.

Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed:

0.94

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	93	93
Residential districts, 2 acres (12% cover)	0.3	1	94
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	2	96
Gravel	0	4	100

E-5a

Variable	Value	VSI
$V_{CCANOPY}$	100 %	1.00
V_{EMBED}	1.4	0.24
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	8 %	1.00
V_{LWD}	3.4	0.42
V_{TDBH}	7.6	0.79
V_{SNAG}	5.1	0.79
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.82	1.00
$V_{DETRITUS}$	61.3 %	0.75
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.94	0.99

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Phase II Haul Road Project
Location: Cresap, Marshall County, WV
Sampling Date: 20 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-5b

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.75
Biogeochemical Cycling	0.55
Habitat	0.68

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	99.80	1.00
V_{EMBED}	Average embeddedness of channel.	1.60	0.32
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	20.75	0.96
V_{LWD}	Number of down woody stems per 100 feet of stream.	16.98	1.00
V_{TDBH}	Average dbh of trees.	9.41	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	3.77	0.92
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.53	0.73
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	56.88	0.69
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.94	0.99

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Mary Gilmore	Latitude/UTM Northing:	39 49 26.587
Project Name:	AEP Mitchell Phase II Haul Road Project	Longitude/UTM Easting:	80 47 19.352
Location:	Cresap, Marshall County, WV	Sampling Date:	20 March 2012

SAR Number: E-5b Reach Length (ft): 53 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **99.8 %**

List the percent cover measurements at each point below:

98	100	100	100	100	100	100	100	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **1.6**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	1	1	5	1	1				
1	1	4	1	1	1				
1	1	1	1	4	1				
1	1	1	1	1	5				
1	1	1	1	5	1				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.08 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	0.08	0.65	1.67	0.08	0.08				
0.08	0.08	0.08	0.08	0.08	0.08				
0.08	0.30	0.75	0.08	0.75	0.08				
0.08	0.08	0.08	0.08	0.08	4.58				
1.00	0.08	0.08	1.25	0.93	0.08				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **21 %**

Left Bank: 3 ft Right Bank: 8 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 9	17.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	9.4
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 1	3.8
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.53

Left Side					Right Side				
4.75					11.5				
10					6.25				
8.5									
10.25									
14.6									

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*				
☐	*Magnolia acuminata*						
2	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **56.88 %**

Left Side				Right Side			
10	40	90	75	20	45	75	100

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.94**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	93	93
Residential districts, 2 acres (12% cover)	0.3	1	94
Open space (pasture, lawns, parks, etc.), grass cover <50%	0.1	2	96
Gravel	0	4	100

E-5b

Variable	Value	VSI
$V_{CCANOPY}$	100 %	1.00
V_{EMBED}	1.6	0.32
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	21 %	0.96
V_{LWD}	17.0	1.00
V_{TDBH}	9.4	1.00
V_{SNAG}	3.8	0.92
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.53	0.73
$V_{DETRITUS}$	56.9 %	0.69
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.94	0.99

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Haul Road Improvements
Location: Cresap, WV
Sampling Date: 09/26/11

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: HGM1 (E6)

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.60
Biogeochemical Cycling	0.66
Habitat	0.45

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	52.00	0.52
V_{EMBED}	Average embeddedness of channel.	2.37	0.59
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	6.33	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	7.67	0.96
V_{TDBH}	Average dbh of trees.	7.20	0.71
V_{SNAG}	Number of snags per 100 feet of stream.	2.33	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	55.63	0.68
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.67	0.71

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	J. Seamands & T. Chadwell	Latitude/UTM Northing:	39.82447
Project Name:	AEP Mitchell Haul Road Improvements	Longitude/UTM Easting:	-80.78551
Location:	Cresap, WV	Sampling Date:	09/26/11

SAR Number: HGM1 (E6) Reach Length (ft): 300 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **52.0 %**

List the percent cover measurements at each point below:

0	70	40	60	70	95	20	55	25	85

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.4**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

