DRAFT

Wetland Delineation & Aquatic Resource Inventory

New I-79 Interchange
State Project U331-79-153.30

Morgantown, Monongalia County, West Virginia

Prepared For:

West Virginia Department of Transportation
1900 Kanawha Blvd., East
Building 5, Room 450
Charleston, WV 25305

August 2013

DRAFT

WETLAND DELINEATION & AQUATIC RESOURCE INVENTORY

NEW I-79 INTERCHANGE
STATE PROJECT U331-79-153.30
MORGANTOWN, MONONGALIA COUNTY, WEST VIRGINIA

PREPARED FOR

WEST VIRGINIA DEPARTMENT OF TRANSPORATION
1900 KANAWHA BLVD., EAST
CHARLESTON, WEST VIRGINIA 25305

AUGUST 2013

PREPARED BY:

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1.0 PROJECT DESCRIPTION & PURPOSE

The proposed project involves construction of a new interchange on Interstate 79 (I-79) between the current Star City (Exit 155) and Westover (Exit 152) exits near Morgantown, Monongalia County, West Virginia. The proposed project will tie the newly constructed interchange into two new frontage roads, connecting a relocated County Road (CR) 46/3 (Martin Hollow Road) on the west side of I-79 and an extension of University Town Center Drive on the east side of I-79. The purposes of the project are to reduce traffic conflicts in the area, improve safety, and increase traffic capacity. The project is being undertaken by the West Virginia Department of Transportation (WVDOT).

Project location mapping is provided in **Appendix A.**

2.0 LITERATURE REVIEW AND BACKGROUND INFORMATION

2.1 Streams

The study area is located within the watershed of Dents Run (HUC 050200030308/WVM-12), a tributary to the Monongahela River (HUC 0502003/WVM). The Dents Run watershed covers approximately 14.6 square miles (sm) west of Morgantown, encompassing portions of the communities of Westover, Granville, Morgan Heights, and Laurel Point. A perennial tributary to Dents Run, identified by WVDEP as Flaggy Meadow Run (WVM-12-A), is the principal drainage feature in the study area. This tributary is depicted as an unnamed perennial stream on USGS topographic mapping covering the study area (See **Appendix A**).

The Dents Run watershed is dominated by forest and agricultural lands. Coal mining has been historically important in the watershed, but there are currently no active mining operations in the study area. Acid mine drainage (AMD) collection facilities and two AMD injection points operated by Consolidated Coal Company (Consol) are located within the study area (Martin Hollow Injection Points 208 & 209). The facilities collect legacy AMD from the former Arkwright mining complex, now closed and reclaimed. The facilities do not discharge to Flaggy Meadow Run or to Dents Run, but are piped to a regional AMD treatment facility operated by Consol.

The West Virginia Department of Environmental Protection's (WVDEP) most recent Total Maximum Daily Load (TMDL) document for the Monongahela River (still in draft) lists Flaggy Meadow Run (WVM-12-A) as impaired due to excessive organic enrichment and ionic stress, and Dents Run (WVM-12) as impaired due to excessive organic enrichment, sedimentation, and ionic stress.[1]. TMDL allocations for fecal coliforms and iron are proposed in the document for Dents Run, and TMDL allocations for fecal coliforms are proposed for Flaggy Meadow Run. Principal sources of fecal coliform impairment identified included failing package wastewater treatment plants, on–site septic systems, and runoff from pasture and livestock operations. Untreated discharges from forfeited and abandoned coal mining operations were identified as the principal source of iron impairments.

[1] *Total Maximum Daily Loads for Selected Streams in the Monongahela River Watershed, West Virginia -Draft Report.* WVDEP Division of Water and Waste Management. August 2013.

National Wetlands Inventory (NWI) mapping covering the study area depicts the Monongahela River, located east of the study area, as a Riverine/Lower Perennial/Unconsolidated Bottom/Permanent (R2UBH) deepwater habitat. No riverine or other deepwater habitats are identified in the study area.

2.2 Wetlands & Other Waters

National Wetlands Inventory (NWI) maps maintained by the U.S. Fish & Wildlife Service were reviewed to identify any mapped wetlands located in the study area. No palustrine or riverine wetlands of any kind are depicted on the NWI map. The closest mapped wetlands include several excavated ponds located outside the study area to the northeast that are associated with University Town Center.

A copy of the NWI map excerpt covering the study area is included in **Appendix B**.

2.3 Soils

Soils information for the study area was obtained using the Natural Resources Conservation Service (NRCS) on-line Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov). Mapped soil information for the study area is summarized in **Table 1**.

Table 1
Mapped Soil Types
I-79 Study Area

Map Unit Symbol	Map Unit Name	Hydric Status	Drainage Class
CwC	Culleoka-Westmoreland silt loams, 8-15% slopes	Not hydric	Well drained
CwD	Culleoka-Westmoreland silt loams, 15-25% slopes	Not hydric	Well drained
CwE	Culleoka-Westmoreland silt loams, 25-35% slopes	Not hydric	Well drained

Table 1
Mapped Soil Types
I-79 Study Area (cont.)

Map Unit Symbol	Map Unit Name	Hydric Status	Drainage Class
CwF	Culleoka-Westmoreland silt loams, 35-65% slopes	Not hydric	Well drained
DgD	Dormont & Guernsey silt loams, 15-25% slopes	Not hydric	Moderately well drained
GuF	Gilpin-Culleoka-Upshur silt loams, 35-65% slopes	Not hydric	Well drained
TlB	Tilsit silt loam, 3-8% slopes	Not hydric	Moderately well drained
U1	Udorthents, cut & fill	Not hydric	-----
U2	Udorthents, dump, low base	Not hydric	-----
U4	Udorthents, mudstone & sandstone, high base	Not hydric	-----
U5	Udorthents, mudstone & sandstone, low base	Not hydric	-----
WeE	Westmoreland silt loam, 25-35% slopes	Not hydric	Well drained

Copies of soil information obtained from the NRCS Web Soil Survey are included in **Appendix B**.

3.0 FIELD INVESTIGATION

3.1 Study Area Description

The study area investigated by Burgess & Niple, Inc. (B&N) originated approximately 0.75 mile south of the Star City exit and extended approximately 0.8 mile south along I-79. Field observations were made for areas located along both the east and west sides of the existing I-79 alignment. To the west of I-79, this included areas primarily along CR 46/3 (Martin Hollow Road) and CR 49/1 (Old Martin Hollow Road). F

Field investigations were not completed on any property owned by Mr. Gary Solomon in the study area, as right-of-entry to this property was not granted by Mr. Solomon. To the east of I-79, field observations were limited to areas that could be safely accessed by foot from the I-79 right-of-way (ROW) or from Consol's Martin Hollow AMD treatment area. The limits of the study area are depicted on the Study Area map in **Appendix A**.

3.2 Field Investigation Methodology

B&N conducted a field investigation of the study area beginning on Monday, July 22, 2013 and concluding on Friday, July 26, 2013. Results of the literature review, and available aerial and topographic mapping were used during the field investigation to help identify areas where potential streams and/or wetlands could exist.

Potential wetland areas observed during the field investigation were evaluated in accordance with the *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1 (1987),* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0)*.

Potential jurisdictional streams observed were evaluated in accordance with USEPA Rapid Bioassessment Protocols (RBP) for Physical Condition and Habitat [2], West Virginia Stream Condition Index (SCI) protocols, as adapted for the Save Our Streams program [3], West

[2] *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, BenthicMacroinvertebrates, and Fish, Second Edition – EPA 841-B-99-002. .* Office of Water, U.S. Environmental Protection Agency. 1999.
[3] *West Virginia Save Our Stream Program Advanced Standard Operating Procedures Manual*. Office of Water and Waste, West Virginia Department of Environmental Protection. 2010.

Virginia High Gradient Headwater Stream Assessment (HGM) protocols [4], and WV DEP Benthic Macroinvertebrate Collection Protocols [5], as applicable. An overall index score was calculated for each stream using the West Virginia Stream and Wetland Valuation Metric (WVSWVM) calculator for Impact Streams [6]. Stream impact length was set at zero for purposes of calculating WVSWVM index scores, as stream impacts for the project have not yet been determined.

[4] *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. July 2010.
[5] *Watershed Assessment Branch 2013 Standard Operating Procedures, Chapter V. Benthic Macroinvertebrate Collection Protocols. WV DEP, 2013.*
[6] *West Virginia Stream and Wetland Valuation Metric Version 2.0.* West Virginia Interagency Review Team. February 2011.

4.0 FINDINGS

4.1 Streams

4.1.1 General

Six jurisdictional streams were found within the study area, identified in this report as Streams 1 through 6. Stream 1 is a perennial headwater tributary to Dents Run, identified by WVDEP as Flaggy Meadow Run. Streams 2 through 6 are high-gradient ephemeral tributaries to Stream 1. Descriptions of conditions in each stream follow below. Locations of Streams 1 through 6 are shown on the Aquatic Resources mapping provided in **Appendix C**. Stream assessment results are summarized in **Table 2** following stream descriptions. Copies of stream assessment data forms are included in **Appendix D.**

4.1.2 Stream 1

Stream 1 is a perennial headwater tributary to Dents Run, identified by WVDEP as Flaggy Meadow Run (WVM-12-A). It is the principal drainage feature within the study area. The drainage area of Stream 1 was estimated to be approximately 1.54 square miles (sm). It originates northwest of the study area near Kelley's Road (CR 46/1), and closely parallels Martin Hollow Road (CR 46/3) for the majority of its length. Its riparian corridor is largely wooded. Dominant tree species observed in the assessment reach included ironwood (*Carpinus caroliniana*) and sugar maple (*Acer saccharum*). Stream 1 flows into a culvert on the west side of I-79 near the south end of the study area, and emerges outside the study area on the east side of I-79 to join Dents Run near the Riverside Apostolic Church (336 Dents Run Road). Stream 1 is also culverted for approximately 600 lf beneath Consol's Martin Hollow AMD collection and injection facilities (Injection Point Nos. 208/209), at the north end of the study area. There are three additional culverted road crossings on Stream 1 in the study area beneath Martin Hollow Road and Old Martin Hollow Road (CR 49/1) before entering the culvert beneath I-79. Estimated length of Stream 1 within the study area is 4,727 linear feet (lf).

Although short segments of Stream 1 within the study area exhibited high gradient characteristics, overall channel slope was estimated to be approximately 3 percent; therefore Stream 1 was evaluated as a low gradient stream. Stream 1 exhibited step-pool

morphology in steeper segments, but also exhibited riffle, run, and pool features. Scattered litter and minor dumping were observed along the length of Stream 1.

4.1.3 Stream 2

Stream 2 is an unnamed, high-gradient (≥ 4 % channel slope), ephemeral tributary to Stream 1 (Flaggy Meadow Run). Stream 2 originates west of the study area, and flows east along the north side of Old Martin Hollow Road (CR 49/1) to join Stream 1 just upstream of its culverted crossing beneath Old Martin Hollow Road. Estimated drainage area of Stream 2 is 0.30 sm.

The left bank riparian corridor of Stream 2 is wide (> 100 ft) and heavily wooded. Dominant tree species observed in the assessment reach included ironwood (*Carpinus caroliniana*), red maple (*Acer rubrum*), and basswood (*Tilia americana*). The right bank corridor is wooded, but narrow, where Stream 2 parallels Old Martin Hollow Road. Common invasive species such as tree-of-heaven (*Ailanthus altissima*), Japanese knotweed (*Polygonum cuspidatum*), and sericea lespedeza (*Lespedeza cuneata*) were observed along the road, in addition to native woody and herbaceous species.

Stream 2 exhibits step-pool morphology dominated by large boulders, cobble, woody debris, and detritus. Minor littering and dumping was observed along Stream 2. Excessive bank erosion was observed in the upper reaches of Stream 2 within the study area; however, bank conditions at the downstream end and approaching the confluence with Stream 1 were observed to be relatively stable. As the Morgantown area had experienced heavy rain in the days immediately preceding the field investigation, flow was observed in Stream 2 during the field investigation. Estimated length of Stream 2 in the study area is 473 lf.

4.1.4 Stream 3

Stream 3 is an unnamed, high-gradient, ephemeral tributary to Stream 1. It originates west of the study area and flows along the south side of Old Martin Hollow Road. It joins Stream 1 at the downstream end of Stream 1's culverted crossing beneath Old Martin Hollow Road. Estimated drainage area of Stream 3 is 0.14 sm.

The right bank riparian corridor of Stream 3 is wide and largely wooded. Dominant tree species observed in the assessment reach included ironwood (*Carpinus caroliniana*), red maple (*Acer rubrum*) and box elder (*Acer negundo*). The left bank corridor is wooded for the majority of its length, but is narrow where it parallels the road. Portions of the left bank corridor have been cleared of trees and are dominated by shrubs, sapling, and herbaceous vegetation. Common invasive species such as tree-of-heaven (*Ailanthus altissima*), Japanese knotweed (*Polygonum cuspidatum*), and sericea lespedeza (*Lespedeza cuneata*) were observed here, along with native species.

Stream 3 exhibits step-pool morphology, dominated by large boulders and cobble, woody debris, and detritus. Bank erosion was relatively more severe along the length of Stream 3 than observed along Stream 2. Minor littering and dumping were also observed. Stream 3 was observed to be flowing during the field investigation due to the period of heavy rain just before the field investigation commenced. Estimated length of Stream 3 in the study area is 631 lf.

4.1.5 Stream 4

Stream 4 is a small, unnamed, high-gradient, ephemeral tributary to Stream 1. It originates from a culvert in the west ROW of I-79, and flows steeply down the west I-79 embankment to join Stream 1 just upstream of where Stream 1 enters the culvert beneath I-79. Estimated drainage area for Stream 4 is 0.04 sm.

The riparian corridor of Stream 4 is wide and heavily wooded. Dominant tree species observed in the assessment reach included ironwood (*Carpinus caroliniana*), red maple (*Acer rubrum*), and basswood (*Tilia americana*). Common invasive species such as Japanese knotweed (*Polygonum cuspidatum*) and Tartarian honeysuckle (*Lonicera tatarica*) were prevalent at the downstream end of Stream 4, but the majority of the corridor was dominated by native forest species.

Stream 4 exhibits step-pool/cascade morphology, dominated by large boulders, cobble, woody debris and detritus. Bank erosion was relatively severe along Stream 4 due to its steepness. Stream 4 was observed to be flowing due to the period of heavy rain just before the field investigation commenced. Estimated length of Stream 4 in the study area is 508 lf.

4.1.6 Stream 5

Stream 5 is a small, unnamed, high-gradient, ephemeral tributary to Stream 1. It originates in the east ROW of I-79, crosses beneath I-79, and emerges from a culvert at the base of the west I-79 embankment in the south portion of the study area. From there it flows for a short distance to join Stream 1 after crossing beneath Martin Hollow Road (CR 46/3). Estimated drainage area for Stream 5 is 0.05 sm.

The riparian corridor for Stream 5 is wide and consists primarily of open woods. Dominant tree species observed in the assessment reach included ironwood (*Carpinus caroliniana*) and red maple (*Acer rubrum*). Japanese knotweed (*Polygonum cuspidatum*) and Tartarian honeysuckle (*Lonicera tatarica*) were observed, but the majority of the Stream 5 corridor was dominated by native forest species.

Stream 5 exhibited step-pool morphology dominated by large cobble, woody debris, and detritus. Its channel slope was relatively low in comparison to the other ephemeral tributaries observed in the study area. As a consequence, it generally lacked the large boulders characteristic of the steeper tributaries, and contained relatively more gravel and sand. Bank conditions in the assessment reach (west side of I-79) were relatively stable. Stream 5 was observed to be flowing due to the period of heavy rain just before the field investigation commenced. Estimated length of Stream 5 in the study area is 285 lf.

4.1.7 Stream 6

Stream 6 is an unnamed, high-gradient, ephemeral tributary to Stream 1 which originates northeast of the study area, and flows into Wetland A at the north end of the study area. Estimated drainage area of Stream 6 is 0.18 sm. From its discharge out of Wetland A it flows along the east side of Martin Hollow Road. Stream 6 exhibits the characteristics of a "captured stream" for the majority of its length in the study area, that is to say, a stream which has been altered to function as a ditch, in this case serving Martin Hollow Road. At the downstream end, it recovers its natural stream characteristics, and "disappears" beneath Martin Hollow Road. Although no culvert crossing could be discovered, flow from Stream 6 was observed moving beneath the road. The culvert crossing may be buried or dysfunctional. The route of Stream 6 could not be further traced from this point because access to the Solomon property on the opposite side of Martin Hollow Road was denied by the property owner.

For the majority of its length within the study area, the riparian corridor of Stream 6 lacked canopy cover and was dominated by herbaceous and shrub vegetation. Dominant species observed in the assessment reach included goldenrod (*Solidago* sp.), jewelweed (*Impatiens* sp.), wild grape (*Vitis* sp.), and mugwort (*Artemisia vulgaris*). Invasive species including tree of heaven (*Ailanthus altissima*), Japanese knotweed (*Polygonum cuspidatum*), Tartarian honeysuckle (*Lonicera tatarica*), and sericea lespedeza (*Lespedeza cuneata*) were also observed in the Stream 6 corridor. For a short distance at the downstream end of Stream 6, the corridor was wooded, and similar in composition to the wooded corridors of the other ephemeral tributaries in the study area.

Stream 6 exhibited channelized morphology for the majority of its length within the study area, excepting short segments upstream of Wetland A, and at the downstream end. Embeddedness was moderate to heavy, in contrast to the other tributaries, and morphological development was poor, reflecting a history of alteration. Estimated length of Stream 6 in the study area is 1,011 lf.

Table 2
Stream Assessment Summary
New I-79 Interchange
Morgantown, WV

Assessment Method/Parameter		Stream 1 (Flaggy Meadow Run)	Stream 2 (UT to Stream 1)	Stream 3 (UT to Stream 1)	Stream 4 (UT to Stream 1)	Stream 5 (UT to Stream 1)	Stream 6 (UT to Stream 1)
Estimated Drainage Area (sm)		1.54	0.30	0.14	0.04	0.05	0.18
Estimated Length in Study Area (lf)		4727	473	631	508	285	1011
USEPA RBP Habitat							
High Gradient	**Low Gradient**						
Epifaunal Substrate/Cover		14	0*	0*	0*	0*	0*
Pool Substrate	Embeddedness	17	16	16	16	14	12
Velocity/Depth Regime	Pool Variability	8	0*	0*	0*	0*	0*
Sediment Deposition		18	18	18	18	17	13
Channel Flow Status		15	0*	0*	0*	0*	0*
Channel Alteration		15	15	15	15	20	8
Frequency of Riffles/Bends	Channel Sinuosity	11	0*	0*	0*	0*	0*
Bank Stability		15	18	8	8	20	14
Vegetative Protection		17	18	16	12	14	14
Riparian Vegetative Zone		15	16	13	20	18	11
RBP Habitat Score /(WVSWVM index)		**145 Suboptimal**	**101/(0.51) Marginal**	**86/(0.43) Marginal**	**89/(0.45) Marginal**	**103/(0.52) Marginal**	**72/0.36) Marginal**

* Scored per WVSWVM for ephemeral streams.

Table 2
Stream Assessment Summary
New I-79 Interchange
Morgantown, WV (cont.)

Assessment Method/Parameters	Stream 1 (Flaggy Meadow Run)	Stream 2 (UT to Stream 1)	Stream 3 (UT to Stream 1)	Stream 4 (UT to Stream 1)	Stream 5 (UT to Stream 1)	Stream 6 (UT to Stream 1)
Water Quality Indicators						
• Conductivity (µS/cm)	873	1010	841	1200	1200	371
• pH (SUs)	7.36	7.72	7.88	7.82	6.95	7.79
• Dissolved Oxygen (mg/l)	10.5	9.88	8.0	9.75	6.35	8.52
Water Quality Score	**0.70**	**0.65**	**0.70**	**0.65**	**0.65**	**0.90**
WV Stream Condition Index (SCI)						
• Total Taxa	Pending †	NA	NA	NA	NA	NA
• EPT Taxa	Pending †	NA	NA	NA	NA	NA
• % Chironomidae	Pending †	NA	NA	NA	NA	NA
• % EPT	Pending †	NA	NA	NA	NA	NA
• % Top 2 Dominant Taxa	Pending †	NA	NA	NA	NA	NA
• Hilsenhoff Biotic Index (HBI)	Pending †	NA	NA	NA	NA	NA
Total SCI Score	Pending †	NA	NA	NA	NA	NA
WV High Gradient Streams (HGM)						
• Hydrology	NA	0.92	0.79	0.63	0.86	0.60
• Biogeochemical Cycling	NA	0.91	0.77	0.75	0.96	0.47
• Habitat	NA	0.85	0.70	0.67	0.71	0.32
WV HGM Score	**NA**	**0.89**	**0.75**	**0.68**	**0.84**	**0.46**
Overall WVSWVM Index Score	**Pending †**	**0.73**	**0.66**	**0.62**	**0.71**	**0.55**

† SCI and WVSWVM scores pending macroinvertebrate sample processing results

4.2 Wetlands

4.2.1 General

Two jurisdictional wetlands were delineated by B&N within the study area for the new I-79 interchange. These wetlands are referred to in this report as Wetland A and B. Wetland A is a primarily emergent wetland located at the extreme northern end of the study area, along the east side of CR 46/3 (Martin Hollow Rd.). Wetland B is an emergent wetland also located on the east side of CR 46/3, just south of Consol's AMD Injection Points 208 and 209.

Additional details for each wetland area are included below. The specific locations and delineated boundaries for both wetlands are depicted on the exhibit provided in **Appendix C.** Detailed Wetland Determination Data Forms completed for both wetland and upland areas are included in **Appendix E.** The *West Virginia 2013 State Wetland Plant List*[7] was used to determine the indicator status for vegetation assessed during wetland delineation activities. Site photographs depicting aquatic resources observed in the study area are included in **Appendix F.**

4.2.2 Wetland A

Wetland A is located in the northeast corner of the study area, just south of 590 Martin Hollow Road and is 0.13 acre in size. The wetland is situated in a low-lying area between CR 46/3 (Martin Hollow Road) and the I-79 embankment. Stream 6 originates to the northeast of this wetland and flows generally south/southwest through the wetland before entering a driveway culvert associated with the residence to the north of the wetland. From there, Stream 6 flows along the east side of CR 46/3.