5	1	1	4	1	1	1	1	5	1
1	1	1	1	3	1	4	3	5	1
1	1	1	1	5	1	5	5	5	4

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.08 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.50	0.08	0.08	3.60	0.08	0.08	0.08	0.08	0.10	0.08
0.08	0.25	0.08	0.08	16.10	8.00	0.50	4.80	1.10	0.08
0.08	0.08	0.08	0.08	1.10	0.08	0.04	0.07	6.00	1.70

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **6 %**

Left Bank: 11 ft Right Bank: 8 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 23	7.7
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	7.2
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 2 Right Side: 5	2.3
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	0.00

Left Side					Right Side				
8.3	5.3	6.8	6.3	4.7	5.6	4.3	6	4.7	14.3
6.4	6.7	8.6	7.4	9.2	6.6	4.2	12.7	5.3	4.3
6.1	4.9	7.3	6.7	4.8	15.5	7.1	7.5	11.8	6.6
13.9	4.6	13.6	4.1	7.7	5	13.6	5.2	6.9	4.3
4	6.5	4.1			6.2	8.9	6.8		

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☐	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☑	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☑	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

1	Species in Group 1	3	Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **55.63 %**

Left Side				Right Side			
40	70	50	85	80	25	40	55

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.67**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (50% to 75% ground cover)	0.7	93.7	93.7
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	6.3	100

HGM1 (E6)

Variable	Value	VSI
$V_{CCANOPY}$	52 %	0.52
V_{EMBED}	2.4	0.59
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	6 %	1.00
V_{LWD}	7.7	0.96
V_{TDBH}	7.2	0.71
V_{SNAG}	2.3	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	55.6 %	0.68
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.67	0.71

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Haul Road Improvements
Location: Cresap, WV
Sampling Date: 09/27/11

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: HGM4 (E8)

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.62
Biogeochemical Cycling	0.72
Habitat	0.54

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	65.00	0.70
V_{EMBED}	Average embeddedness of channel.	2.67	0.70
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.25	0.13
V_{BERO}	Total percent of eroded stream channel bank.	3.13	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	13.13	1.00
V_{TDBH}	Average dbh of trees.	6.83	0.64
V_{SNAG}	Number of snags per 100 feet of stream.	6.88	0.61
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	60.00	0.73
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.64	0.67

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	J. Seamands & T. Chadwell	Latitude/UTM Northing:	39.825265
Project Name:	AEP Mitchell Haul Road Improvements	Longitude/UTM Easting:	-80.784482
Location:	Cresap, WV	Sampling Date:	09/27/11

SAR Number: HGM4 (E8) Reach Length (ft): 160 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **65.0 %**

List the percent cover measurements at each point below:

95	70	45	10	45	20	95	90	95	85

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.7**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

4	1	1	5	5	3	1	3	1	5
5	5	5	1	1	4	5	1	1	5
1	1	5	5	1	1	1	1	1	1

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.25 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.10	1.00	1.10	6.50	5.60	2.30	0.08	1.80	0.08	0.50
6.00	11.00	4.50	0.08	0.08	3.80	1.00	0.08	0.08	0.40
0.08	0.08	0.40	0.40	0.08	0.08	0.08	0.08	0.08	0.08

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **3 %**

Left Bank: 3 ft Right Bank: 2 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 21	13.1
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	6.8
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 8 Right Side: 3	6.9
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	0.00

Left Side					Right Side				
9.3	10.3	11.7	4.4	4.9	5.1	4.2	5.8	4.2	7.8
5.1	8.7	7.3	9	8	7.9	4.4	4.2	4.7	10.3
8.6	4.7	7.3	11.2	5.3	7.5	9.4	4.1	8.5	5.3
9.2	4.7	7	5.5	4.5	5.6	9	4.8		

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☑	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☐	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*				
☐	*Magnolia acuminata*						
	1 Species in Group 1				2 Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **60.00 %**

Left Side				Right Side			
50	50	25	85	40	55	80	95

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.64**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (50% to 75% ground cover)	0.7	84.5	84.5
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	15.5	100