Wetland A is comprised primarily of emergent vegetation with a small scrub-shrub component located along the west edge of the wetland. Dominant vegetation associated with the wetland included black willow (*Salix nigra*) in the shrub layer and rice cutgrass (*Leersia oryzoides),* pale touch-me-not (*Impatiens pallida),* narrowleaf cattail (*Typha angustifolia*), and shallow sedge (*Carex lurida*) in the herbaceous layer. Wetland hydrology was confirmed in the form of a hydrogen sulfide odor throughout the wetland, drainage

[7] *West Virginia 2013 State Wetland Plant List.* U.S. Army Corps of Engineers. 2013.

patterns, and water observed at 3 inches in the soil pit. Hydric soils were also confirmed for Wetland A.

4.2.3 Wetland B

Wetland B is located along the east side of CR 46/3, just south and east of the gravel access drive that leads to Consol's Martin Hollow Injection Points 208 and 209. The wetland is 0.07 acre in size. The wetland is situated at the toe of the I-79 embankment which generally forms the eastern boundary of the wetland. The wetland occupies a position that is located over two twin drainage pipes that convey drainage under I-79, as well as a third pipe that conveys Stream 1 under CR 46/3 (Martin Hollow Road) and Consol's nearby injection area.

Vegetation in Wetland B is limited to an emergent community. Dominant species observed included soft rush (*Juncus effusus),* rough boneset (*Eupatorium pilosusm),* and common boneset (*Eupatorium perfoliatum).* Observed indicators of wetland hydrology included standing water in the wetland, free water in the soil pit, drainage patterns, and the geomorphic position of the wetland. Hydric soils were confirmed for Wetland B.

4.2.4 Wetland Assessment Results

Wetland assessment results are summarized below in **Table 3.**

Table 3
Wetland Assessment Summary
New I-79 Interchange
Morgantown, WV

Wetland ID	Size (Acres)	Cowardin Classification[8]	Photo #	Connectivity to a Waters of the U.S.?	Likely Water of the U.S.?
Wetland A	0.13	Palustrine emergent/scrub-shrub (PEM/SS)	1	Yes	Yes
Wetland B	0.07	Palustrine emergent (PEM)	3	No	Yes

[8] Cowardin, L.M., *et al.* 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* FWS/OBS-79/31.

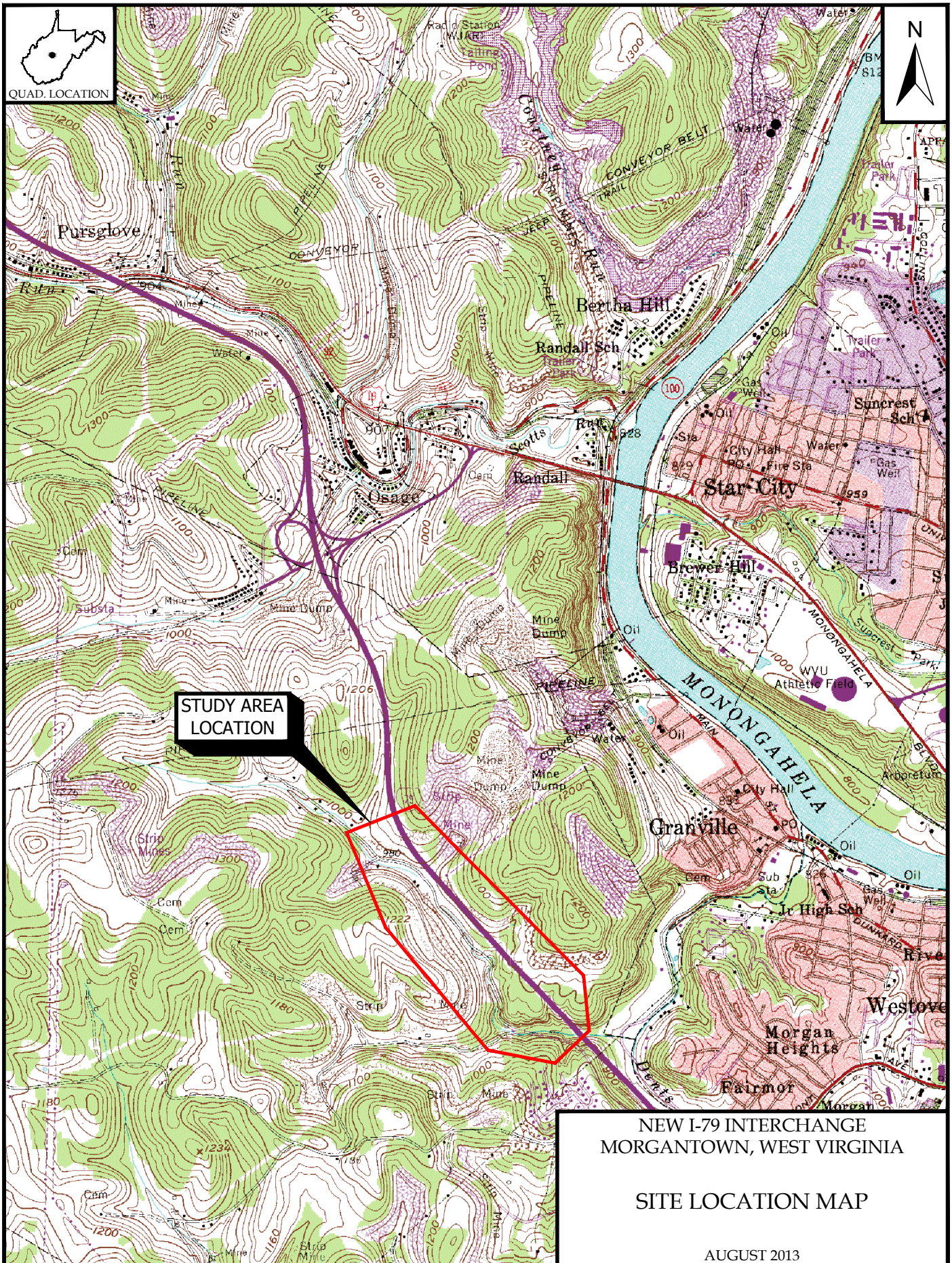
4.3 Other Water Features

Several ponds and ditches were identified within the study area during the course of field investigations. All of these features are man-made and appear to have been constructed in association with historic mining operations in the area or as part of current AMD treatment systems. These features do not appear to be jurisdictional "waters of the U.S." subject to Clean Water Act (CWA) regulatory requirements. See **Table 4** below for available summary information on other water features identified in the study area.

Table 4
Summary of Other Water Features
New I-79 Interchange
Morgantown, WV

Feature ID	Description	Location	Photo #	Likely "Water of the U.S."?
Pond 1	Consol AMD Treatment Pond	East of I-79, Northeast corner of study area	15	No
Ponds 2-4	Lynch Hillside Ponds, Former Redstone Coal Seam	West of CR 46/3 on property owned by John Lynch	16 and 17	No
R/W Ditch	I-79 R/W Ditches existing as rock or concrete lined features	Multiple locations along I-79	14	No
AMD Treatment Ditch	Consol AMD Treatment Ditches	East of I-79, Northeast corner of study area, Associated with Pond 1 and Sump Area	18	No

APPENDIX A
Project Location Mapping



NEW I-79 INTERCHANGE
MORGANTOWN, WEST VIRGINIA

SITE LOCATION MAP

AUGUST 2013

SOURCE: 7.5 MINUTE MORGANTOWN NORTH, AND OSAGE, WEST VIRGINIA U.S.G.S. QUADRANGLE MAP

BURGESS & NIPLE
Engineers • Environmental Scientists • Geologists

PLOTTED: 8/15/2013 2:11:13 PM

P:\PR52354\cadd\Environmental\Site Location Map.dwg 8/8/2013 10:45:27 AM Cox, Doug


Study Area Map
I-79
New Interchange
Morgantown
WVDOT
JULY 2013
BURGESS & NIPLE
Engineers ■ Architects ■ Planners
TO
Star City
Exit
CR 46/3
Martin Hollow Road
University Town Centre Drive
Not investigated
No access granted
(Solomon property)
79
STUDY AREA
CR 49/1
Old Martin Hollow Road
Dents Run Road
Lawless Road
TO
Westover
Exit
Map
Location
Osage
Star City
University Ave
Jerry West Blvd
Patteson Dr
Beechurst Ave
Granville
Westover
Morgantown Mall
Fairmont Rd
River Rd
WV-100

APPENDIX B
NWI and Soils Mapping

U.S. Fish and Wildlife Service
National Wetlands Inventory

I-79 New Interchange

Jul 8, 2013

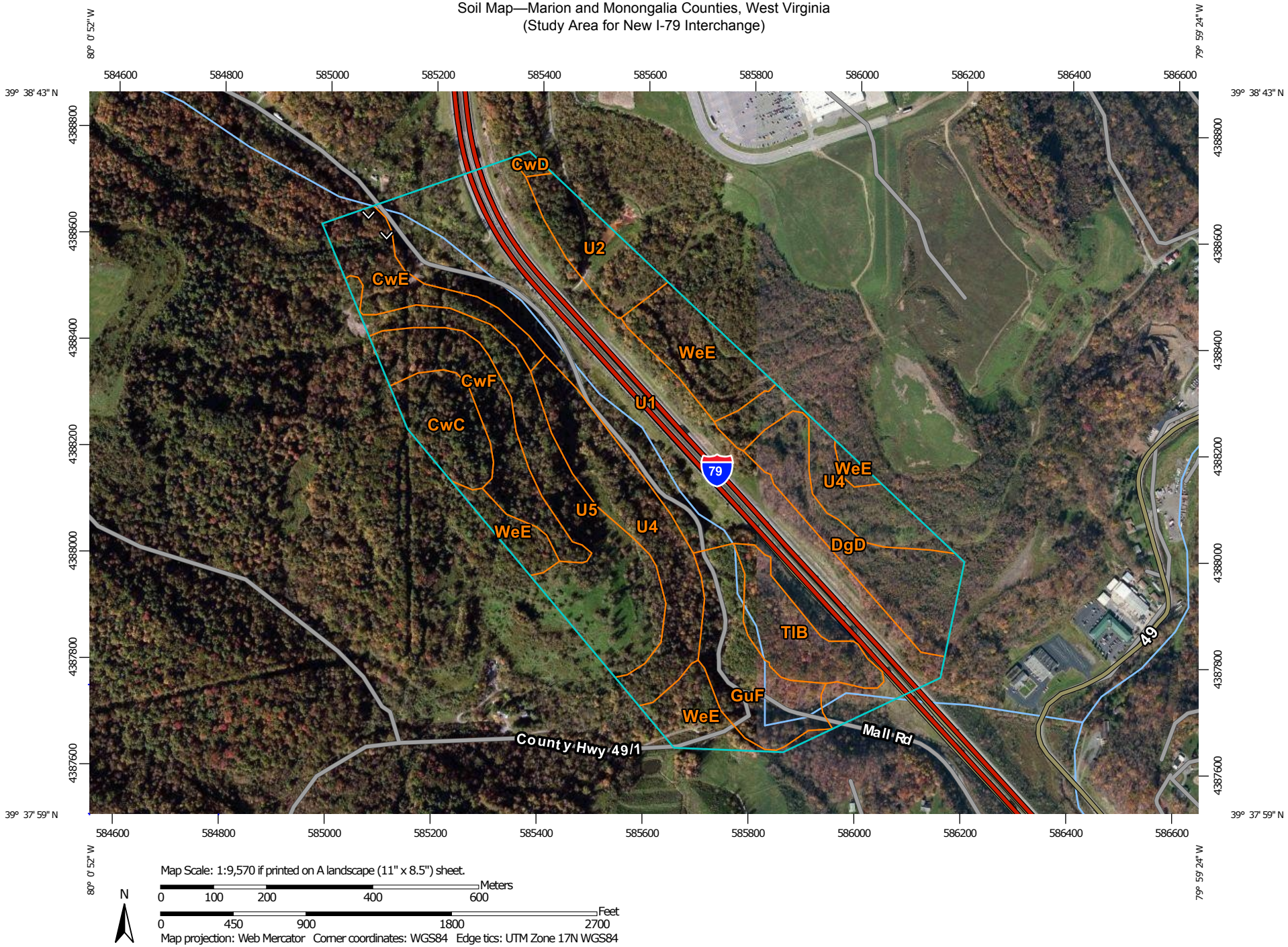
Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

User Remarks:

Morgantown, WV

Soil Map—Marion and Monongalia Counties, West Virginia
(Study Area for New I-79 Interchange)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 6, Apr 2, 2009

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

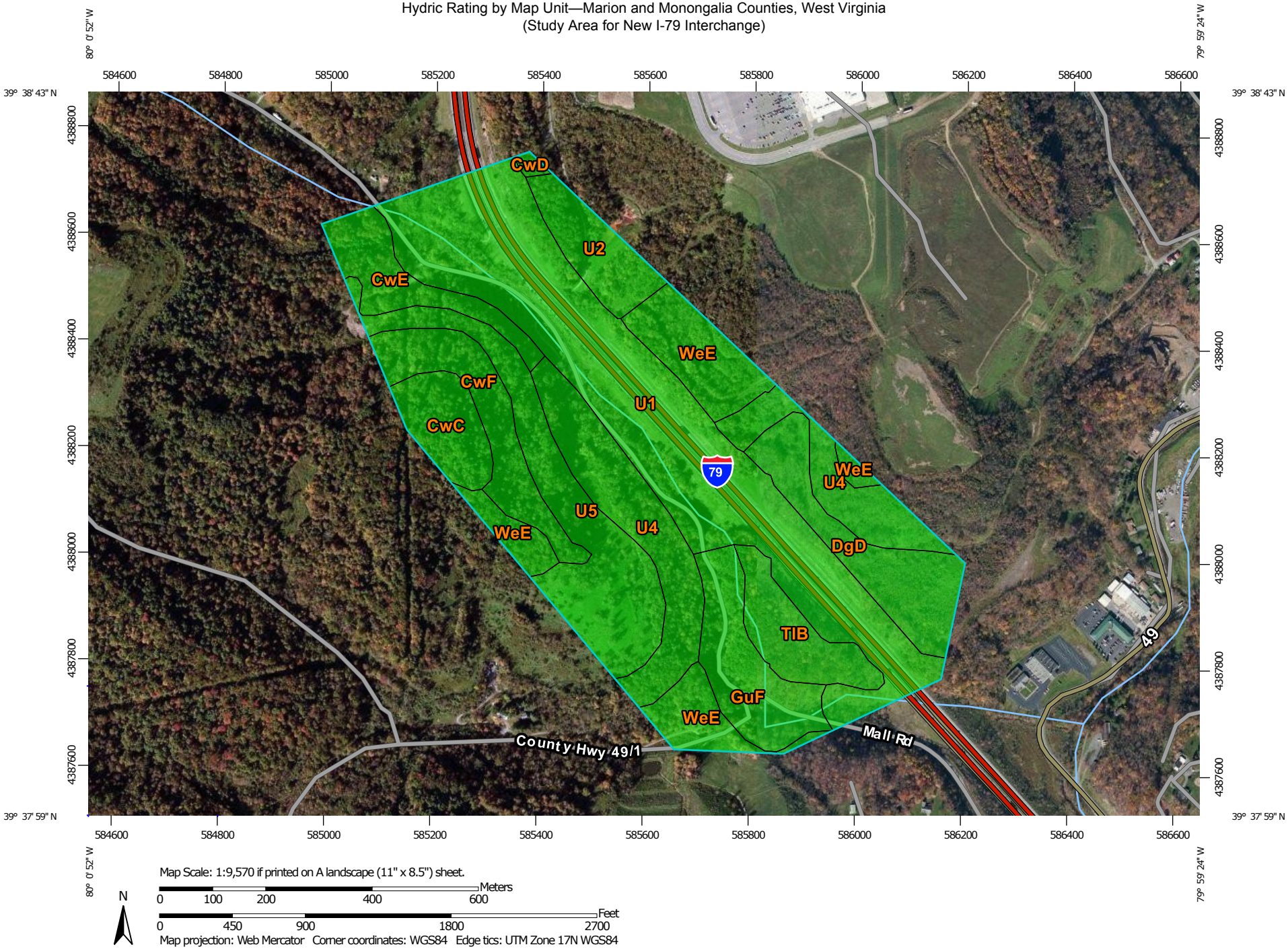
Date(s) aerial images were photographed: Oct 8, 2011—Oct 25, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Marion and Monongalia Counties, West Virginia (WV611)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CwC	Culleoka-Westmoreland silt loams, 8 to 15 percent slopes	6.7	3.8%
CwD	Culleoka-Westmoreland silt loams, 15 to 25 percent slopes	0.5	0.3%
CwE	Culleoka-Westmoreland silt loams, 25 to 35 percent slopes	7.6	4.3%
CwF	Culleoka-Westmoreland silt loams, 35 to 65 percent slopes	10.4	5.9%
DgD	Dormont and Guernsey silt loams, 15 to 25 percent slopes	12.2	6.9%
GuF	Gilpin-Culleoka-Upshur silt loams, 35 to 65 percent slopes	11.0	6.3%
TlB	Tilsit silt loam, 3 to 8 percent slopes	7.7	4.4%
U1	Udorthents, cut and fill	53.6	30.5%
U2	Udorthents, dumps, low base	7.1	4.0%
U4	Udorthents, mudstone and sandstone, high base	23.0	13.1%
U5	Udorthents, mudstone and sandstone, low base	19.6	11.1%
WeE	Westmoreland silt loam, 25 to 35 percent slopes	16.6	9.4%
Totals for Area of Interest		**176.0**	**100.0%**

Hydric Rating by Map Unit—Marion and Monongalia Counties, West Virginia
(Study Area for New I-79 Interchange)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Predominantly hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominantly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Predominantly hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominantly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Predominantly hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominantly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 6, Apr 2, 2009

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Date(s) aerial images were photographed: Oct 8, 2011—Oct 25, 2011

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Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Marion and Monongalia Counties, West Virginia (WV611)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
CwC	Culleoka-Westmoreland silt loams, 8 to 15 percent slopes	0	6.7	3.8%
CwD	Culleoka-Westmoreland silt loams, 15 to 25 percent slopes	0	0.5	0.3%
CwE	Culleoka-Westmoreland silt loams, 25 to 35 percent slopes	0	7.6	4.3%
CwF	Culleoka-Westmoreland silt loams, 35 to 65 percent slopes	0	10.4	5.9%
DgD	Dormont and Guernsey silt loams, 15 to 25 percent slopes	0	12.2	6.9%
GuF	Gilpin-Culleoka-Upshur silt loams, 35 to 65 percent slopes	0	11.0	6.3%
TlB	Tilsit silt loam, 3 to 8 percent slopes	0	7.7	4.4%
U1	Udorthents, cut and fill	0	53.6	30.5%
U2	Udorthents, dumps, low base	0	7.1	4.0%
U4	Udorthents, mudstone and sandstone, high base	0	23.0	13.1%
U5	Udorthents, mudstone and sandstone, low base	0	19.6	11.1%
WeE	Westmoreland silt loam, 25 to 35 percent slopes	0	16.6	9.4%
Totals for Area of Interest			**176.0**	**100.0%**

Description

This rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is designated as "hydric," "predominantly hydric," "partially hydric," "predominantly nonhydric," or "nonhydric" depending on the rating of its respective components and the percentage of each component within the map unit.

"Hydric" means that all components listed for a given map unit are rated as being hydric. "Predominantly hydric" means components that comprise 66 to 99 percent of the map unit are rated as hydric. "Partially hydric" means components that comprise 33 to 66 percent of the map unit are rated as hydric. "Predominantly nonhydric" means components that comprise up to 33 percent of the map unit are rated as hydric. "Nonhydric" means that none of the components are rated as hydric. The assumption here is that all components of the map unit are rated as hydric or nonhydric in the underlying database. A "Not rated or not available" map unit rating is displayed when none of the components within a map unit have been rated.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

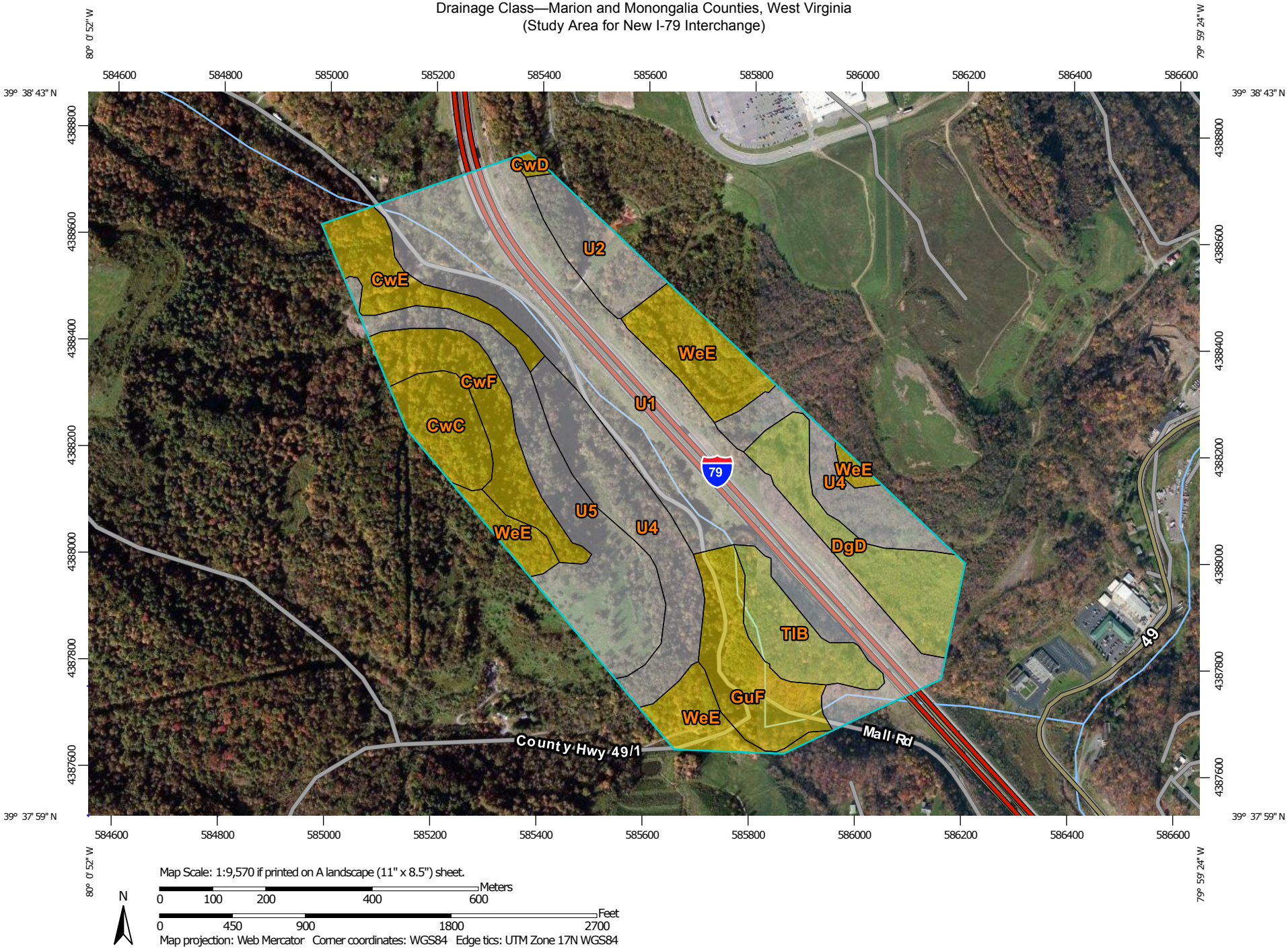
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Drainage Class—Marion and Monongalia Counties, West Virginia
(Study Area for New I-79 Interchange)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Drainage Class