HGM4 (E8)		
Variable	Value	VSI
$V_{CCANOPY}$	65 %	0.70
V_{EMBED}	2.7	0.70
$V_{SUBSTRATE}$	0.25 in	0.13
V_{BERO}	3 %	1.00
V_{LWD}	13.1	1.00
V_{TDBH}	6.8	0.64
V_{SNAG}	6.9	0.61
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	60.0 %	0.73
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.64	0.67

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 21 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-10

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.96
Biogeochemical Cycling	0.93
Habitat	0.95

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	87.50	0.99
V_{EMBED}	Average embeddedness of channel.	3.10	0.86
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.78	0.89
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	8.00	1.00
V_{TDBH}	Average dbh of trees.	12.95	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	4.00	0.90
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.80	0.86
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	85.00	1.00
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	1.00	1.00

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Dan Godec	Latitude/UTM Northing:	39.826009
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	-80.783814
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	21 March 2012

SAR Number: E-10 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **87.5 %**

List the percent cover measurements at each point below:

60	80	100	100						
60	100	100	100						

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **3.1**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

4	5	3	3	1	1				
4	1	1	5	3	5				
1	1	5	1	2	5				
5	4	4	3	1	1				
5	5	1	5	3	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **1.78 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

2.50	1.75	4.75	3.25	0.08	0.08				
1.75	0.08	0.08	17.00	1.50	1.60				
0.08	0.08	4.80	0.08	1.80	3.50				
3.20	4.00	4.60	10.25	0.08	0.08				
4.25	3.10	0.08	16.50	1.25	8.00				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **0 %**

Left Bank: 0 ft Right Bank: 0 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 8	8.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	13.0

Left Side					Right Side				
12	15				18	15	12	13	
9						8.5	15	12	

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 3	4.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 124 Right Side: 80	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.80

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		

3 Species in Group 1	1 Species in Group 2

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **85.00 %**

Left Side				Right Side			
90	100			100	100		
100	100			50	40		

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **1.00**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	100	100

E-10

Variable	Value	VSI
$V_{CCANOPY}$	88 %	0.99
V_{EMBED}	3.1	0.86
$V_{SUBSTRATE}$	1.78 in	0.89
V_{BERO}	0 %	1.00
V_{LWD}	8.0	1.00
V_{TDBH}	13.0	1.00
V_{SNAG}	4.0	0.90
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.80	0.86
$V_{DETRITUS}$	85.0 %	1.00
V_{HERB}	Not Used	Not Used
V_{WLUSE}	1	1.00

Notes:

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FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 21 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-11

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.91
Biogeochemical Cycling	0.80
Habitat	0.81

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	82.50	0.93
V_{EMBED}	Average embeddedness of channel.	2.63	0.69
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.38	0.69
V_{BERO}	Total percent of eroded stream channel bank.	40.00	0.86
V_{LWD}	Number of down woody stems per 100 feet of stream.	10.00	1.00
V_{TDBH}	Average dbh of trees.	12.70	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	0.00	0.10
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	1.80	0.86
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	49.38	0.60
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.93	0.98

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Dan Godec	Latitude/UTM Northing:	39.826067
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	-80.783565
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	21 March 2012

SAR Number: E-11 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **82.5 %**

List the percent cover measurements at each point below:

70	85	90	70	80	80	90	80	80	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.6**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	5	1	5	2	1				
1	1	4	1	1	1				
4	5	5	5	5	1				
4	1	5	4	1	1				
1	1	1	5	1	5				

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **1.38 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	15.00	2.00	2.60	5.25	0.08				
0.08	0.08	7.80	0.08	0.08	0.50				
1.80	5.00	6.15	6.75	7.20	0.08				
1.50	0.08	4.12	5.25	1.25	0.08				
0.08	0.08	0.08	2.10	0.08	9.00				

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **40 %**

Left Bank: 20 ft Right Bank: 20 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 10	10.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	12.7
7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 0 Right Side: 0	0.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: 124 Right Side: 80	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	1.80