Drainage Class— Summary by Map Unit — Marion and Monongalia Counties, West Virginia (WV611)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
CwC	Culleoka-Westmoreland silt loams, 8 to 15 percent slopes	Well drained	6.7	3.8%
CwD	Culleoka-Westmoreland silt loams, 15 to 25 percent slopes	Well drained	0.5	0.3%
CwE	Culleoka-Westmoreland silt loams, 25 to 35 percent slopes	Well drained	7.6	4.3%
CwF	Culleoka-Westmoreland silt loams, 35 to 65 percent slopes	Well drained	10.4	5.9%
DgD	Dormont and Guernsey silt loams, 15 to 25 percent slopes	Moderately well drained	12.2	6.9%
GuF	Gilpin-Culleoka-Upshur silt loams, 35 to 65 percent slopes	Well drained	11.0	6.3%
TlB	Tilsit silt loam, 3 to 8 percent slopes	Moderately well drained	7.7	4.4%
U1	Udorthents, cut and fill		53.6	30.5%
U2	Udorthents, dumps, low base		7.1	4.0%
U4	Udorthents, mudstone and sandstone, high base		23.0	13.1%
U5	Udorthents, mudstone and sandstone, low base		19.6	11.1%
WeE	Westmoreland silt loam, 25 to 35 percent slopes	Well drained	16.6	9.4%
Totals for Area of Interest			**176.0**	**100.0%**

Description

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

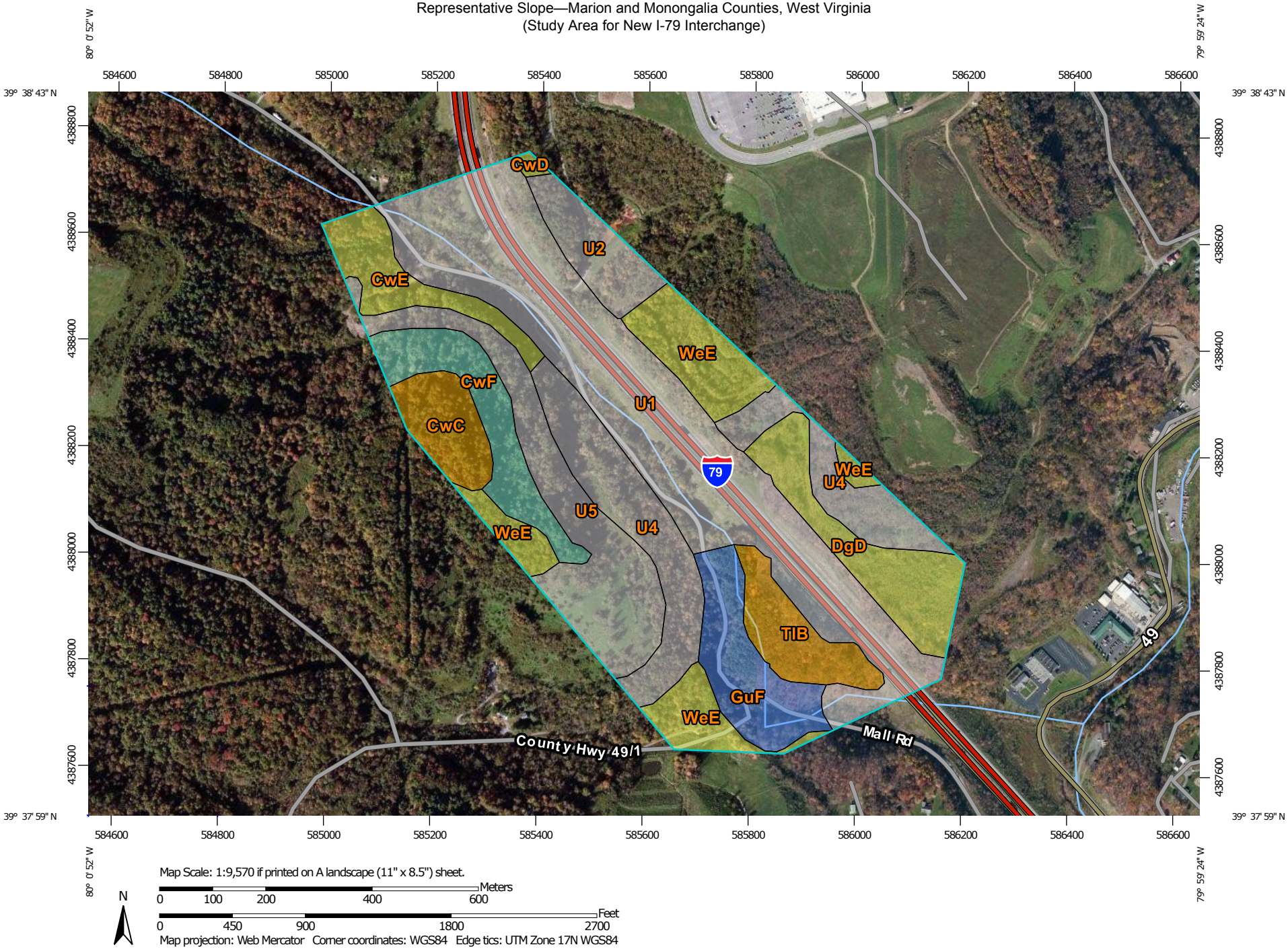
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Representative Slope—Marion and Monongalia Counties, West Virginia
(Study Area for New I-79 Interchange)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 5
- 5 - 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 100
- Not rated or not available

Soil Rating Lines
- 0 - 5
- 5 - 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 100
- Not rated or not available

Soil Rating Points
- 0 - 5
- 5 - 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 100
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Representative Slope

Representative Slope— Summary by Map Unit — Marion and Monongalia Counties, West Virginia (WV611)				
Map unit symbol	**Map unit name**	**Rating (percent)**	**Acres in AOI**	**Percent of AOI**
CwC	Culleoka-Westmoreland silt loams, 8 to 15 percent slopes	9.0	6.7	3.8%
CwD	Culleoka-Westmoreland silt loams, 15 to 25 percent slopes	16.0	0.5	0.3%
CwE	Culleoka-Westmoreland silt loams, 25 to 35 percent slopes	28.0	7.6	4.3%
CwF	Culleoka-Westmoreland silt loams, 35 to 65 percent slopes	40.0	10.4	5.9%
DgD	Dormont and Guernsey silt loams, 15 to 25 percent slopes	20.0	12.2	6.9%
GuF	Gilpin-Culleoka-Upshur silt loams, 35 to 65 percent slopes	50.0	11.0	6.3%
TlB	Tilsit silt loam, 3 to 8 percent slopes	6.0	7.7	4.4%
U1	Udorthents, cut and fill		53.6	30.5%
U2	Udorthents, dumps, low base		7.1	4.0%
U4	Udorthents, mudstone and sandstone, high base		23.0	13.1%
U5	Udorthents, mudstone and sandstone, low base		19.6	11.1%
WeE	Westmoreland silt loam, 25 to 35 percent slopes	30.0	16.6	9.4%
Totals for Area of Interest			**176.0**	**100.0%**

Description

Slope gradient is the difference in elevation between two points, expressed as a percentage of the distance between those points.

The slope gradient is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Interpret Nulls as Zero: No

APPENDIX C
Aquatic Resources Mapping

N

T1A
WETLAND A
0.13 AC.
T1B
STREAM 6
1011 L.F.
C.R. 46/3
I-79
POND 1
AMD TREATMENT
DITCH
WETLAND B
0.07 AC.
T2A
T2B
STREAM 1
(FLAGGY MEADOW RUN)
4727 L.F
POND 2

0 100' 200'

LEGEND

- PERENNIAL STREAM
- EPHEMERAL STREAM
- PROJECT STUDY AREA
- × T2A PLOT LOCATION
- WETLAND DELINEATION TRANSECT
- WETLAND BOUNDARY LINE

NEW I-79 INTERCHANGE
MORGANTOWN, WEST VIRGINIA

SHEET 1 OF 3
AQUATIC RESOURCES

AUGUST 2013

BURGESS & NIPLE
Engineers ▪ Environmental Scientists ▪ Geologists

PLOTTED: 8/15/2013 2:19:46 PM

STREAM 1
(FLAGGY MEADOW RUN)
4727 L.F.

POND 2

POND 3

POND 4

I-79

C.R. 46/3

STREAM 5
285 L.F.

STREAM 1
(FLAGGY MEADOW RUN)
4727 L.F.

STREAM 4
508 L.F.

STREAM 2

N

0 100' 200'

LEGEND

- PERENNIAL STREAM
- EPHEMERAL STREAM
- PROJECT STUDY AREA
- × T2A — PLOT LOCATION
- WETLAND DELINEATION TRANSECT
- WETLAND BOUNDARY LINE

NEW I-79 INTERCHANGE
MORGANTOWN, WEST VIRGINIA

SHEET 2 OF 3
AQUATIC RESOURCES

AUGUST 2013

BURGESS & NIPLE
Engineers ■ Environmental Scientists ■ Geologists

P:\PR52354C0L\ceddl\Environmental\ENV-Basemap.dwg 8/15/2013 1:30:31 PM Cox, Doug

PLOTTED: 8/15/2013 2:20:14 PM

P:\PR52354C01\Icadd\Environmental\ENV-Basemap.dwg 8/15/2013 1:30:31 PM Cox, Doug

N

POND 4

STREAM 1
(FLAGGY MEADOW RUN)
4727 L.F.

STREAM 2
473 L.F.

STREAM 3
631 L.F.

STREAM 4
508 L.F.

STREAM 5
285 L.F.