Left Side					Right Side				
17					9.8				
18					11.3				
13.5					7.1				
12.3					11.8				
13.5									

Group 1 = 1.0				Group 2 (-1.0)			
☐	*Acer rubrum*	☐	*Magnolia tripetala*	☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*	☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*	☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Asimina triloba*	☐	*Prunus serotina*	☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
☐	*Betula alleghaniensis*	☐	*Quercus alba*			☐	*Microstegium vimineum*
☐	*Betula lenta*	☐	*Quercus coccinea*	☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Carya alba*	☐	*Quercus imbricaria*	☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Carya glabra*	☐	*Quercus prinus*	☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Carya ovalis*	☐	*Quercus rubra*	☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Carya ovata*	☐	*Quercus velutina*	☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Cornus florida*	☐	*Sassafras albidum*	☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Fagus grandifolia*	☐	*Tilia americana*	☐	*Ligustrum obtusifolium*		
☑	*Fraxinus americana*	☐	*Tsuga canadensis*	☐	*Ligustrum sinense*		
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*				
☐	*Magnolia acuminata*						
3	Species in Group 1			1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	49.38 %

Left Side				Right Side			
95	20	50	75	10	40	5	100

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.93

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	90	90
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	5	95
Residential districts, 2 acres (12% cover)	0.3	5	100

E-11

Variable	Value	VSI
$V_{CCANOPY}$	83 %	0.93
V_{EMBED}	2.6	0.69
$V_{SUBSTRATE}$	1.38 in	0.69
V_{BERO}	40 %	0.86
V_{LWD}	10.0	1.00
V_{TDBH}	12.7	1.00
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	1.80	0.86
$V_{DETRITUS}$	49.4 %	0.60
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.93	0.98

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 21 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-12

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.62
Biogeochemical Cycling	0.70
Habitat	0.65

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	86.00	0.97
V_{EMBED}	Average embeddedness of channel.	2.26	0.55
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.08	0.04
V_{BERO}	Total percent of eroded stream channel bank.	0.00	1.00
V_{LWD}	Number of down woody stems per 100 feet of stream.	4.00	0.50
V_{TDBH}	Average dbh of trees.	10.34	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	1.00	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.70	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	74.38	0.91
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.93	0.98

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Dan Godec	Latitude/UTM Northing:	39.826112
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	-80.783545
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	21 March 2012

SAR Number: E-12 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **86.0 %**

List the percent cover measurements at each point below:

50	50	95	100	100	100	80	95	90	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.3**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	1	5	1	1	1	4			
1	1	5	1	1	5	4			
5	1	1	1	1	5	4			
1	2	1	1	1	5	5			
1	1	1	1	3	5	1			

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **0.08 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	0.08	1.00	0.08	0.08	0.08	4.25			
0.08	0.08	1.00	0.08	0.08	4.00	11.00			
4.15	0.08	0.08	0.08	2.48	12.00	5.20			
0.08	0.08	0.08	0.08	0.08	6.70	9.00			
0.08	0.08	0.08	0.08	4.55	1.75	0.08			

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **0 %**

Left Bank: 0 ft Right Bank: 0 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 4	4.0
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.3

Left Side					Right Side				
7.5					13.25				
11.75					15				
11.1					7.25				
6.75									
7.1									
11.25									
11.75									
11									

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 0 Right Side: 1	1.0
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.70

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☑	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		
4	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10	$V_{DETRITUS}$	Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot.	74.38 %

Left Side				Right Side			
95	40	90	25	100	95	50	100

11	V_{HERB}	Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot.	Not Used

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12	V_{WLUSE}	Weighted Average of Runoff Score for watershed:	0.93

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	90	90
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	5	95
Residential districts, 2 acres (12% cover)	0.3	5	100

E-12

Variable	Value	VSI
$V_{CCANOPY}$	86 %	0.97
V_{EMBED}	2.3	0.55
$V_{SUBSTRATE}$	0.08 in	0.04
V_{BERO}	0 %	1.00
V_{LWD}	4.0	0.50
V_{TDBH}	10.3	1.00
V_{SNAG}	1.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.70	1.00
$V_{DETRITUS}$	74.4 %	0.91
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.93	0.98