C.R. 46/3 (MARTIN HOLLOW RD.)

C.R. 49/1
(OLD MARTIN HOLLOW RD.)

I-79

0 100' 200'

LEGEND

- PERENNIAL STREAM
- EPHEMERAL STREAM
- PROJECT STUDY AREA
- × T2A PLOT LOCATION
- WETLAND DELINEATION TRANSECT
- WETLAND BOUNDARY LINE

NEW I-79 INTERCHANGE
MORGANTOWN, WEST VIRGINIA

SHEET 3 OF 3
AQUATIC RESOURCES

AUGUST 2013

BURGESS & NIPLE
Engineers ■ Environmental Scientists ■ Geologists

APPENDIX D
Stream Assessment Forms

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 1-Flaggy Meadow Run	LOCATION Martin Hollow Rd(CR46)/Old Martin Hollow Rd Morgantown WV	
STATION # US end RIVERMILE	STREAM CLASS Headwater/Perennial	
LAT 39o 38' 7.4" LONG 80o 0' 2.7"	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS; Jennifer Walker, PWS; Krista Carter		
FORM COMPLETED BY K. Fontaine	DATE 7/23/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
30 % ☑	%cloud cover	☑ 100%
☐	clear/sunny	☐

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

Air Temperature 80 °C

Other _____

SITE LOCATION/MAP

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

Stream 1 assessment reach. Looking downstream.

Stream 1 assessment reach. Looking upstream.

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 3.99 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Stream 1 (cont.)

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☑ Other roads, reclaimed minelands
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources minor dumping

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 Carpinus caroliniana, Acer saccharum

INSTREAM FEATURES

Estimated Reach Length 100 m
Estimated Stream Width 4 m
Sampling Reach Area 400 m²
Area in km² (m²x1000) 0.0004 km²
Estimated Stream Depth 0.13 m (H2O depth)
Surface Velocity (at thalweg) 0.28 m/sec

Canopy Cover
☐ Partly open ☐ Partly shaded ☑ Shaded

High Water Mark 0.45 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle 60 % ☐ Run 10 %
☐ Pool 30 %

Channelized ☐ Yes ☑ No

Dam Present ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD 0.63 m²
Density of LWD 1575 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

Temperature 21.4 °C
Specific Conductance 0.873 mS/cm
Dissolved Oxygen 10.5 mg/l
pH 7.36 SUs
Turbidity 10.5 NTUs
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 minor dumping

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")	10			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	30			
Sand	0.06-2mm (gritty)	40	Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

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

STREAM NAME Stream 1 - Flaggy Meadow Run	LOCATION Martin Hollow Rd(CR46)/Old Martin Hollow Rd Morgantown WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Headwater/Perennial	
LAT _____ LONG _____	RIVER BASIN Monongahela	
STORET #	AGENCY	
INVESTIGATORS Katherine Fontaine, PWS; Jennifer Walker, PWS; Krista Carter		
FORM COMPLETED BY K. Fontaine	DATE 7/23/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 Interchange Env. Assessment

	Habitat Parameter	Condition Category			
		Optimal	**Suboptimal**	**Marginal**	**Poor**
Parameters to be evaluated in sampling reach	**1. Epifaunal Substrate/ Available Cover**	Greater than 50% 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).	30-50% 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).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE 14	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE 17	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	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 <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% 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 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 18	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 15	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—LOW GRADIENT STREAMS (BACK)

Stream 1 (cont.)

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. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
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)	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 8 (RB)	Right Bank 10 9	**8** 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	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 7 (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 6 (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 145

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 2 - UT to Stream 1	LOCATION North side Old Martin Hollow Rd. Morgantown, WV	
STATION # Confl. RIVERMILE	STREAM CLASS Headwater/Ephemeral	
LAT 39o 38' 6.7" LONG 80o 0' 1.0"	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/23/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
30 % ☑	%cloud cover	☑ 100%
☐	clear/sunny	☐

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

Air Temperature 80 ° C

Other _____

SITE LOCATION/MAP

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

Stream 2. Looking US from Stream 1 confluence.

Stream 2. Upstream end of assessment reach.

STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☑ ~~Intermittent~~ Ephemeral ☐ Tidal

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

Stream Type
☐ Coldwater ☑ Warmwater

Catchment Area 0.77 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Stream 2 (cont.)

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☑ Other roads, reclaimed minelands
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources litter, dumping, used tires

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 Carpinus caroliniana, Acer rubrum, Tilia americana

INSTREAM FEATURES

Estimated Reach Length 100 m
Estimated Stream Width 3.6 m
Sampling Reach Area 360 m²
Area in km² (m²x1000) 0.0004 km²
Estimated Stream Depth 0.08 m (H2O depth)
Surface Velocity (at thalweg) 0.4 m/sec

Canopy Cover
☐ Partly open ☐ Partly shaded ☑ Shaded

High Water Mark 0.27 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle 80 % ☐ Run ____ %
☐ Pool 20 % Step-pool morph.

Channelized ☐ Yes ☑ No

Dam Present ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD 0.74 m²
Density of LWD 1850 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

Temperature 21.52 °C
Specific Conductance 1.01 mS/cm
Dissolved Oxygen 9.88 mg/l
pH 7.72 SUs
Turbidity 22.5 NTUs
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 litter, dumping

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)	40
Boulder	> 256 mm (10")	20			
Cobble	64-256 mm (2.5"-10")	20	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	15			
Sand	0.06-2mm (gritty)	30	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	5			
Clay	< 0.004 mm (slick)				

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

STREAM NAME Stream 2 - UT to Stream 1	LOCATION North side Old Martin Hollow Rd., Morgantown, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Headwater/Ephemeral	
LAT _____ LONG _____	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/23/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

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 0	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 18	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)** *

* Scored per WVSWVM

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

Stream 2 (cont.)

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 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 10 (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 10 (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 6 (RB)	Right Bank 10 9	8 7 **6**	5 4 3	2 1 0

Total Score 101

* Scored per WVSWVM for ephemeral streams

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: I-79 New Interchange
Location: Morgantown, WV
Sampling Date: 7/23/13

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: Stream 2

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.92
Biogeochemical Cycling	0.91
Habitat	0.85

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	78.50	0.87
V_{EMBED}	Average embeddedness of channel.	4.27	0.87
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.50	0.75
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.	13.00	1.00
V_{TDBH}	Average dbh of trees.	8.46	0.95
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.	0.00	0.00
$V_{DETRITUS}$	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.	0.92	0.97

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team: Katherine E. Fontaine, PWS; Jennifer Walker, PWS
Latitude/UTM Northing: 39o 38' 6.7"
Project Name: I-79 New Interchange
Longitude/UTM Easting: 80o 0' 1.0"
Location: Morgantown, WV
Sampling Date: 7/23/13
SAR Number: Stream 2
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.)

78.5 %

List the percent cover measurements at each point below:

80	90	50	80	75	80	80	90	70	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.

4.3

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:

5	5	4	4	5	5	4	4	4	4
5	4	5	4	5	5	5	4	4	5
4	4	5	5	3	4	3	3	4	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}.

1.50 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):

1.80	1.00	0.40	4.50	0.08	0.40	12.00	4.50	0.08	7.00
0.70	14.00	1.20	0.60	18.00	1.40	0.80	6.00	99.00	0.90
99.00	99.00	1.50	14.00	3.00	1.50	0.70	99.00	0.60	0.30

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%.

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. **13.0**

Number of downed woody stems: 13

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. **8.5**

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				
14	12	5			7	8			
20	9	5			8	8			
16	7	5			7	8			
14	7	9			6	7			
7	6	14			6	12			
8	6				7				
6	18				5				
8	5				6				
7	5				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. **1.0**

Left Side: 1 Right Side:

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. **Not Used**

Left Side: Right Side:

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				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			4	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			
80	25	80	70	90	85	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:

0.92

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	7	97
Impervious areas (parking lots, roofs, driveways, etc)	0	3	100

Stream 2

Variable	Value	VSI
$V_{CCANOPY}$	79 %	0.87
V_{EMBED}	4.3	0.87
$V_{SUBSTRATE}$	1.50 in	0.75
V_{BERO}	40 %	0.86
V_{LWD}	13.0	1.00
V_{TDBH}	8.5	0.95
V_{SNAG}	1.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	76.3 %	0.93
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.92	0.97

Notes:

West Virginia Stream and Wetland Valuation Metric

(Stream Valuation Metric - Worksheet 1 of 3)

USACE FILE NO./Project Name:	**I-79 New Interchange Morgantown, WV Stream 2**	
STREAM CLASSIFICATION:	**Ephemeral**	
STREAM IMPACT LENGTH:	**0**	**FORM OF MITIGATION:**

Column No. 1- Impact Existing Condition (Debit)

HGM Score (attach data forms):		Average
Hydrology	0.92	0.89333333
Biogeochemical Cycling	0.91	
Habitat	0.85	

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		18
9. Vegetative Protection (LB & RB)	0-20		18
10. Riparian Vegetative Zone Width (LB & RB)	0-20		16
Total RBP Score	Marginal		101
Sub-Total			0.505
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	000-1499 - 20 poin
1000-1499 - 20 points	0-90		1010
pH			
6.0-8.0 = 80 points	0-80		7.72
DO			
<5.0 = 10 points	10-30		9.88
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.735416667	0	0

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 3 - UT to Stream 1	LOCATION South side Old Martin Hollow Rd. Morgantown, WV	
STATION # Confl. RIVERMILE	STREAM CLASS Headwater/Ephemeral	
LAT 39o 38' 5.5" LONG 79o 59' 58.6"	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS; Jennifer Walker, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/23/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
30 % ☑	%cloud cover	☑ 100%
☐	clear/sunny	☐

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

Air Temperature 80 °C

Other _____

SITE LOCATION/MAP

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

Stream 3. Looking US from Stream 1 confluence.

Stream 3. Upstream end of assessment reach.

STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☑ ~~Intermittent~~ Ephemeral ☐ Tidal

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

Stream Type
☐ Coldwater ☑ Warmwater

Catchment Area 0.36 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Stream 3 (cont.)

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☑ Other roads, reclaimed minelands
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources litter, dumping

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 Carpinus caroliniana, Acer rubrum, Acer negundo

INSTREAM FEATURES

Estimated Reach Length 100 m
Estimated Stream Width 1.8 m
Sampling Reach Area 180 m²
Area in km² (m²x1000) 0.0002 km²
Estimated Stream Depth 0.08 m (H2O depth)
Surface Velocity (at thalweg) 0.5 m/sec

Canopy Cover
☐ Partly open ☐ Partly shaded ☑ Shaded

High Water Mark 0.15 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle 90 % ☐ Run ____ %
☐ Pool 10 % Step-pool morph.

Channelized ☐ Yes ☑ No

Dam Present ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD 0.24 m²
Density of LWD 1200 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

Temperature 25.17 °C
Specific Conductance 0.841 mS/cm
Dissolved Oxygen 8.0 mg/l
pH 7.88 SUs
Turbidity 19.5 NTUs
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 litter, dumping

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")	10			
Cobble	64-256 mm (2.5"-10")	30	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	25			
Sand	0.06-2mm (gritty)	33	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	2			
Clay	< 0.004 mm (slick)				

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

STREAM NAME Stream 3 - UT to Stream 1	LOCATION South side Old Martin Hollow Rd., Morgantown, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Headwater/Ephemeral	
LAT _____ LONG _____	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/23/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

	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 0	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 18	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)** *

* Scored per WVSWVM

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

Stream 3 (cont.)

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 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 4 (LB)	Left Bank 10 9	8 7 6	5 **4** 3	2 1 0
SCORE 4 (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 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 3 (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 86

* Scored per WVSWVM

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: I-79 New Interchange
Location: Morgantown, WV
Sampling Date: 7/23/13

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: Stream 3

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.79
Biogeochemical Cycling	0.77
Habitat	0.70

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	61.00	0.64
V_{EMBED}	Average embeddedness of channel.	4.50	0.75
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.38	0.69
V_{BERO}	Total percent of eroded stream channel bank.	120.00	0.43
V_{LWD}	Number of down woody stems per 100 feet of stream.	9.00	1.00
V_{TDBH}	Average dbh of trees.	6.05	0.49
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.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	46.75	0.57
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: Katherine E. Fontaine, PWS; Jennifer Walker, PWS
Latitude/UTM Northing: 39o 38' 5.5"
Project Name: I-79 New Interchange
Longitude/UTM Easting: 79o 59' 58.6"
Location: Morgantown, WV
Sampling Date: 7/23/13

SAR Number: Stream 3 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.)

61.0 %

List the percent cover measurements at each point below:

80	60	60	50	30	60	60	60	70	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.

4.5

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:

5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	4	4	4
4	4	4	4	4	4	4	4	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}.

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):

1.00	2.25	0.70	0.20	1.50	2.75	2.00	2.00	0.15	3.00
2.25	1.50	1.25	1.50	0.70	1.00	5.00	0.60	3.50	7.50
1.00	0.04	2.75	0.60	0.25	1.50	0.75	1.00	0.40	2.25

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%.

120 %

Left Bank: 60 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. **9.0**

Number of downed woody stems: 9

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. **6.1**

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				
8					4	5	14	8	
4					4	5	4	6	
6					4	7	5	14	
4					5	4	4	8	
					6	4	5	4	
					4	9	16	4	
					5	6	8	4	
					9	4	4		
					4	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. **2.0**

Left Side: Right Side: 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. **Not Used**

Left Side: Right Side:

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				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			5	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.

46.75 %

Left Side				Right Side			
10	2	100	70	70	30	2	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:

0.83

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
Open space (pasture, lawns, parks, etc.), grass cover 50% - 75%	0.2	15	95
Impervious areas (parking lots, roofs, driveways, etc)	0	5	100

Stream 3

Variable	Value	VSI
$V_{CCANOPY}$	61 %	0.64
V_{EMBED}	4.5	0.75
$V_{SUBSTRATE}$	1.38 in	0.69
V_{BERO}	120 %	0.43
V_{LWD}	9.0	1.00
V_{TDBH}	6.1	0.49
V_{SNAG}	2.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	46.8 %	0.57
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.83	0.87

Notes:

West Virginia Stream and Wetland Valuation Metric

(Stream Valuation Metric - Worksheet 1 of 3)

USACE FILE NO./Project Name:	**I-79 New Interchange Morgantown, WV Stream 3**	
STREAM CLASSIFICATION:	**Ephemeral**	
STREAM IMPACT LENGTH:	**0**	**FORM OF MITIGATION:**

Column No. 1- Impact Existing Condition (Debit)

HGM Score (attach data forms):		Average
Hydrology	0.79	0.75333333
Biogeochemical Cycling	0.77	
Habitat	0.7	

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		8
9. Vegetative Protection (LB & RB)	0-20		16
10. Riparian Vegetative Zone Width (LB & RB)	0-20		13
Total RBP Score	Marginal		86
Sub-Total			0.43
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	750-999 - 30 points
750-999 - 30 points	0-90		841
pH			
6.0-8.0 = 80 points	0-80		7.88
DO			
<5.0 = 10 points	10-30		8
Sub-Total			0.7
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.659166667	0	0

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 4 - UT to Stream 1	LOCATION US of Stream 1 E.side culvert X-ing under I-79 Morgantown,WV	
STATION # Confl. RIVERMILE	STREAM CLASS Headwater/Ephemeral	
LAT 39o 38' 5.9" LONG 79o 59' 50.6"	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS; Jennifer Walker, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/24/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
60 % ☑	%cloud cover	☑ 30 %
☐	clear/sunny	☐

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

Air Temperature 70 °C

Other _____

SITE LOCATION/MAP

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

Stream 4. Looking US at Stream 1 confluence.

Stream 4. Upstream at I-79 R.O.W. fence.

STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☑ ~~Intermittent~~ Ephemeral ☐ Tidal

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

Stream Type
☐ Coldwater ☑ Warmwater

Catchment Area 0.098 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Stream 4 (cont.)

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☑ Other roads, reclaimed minelands
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources litter, dumping

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 Carpinus caroliniana, Acer rubrum, Tilia americana

INSTREAM FEATURES

Estimated Reach Length 100 m
Estimated Stream Width 1.8 m
Sampling Reach Area 180 m²
Area in km² (m²x1000) 0.0002 km²
Estimated Stream Depth 0.08 m (H2O depth)
Surface Velocity (at thalweg) 0.38 m/sec

Canopy Cover
☐ Partly open ☐ Partly shaded ☑ Shaded

High Water Mark 0.30 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle 90 % ☐ Run ____ %
☐ Pool 10 % Step-pool morph.

Channelized ☐ Yes ☑ No

Dam Present ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD 0.12 m²
Density of LWD 600 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

Temperature 19.5 °C
Specific Conductance 1.2 mS/cm
Dissolved Oxygen 9.75 mg/l
pH 7.82 SUs
Turbidity 0.0 NTUs
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 litter, dumping

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")	30			
Cobble	64-256 mm (2.5"-10")	30	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	20			
Sand	0.06-2mm (gritty)	15	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	5			
Clay	< 0.004 mm (slick)				

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

STREAM NAME Stream 4 - UT to Stream 1	LOCATION US of Stream1 E. side I-79 culvert X-ing Morgantown, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Headwater/Ephemeral	
LAT _____ LONG _____	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/24/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

	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 0	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 18	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)** *

* Scored per WVSWVM

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

Stream 4 (cont.)

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 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 4 (LB)	Left Bank 10 9	8 7 6	5 **4** 3	2 1 0
SCORE 4 (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 89

* Scored per WVSWVM

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: I-79 New Interchange
Location: Morgantown, WV
Sampling Date: 7/24/13

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: Stream 4

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.63
Biogeochemical Cycling	0.75
Habitat	0.67

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	77.50	0.86
V_{EMBED}	Average embeddedness of channel.	4.53	0.73
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.00	0.50
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.	1.00	0.13
V_{TDBH}	Average dbh of trees.	7.24	0.72
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.	0.50	0.24
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	72.13	0.88
V_{HERB}	Average percent cover of herbaceous vegetation.	Not Used	Not Used
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.90	0.95

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team: Katherine E. Fontaine, PWS; Jennifer Walker, PWS
Latitude/UTM Northing: 39o 38' 5.9"
Project Name: I-79 New Interchange
Longitude/UTM Easting: 79o 59' 50.6"
Location: Morgantown, WV
Sampling Date: 7/24/13
SAR Number: Stream 4
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.)

77.5 %

List the percent cover measurements at each point below:

75	60	80	80	80	80	80	80	80	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.

4.5

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:

5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5
4	4	4	4	4	4	4	3	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}.

1.00 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):

2.25	0.30	3.00	3.00	2.50	1.00	4.00	1.10	0.75	2.50
1.00	1.50	8.00	1.00	4.75	0.75	3.00	0.75	0.40	0.50
1.40	2.75	0.75	0.40	0.70	0.01	0.50	1.50	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%.

100 %

Left Bank: 50 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. **1.0**

Number of downed woody stems: 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. **7.2**

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				
6	4	7			4	5			
4	4	7			7	4			
8	9	4			7	4			
8	5	4			7	6			
8	4	5			7	8			
8	5	4			9	14			
4	5	12			44	8			
5	6	5			9	5			
6	9	6			12	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. **2.0**

Left Side: Right Side: 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. **Not Used**

Left Side: Right Side:

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. **0.50**

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						
6	Species in Group 1			5	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.

72.13 %

Left Side				Right Side			
100	100	5	100	100	100	2	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:

0.90

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
Impervious areas (parking lots, roofs, driveways, etc)	0	10	100

Stream 4

Variable	Value	VSI
$V_{CCANOPY}$	78 %	0.86
V_{EMBED}	4.5	0.73
$V_{SUBSTRATE}$	1.00 in	0.50
V_{BERO}	100 %	0.54
V_{LWD}	1.0	0.13
V_{TDBH}	7.2	0.72
V_{SNAG}	2.0	1.00
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.50	0.24
$V_{DETRITUS}$	72.1 %	0.88
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.9	0.95

Notes:

West Virginia Stream and Wetland Valuation Metric

(Stream Valuation Metric - Worksheet 1 of 3)

USACE FILE NO./Project Name:	**I-79 New Interchange Morgantown, WV Stream 4**	
STREAM CLASSIFICATION:	**Ephemeral**	
STREAM IMPACT LENGTH:	**0**	**FORM OF MITIGATION:**

Column No. 1- Impact Existing Condition (Debit)

HGM Score (attach data forms):		Average
Hydrology	0.63	0.68333333
Biogeochemical Cycling	0.75	
Habitat	0.67	

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		16
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		18
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		15
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		8
9. Vegetative Protection (LB & RB)	0-20		12
10. Riparian Vegetative Zone Width (LB & RB)	0-20		20
Total RBP Score	Marginal		89
Sub-Total			0.445
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	000-1499 - 20 poin
1000-1499 - 20 points	0-90		1200
pH			
6.0-8.0 = 80 points	0-80		7.82
DO			
<5.0 = 10 points	10-30		9.75
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.615416667	0	0

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 5 - UT to Stream 1	LOCATION E. Side CR 46 US of Stream 1 assess. reach Morgantown,WV	
STATION # Confl. RIVERMILE	STREAM CLASS Headwater/Ephemeral	
LAT 39o 38' 16.6" LONG 80o 0' 3.4"	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Krista Carter; Katherine Fontaine, PWS; Jennifer Walker, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/24/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
60 % ☑	%cloud cover	☑ 30 %
☐	clear/sunny	☐

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

Air Temperature 70 °C

Other _____

SITE LOCATION/MAP

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

Stream 5. Culvert at US end of assessment reach.

Stream 5. Looking DS toward culvert under CR 46.

STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☑ ~~Intermittent~~ Ephemeral ☐ Tidal

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

Stream Type
☐ Coldwater ☑ Warmwater

Catchment Area 0.12 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Stream 5 (cont.)