Notes:

Ver. 1-25-11

FCI Calculator for the High-Gradient Headwater Streams in eastern Kentucky and western West Virginia HGM Guidebook

To ensure accurate calculations, the UPPERMOST STRATUM of the plant community is determined based on the calculated value for $V_{CCANOPY}$ (≥20% cover is required for tree/sapling strata). Go to the SAR Data Entry tab and enter site characteristics and data in the yellow cells. For information on determining how to split a project into SARs, see Chapter 5 of the Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky (Environmental Laboratory U.S. Army Corps of Engineers 2010).

Project Name: AEP Mitchell Landfill Phase II Haul Road Project
Location: Cresap, Marshall County, West Virginia
Sampling Date: 21 March 2012

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: E-13

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.74
Biogeochemical Cycling	0.82
Habitat	0.84

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	89.00	1.00
V_{EMBED}	Average embeddedness of channel.	2.91	0.79
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.75	0.88
V_{BERO}	Total percent of eroded stream channel bank.	88.71	0.60
V_{LWD}	Number of down woody stems per 100 feet of stream.	3.23	0.40
V_{TDBH}	Average dbh of trees.	10.29	1.00
V_{SNAG}	Number of snags per 100 feet of stream.	1.61	1.00
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	Not Used	Not Used
V_{SRICH}	Riparian vegetation species richness.	2.71	1.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	65.00	0.79
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.93	0.98

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team:	Dawn York/Dan Godec	Latitude/UTM Northing:	39.826148
Project Name:	AEP Mitchell Landfill Phase II Haul Road Project	Longitude/UTM Easting:	-80.783934
Location:	Cresap, Marshall County, West Virginia	Sampling Date:	21 March 2012

SAR Number: E-13 Reach Length (ft): 62 Stream Type: Ephemeral Stream

Top Strata: Tree/Sapling Strata (determined from percent calculated in $V_{CCANOPY}$)

Site and Timing: Project Site | Before Project

Sample Variables 1-4 in stream channel

1 $V_{CCANOPY}$ Average percent cover over channel by tree and sapling canopy. Measure at no fewer than 10 roughly equidistant points along the stream. Measure only if tree/sapling cover is at least 20%. (If less than 20%, enter at least one value between 0 and 19 to trigger Top Strata choice.) **89.0 %**

List the percent cover measurements at each point below:

50	60	85	95	100	100	100	100	100	100

2 V_{EMBED} Average embeddedness of the stream channel. Measure at no fewer than 30 roughly equidistant points along the stream. Select a particle from the bed. Before moving it, determine the percentage of the surface and area surrounding the particle that is covered by fine sediment, and enter the rating according to the following table. If the bed is an artificial surface, or composed of fine sediments, use a rating score of 1. If the bed is composed of bedrock, use a rating score of 5. **2.9**

Embeddedness rating for gravel, cobble and boulder particles (rescaled from Platts, Megahan, and Minshall 1983)

Rating	Rating Description
5	<5 percent of surface covered, surrounded, or buried by fine sediment (or bedrock)
4	5 to 25 percent of surface covered, surrounded, or buried by fine sediment
3	26 to 50 percent of surface covered, surrounded, or buried by fine sediment
2	51 to 75 percent of surface covered, surrounded, or buried by fine sediment
1	>75 percent of surface covered, surrounded, or buried by fine sediment (or artificial surface)

List the ratings at each point below:

1	4	3	1	5	1	3			
1	5	4	1	5	5	4			
1	5	1	1	4	5	4			
1	5	1	1	3	5	5			
1	5	3	1	1	5	1			

3 $V_{SUBSTRATE}$ Median stream channel substrate particle size. Measure at no fewer than 30 roughly equidistant points along the stream; use the same points and particles as used in V_{EMBED}. **1.75 in**

Enter particle size in inches to the nearest 0.1 inch at each point below (bedrock should be counted as 99 in, asphalt or concrete as 0.0 in, sand or finer particles as 0.08 in):

0.08	5.25	1.25	0.08	6.50	0.08	4.25			
0.08	6.00	5.50	0.08	5.30	4.00	11.00			
0.08	3.25	0.08	0.08	8.20	12.00	5.20			
0.08	7.00	0.08	0.08	10.00	6.70	13.20			
0.08	12.00	1.30	0.08	0.08	1.75	0.08			

4 V_{BERO} Total percent of eroded stream channel bank. Enter the total number of feet of eroded bank on each side and the total percentage will be calculated If both banks are eroded, total erosion for the stream may be up to 200%. **89 %**

Left Bank: 30 ft Right Bank: 25 ft

Sample Variables 5-9 within the entire riparian/buffer zone adjacent to the stream channel (25 feet from each bank).

5	V_{LWD}	Number of down woody stems (at least 4 inches in diameter and 36 inches in length) per 100 feet of stream reach. Enter the number from the entire 50'-wide buffer and within the channel, and the amount per 100 feet of stream will be calculated. Number of downed woody stems: 2	3.2
6	V_{TDBH}	Average dbh of trees (measure only if $V_{CCANOPY}$ tree/sapling cover is at least 20%). Trees are at least 4 inches (10 cm) in diameter. Enter tree DBHs in inches. List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:	10.3

Left Side					Right Side				
16					5.5				
13.25					6				
6.25									
14									
11									

7	V_{SNAG}	Number of snags (at least 4" dbh and 36" tall) per 100 feet of stream. Enter number of snags on each side of the stream, and the amount per 100 feet will be calculated. Left Side: 1 Right Side: 0	1.6
8	V_{SSD}	Number of saplings and shrubs (woody stems up to 4 inches dbh) per 100 feet of stream (measure only if tree cover is <20%). Enter number of saplings and shrubs on each side of the stream, and the amount per 100 ft of stream will be calculated. Left Side: Right Side:	Not Used
9	V_{SRICH}	Riparian vegetation species richness per 100 feet of stream reach. Check all species present from Group 1 in the tallest stratum. Check all exotic and invasive species present in all strata. Species richness per 100 feet and the subindex will be calculated from these data.	2.71

Group 1 = 1.0			
☐	*Acer rubrum*	☐	*Magnolia tripetala*
☑	*Acer saccharum*	☐	*Nyssa sylvatica*
☐	*Aesculus flava*	☐	*Oxydendrum arboreum*
☐	*Asimina triloba*	☐	*Prunus serotina*
☐	*Betula alleghaniensis*	☐	*Quercus alba*
☐	*Betula lenta*	☐	*Quercus coccinea*
☐	*Carya alba*	☐	*Quercus imbricaria*
☐	*Carya glabra*	☐	*Quercus prinus*
☐	*Carya ovalis*	☐	*Quercus rubra*
☐	*Carya ovata*	☐	*Quercus velutina*
☐	*Cornus florida*	☐	*Sassafras albidum*
☐	*Fagus grandifolia*	☐	*Tilia americana*
☑	*Fraxinus americana*	☐	*Tsuga canadensis*
☐	*Liriodendron tulipifera*	☑	*Ulmus americana*
☐	*Magnolia acuminata*		
3	Species in Group 1		

Group 2 (-1.0)			
☐	*Ailanthus altissima*	☐	*Lonicera japonica*
☐	*Albizia julibrissin*	☐	*Lonicera tatarica*
☐	*Alliaria petiolata*	☐	*Lotus corniculatus*
☐	*Alternanthera philoxeroides*	☐	*Lythrum salicaria*
		☐	*Microstegium vimineum*
☐	*Aster tataricus*	☐	*Paulownia tomentosa*
☐	*Cerastium fontanum*	☐	*Polygonum cuspidatum*
☐	*Coronilla varia*	☐	*Pueraria montana*
☐	*Elaeagnus umbellata*	☑	*Rosa multiflora*
☐	*Lespedeza bicolor*	☐	*Sorghum halepense*
☐	*Lespedeza cuneata*	☐	*Verbena brasiliensis*
☐	*Ligustrum obtusifolium*		
☐	*Ligustrum sinense*		
1	Species in Group 2		

Sample Variables 10-11 within at least 8 subplots (40" x 40", or 1m x 1m) in the riparian/buffer zone within 25 feet from each bank. The four subplots should be placed roughly equidistantly along each side of the stream.

10 $V_{DETRITUS}$ Average percent cover of leaves, sticks, or other organic material. Woody debris <4" diameter and <36" long are include. Enter the percent cover of the detrital layer at each subplot. **65.00 %**

Left Side				Right Side			
40	60	100	35	50	100	40	95

11 V_{HERB} Average percentage cover of herbaceous vegetation (measure only if tree cover is <20%). Do *not* include woody stems at least 4" dbh and 36" tall. Because there may be several layers of ground cover vegetation percentages up through 200% are accepted. Enter the percent cover of ground vegetation at each subplot. **Not Used**

Left Side				Right Side			

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed: **0.93**

Land Use (Choose From Drop List)	Runoff Score	% in Catch-ment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	90	90
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	5	95
Residential districts, 2 acres (12% cover)	0.3	5	100

E-13

Variable	Value	VSI
$V_{CCANOPY}$	89 %	1.00
V_{EMBED}	2.9	0.79
$V_{SUBSTRATE}$	1.75 in	0.88
V_{BERO}	89 %	0.60
V_{LWD}	3.2	0.40
V_{TDBH}	10.3	1.00
V_{SNAG}	1.6	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	2.71	1.00
$V_{DETRITUS}$	65.0 %	0.79
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.93	0.98

Notes:

APPENDIX E

USACE JULY 14, 2008 CORRESPONDENCE

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

JUL 18 2008

REPLY TO
ATTENTION OF

July 14, 2008

Operations Division
Regulatory Branch
2008-0094

Mr. Jonathan Pachter
McElroy Coal Company
P.O. Box 425 RD 4
Moundsville, WV 26041

Dear Mr. Pachter:

I refer to your permit application received in this office January 7, 2008, for the McElroy Mine Coal Refuse Disposal Area, 1050 Saddle Dike. The proposed project is located in the Clay District of Marshall County, West Virginia.

You propose to construct a saddle dike to allow for the continued placement of coal refuse into an existing facility (O-1023-92, IBR No. 2). McElroy Coal Company plans to modify the existing refuse disposal area to include a saddle dike that expands the refuse disposal area. In doing so, the project will require the unavoidable placement of fill material into a non-relatively permanent water (NRPW). The fill material will be placed up to a surface elevation of 1050 feet mean sea level in the project area, filling approximately 254 linear feet (LF) of NRPW.

A preliminary jurisdictional determination was conducted by Civil & Environmental Consultants, Inc. and submitted as part of your application. The result of this survey indicated that approximately 254 LF of a NRPW to Conner Run would be permanently impacted by fill material by the expansion of the facilities. The NRPW flows into a 36 inch culvert which discharges into the adjacent fly ash impoundment. Based on the information provided to this office and agency coordination we have determined that the NRPW doesn't exhibit a significant nexus to the Ohio River, a Traditional Navigable Water. Therefore, a Section 404 permit is not required for this activity. However, should the conditions of the proposed project change in such a way that other waters will be impacted; you should again this office for permit requirements.

At this time coordination with this office is complete. You may proceed with your project once you obtain any other required state, local, or federal authorization. If you have any questions, please contact Mr. Allen R. Edris at allen.r.edris@lrp02.usace.army.mil or (412) 395-7158.

Sincerely,

Scott A. Hans
Chief, Regulatory Branch

CF:
WVDEP (Dennis Phipps)
WVDEP (Richard Roy)
PLC
Alliance Consulting (Braden Hoffman)
AEP (David Luchtenberg)