WATERSHED FEATURES

Predominant Surrounding Landuse
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☑ Other roads, reclaimed minelands
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources litter, dumping

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 Carpinus caroliniana, Acer rubrum,

INSTREAM FEATURES

Estimated Reach Length 27 m
Estimated Stream Width 1.5 m
Sampling Reach Area 40.5 m²
Area in km² (m²x1000) 0.00004 km²
Estimated Stream Depth 0.1 m (H2O depth)
Surface Velocity (at thalweg) 0.18 m/sec

Canopy Cover
☐ Partly open ☑ Partly shaded ☐ Shaded

High Water Mark 0.25 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle 70 % ☐ Run 10 %
☐ Pool 20 %

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

Portion of the reach with aquatic vegetation 0 %

WATER QUALITY

Temperature 21.34 °C
Specific Conductance 1.2 mS/cm
Dissolved Oxygen 6.35 mg/l
pH 6.95 SUs
Turbidity 21.3 NTUs
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 litter, dumping

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")	5			
Cobble	64-256 mm (2.5"-10")	15	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	30			
Sand	0.06-2mm (gritty)	40	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	10			
Clay	< 0.004 mm (slick)				

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

STREAM NAME Stream 5 - UT to Stream 1	LOCATION E. side CR46 US of Stream 1 assess. reach Morgantown, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Headwater/Ephemeral	
LAT _____ LONG _____	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Krista Carter; Katherine Fontaine, PWS; Jennifer Walker, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/24/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

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 0	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 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 17	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)** *

* Scored per WVSWVM

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

Stream 5 (cont.)

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 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
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 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
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 103

* Scored per WVSWVM

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: I-79 New Interchange
Location: Morgantown, WV
Sampling Date: 7/24/13

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Tree/Sapling Strata

SAR number: Stream 5

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.86
Biogeochemical Cycling	0.96
Habitat	0.71

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	70.00	0.76
V_{EMBED}	Average embeddedness of channel.	3.84	1.00
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	1.00	0.50
V_{BERO}	Total percent of eroded stream channel bank.	34.44	0.89
V_{LWD}	Number of down woody stems per 100 feet of stream.	12.22	1.00
V_{TDBH}	Average dbh of trees.	7.43	0.76
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.	0.74	0.35
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	69.38	0.85
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: Krista Carter, K. Fontaine, PWS; J. Walker, PWS
Latitude/UTM Northing: 39o 38' 16.6"
Project Name: I-79 New Interchange
Longitude/UTM Easting: 80o 0' 3.4"
Location: Morgantown, WV
Sampling Date: 7/24/13

SAR Number: Stream 5 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.)

70.0 %

List the percent cover measurements at each point below:

30	90	80	60	80	50	95	40	95	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.

3.8

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:

3	4	4	3	3	3	3	5	4	2
4	5	5	5	4	3	3	5	5	5
2	3	4	3	5	4	4	4	5	4
5	5	5	3	5	3	4	3	5	5
4	3	2	5	4	2	4	4	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}.

1.00 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):

1.50	3.00	1.00	2.50	6.00	4.00	6.00	4.00	5.00	3.00
3.00	0.50	0.50	0.25	1.50	0.25	7.00	0.10	0.50	2.00
2.00	4.00	0.25	0.25	1.00	1.00	10.00	0.50	0.10	1.00
0.50	1.50	1.00	0.10	0.10	1.00	1.00	0.50	3.00	0.50
2.00	1.50	5.00	1.00	1.00	0.10	2.00	0.50	0.50	5.00

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%.

34 %

Left Bank: 18 ft Right Bank: 13 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. **12.2**

Number of downed woody stems: 11

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. **7.4**

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				
7	10	5	7	12	7	9	10	10	8
9	8	4	5	5	10	12	5	4	5
5	4	10							

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. **0.0**

Left Side: 0 Right Side: 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. **Not Used**

Left Side: Right Side:

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. **0.74**

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		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.

69.38 %

Left Side				Right Side			
100	90	20	40	40	70	60	80
60	80	50	100	100	20	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:

0.93

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
Impervious areas (parking lots, roofs, driveways, etc)	0	7	100

Stream 5

Variable	Value	VSI
$V_{CCANOPY}$	70 %	0.76
V_{EMBED}	3.8	1.00
$V_{SUBSTRATE}$	1.00 in	0.50
V_{BERO}	34 %	0.89
V_{LWD}	12.2	1.00
V_{TDBH}	7.4	0.76
V_{SNAG}	0.0	0.10
V_{SSD}	Not Used	Not Used
V_{SRICH}	0.74	0.35
$V_{DETRITUS}$	69.4 %	0.85
V_{HERB}	Not Used	Not Used
V_{WLUSE}	0.93	0.98

Notes:

West Virginia Stream and Wetland Valuation Metric

(Stream Valuation Metric - Worksheet 1 of 3)

USACE FILE NO./Project Name:	**I-79 New Interchange Morgantown, WV Stream 5**	
STREAM CLASSIFICATION:	**Ephemeral**	
STREAM IMPACT LENGTH:	**0**	**FORM OF MITIGATION:**

Column No. 1- Impact Existing Condition (Debit)

HGM Score (attach data forms):		Average
Hydrology	0.86	0.84333333
Biogeochemical Cycling	0.96	
Habitat	0.71	

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		14
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		17
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		20
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		20
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		18
Total RBP Score	Marginal		103
Sub-Total			0.515
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	000-1499 - 20 poin
1000-1499 - 20 points	0-90		1200
pH			
6.0-8.0 = 80 points	0-80		6.95
DO			
<5.0 = 10 points	10-30		6.35
Sub-Total			0.65
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.712916667	0	0

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME Stream 6 - UT to Stream 1	LOCATION E.side CR46 N.end of study area @ Wetl. A Morgantown,WV	
STATION # Wetl.A RIVERMILE	STREAM CLASS Headwater/Ephemeral	
LAT 39o 38' 36.1" LONG 80o 0' 28.9"	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS; Jennifer Walker, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/24/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

WEATHER CONDITIONS

Now		Past 24 hours
☐	storm (heavy rain)	☐
☐	rain (steady rain)	☐
☐	showers (intermittent)	☐
60 % ☑	%cloud cover	☑ 30 %
☐	clear/sunny	☐

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

Air Temperature 70 °C

Other _____

SITE LOCATION/MAP

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

Stream 6 head at Wetl A. Then parallels CR 46.

Stream 6 at downstream end of assessment reach.

STREAM CHARACTERIZATION

Stream Subsystem
☐ Perennial ☑ ~~Intermittent~~ Ephemeral ☐ Tidal

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

Stream Type
☐ Coldwater ☑ Warmwater

Catchment Area 0.46 km²

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Stream 6 (cont.)

WATERSHED FEATURES

Predominant Surrounding Landuse
☐ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☑ Other road, reclaimed minelands
☐ Residential

Local Watershed NPS Pollution
☐ No evidence ☑ Some potential sources
☐ Obvious sources litter, dumping

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 Solidago sp. Impatiens sp, Vitis sp, Artemesia vulgaris

INSTREAM FEATURES

Estimated Reach Length 100 m
Estimated Stream Width 1.0 m
Sampling Reach Area 100 m²
Area in km² (m²x1000) 0.0001 km²
Estimated Stream Depth 0.2 m (H2O depth)
Surface Velocity (at thalweg) 0.34 m/sec

Canopy Cover
☑ Partly open ☐ Partly shaded ☑ Shaded

High Water Mark 0.2 m

Proportion of Reach Represented by Stream Morphology Types
☐ Riffle 10 % ☐ Run 80 %
☐ Pool 10 %

Channelized ☑ Yes ☐ No

Dam Present ☐ Yes ☑ No

LARGE WOODY DEBRIS

LWD 0.32 m²
Density of LWD 3200 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 Lysimachia nummularia

Portion of the reach with aquatic vegetation 5 %

WATER QUALITY

Temperature 23.84 °C
Specific Conductance 0.371 mS/cm
Dissolved Oxygen 8.52 mg/l
pH 7.79 SUs
Turbidity 21.5 NTUs
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 litter, dumping

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")	5			
Cobble	64-256 mm (2.5"-10")	15	Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")	30			
Sand	0.06-2mm (gritty)	20	Marl	grey, shell fragments	
Silt	0.004-0.06 mm	30			
Clay	< 0.004 mm (slick)				

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

STREAM NAME Stream 6 - UT to Stream 1	LOCATION E. side CR 46 N. end of study area Morgantown, WV	
STATION #_____ RIVERMILE_____	STREAM CLASS Headwater/Ephemeral	
LAT _____ LONG _____	RIVER BASIN Monongahela	
STORET #	AGENCY Burgess & Niple, Inc. (for WVDOH)	
INVESTIGATORS Katherine Fontaine, PWS; Jennifer Walker, PWS		
FORM COMPLETED BY K. Fontaine	DATE 7/24/13 TIME _____ AM PM	REASON FOR SURVEY New I-79 interchange Env. Assessment

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 0	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 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 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 **(0)** *

* Scored per WVSWVM

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

Stream 6 (cont.)

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 8	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 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 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
	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 4 (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

Total Score 72

* Scored per WVSWVM

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: I-79 New Interchange
Location: Morgantown, WV
Sampling Date: 7/24/13

Project Site Before Project

Subclass for this SAR:
Ephemeral Stream

Uppermost stratum present at this SAR:
Shrub/Herb Strata

SAR number: Stream 6

Functional Results Summary:

Enter Results in Section A of the Mitigation Sufficiency Calculator

Function	Functional Capacity Index
Hydrology	0.60
Biogeochemical Cycling	0.47
Habitat	0.32

Variable Measure and Subindex Summary:

Variable	Name	Average Measure	Subindex
$V_{CCANOPY}$	Percent canpoy over channel.	Not Used, <20%	Not Used
V_{EMBED}	Average embeddedness of channel.	2.70	0.71
$V_{SUBSTRATE}$	Median stream channel substrate particle size.	0.70	0.35
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.	5.00	0.63
V_{TDBH}	Average dbh of trees.	Not Used	Not Used
V_{SNAG}	Number of snags per 100 feet of stream.	37.00	0.50
V_{SSD}	Number of saplings and shrubs per 100 feet of stream.	32.00	0.49
V_{SRICH}	Riparian vegetation species richness.	0.00	0.00
$V_{DETRITUS}$	Average percent cover of leaves, sticks, etc.	4.63	0.06
V_{HERB}	Average percent cover of herbaceous vegetation.	125.00	1.00
V_{WLUSE}	Weighted Average of Runoff Score for Catchment.	0.68	0.72

Version 1-25-11

High-Gradient Headwater Streams in eastern Kentucky and western West Virginia
Field Data Sheet and Calculator

Team: Katherine E. Fontaine, PWS
Project Name: I-79 New Interchange
Location: Morgantown, WV
Latitude/UTM Northing: 39o 38' 36.1"
Longitude/UTM Easting: 80o 0' 28.9"
Sampling Date: 7/24/13

SAR Number: Stream 6 Reach Length (ft): 100 Stream Type: Ephemeral Stream

Top Strata: Shrub/Herb 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.)

Not Used, <20%

List the percent cover measurements at each point below:

19									

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:

3	5	4	4	5	4	4	1	2	2
3	4	3	3	3	4	3	3	3	4
3	2	1	2	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}.

0.70 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):

0.00	0.70	1.90	0.90	0.40	0.50	0.08	0.40	1.00	1.00
18.00	1.80	4.50	1.50	6.00	0.80	1.50	0.70	2.70	0.70
0.20	0.75	0.08	0.70	0.50	0.60	1.10	0.08	0.08	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%.

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. **5.0**

Number of downed woody stems: 5

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. **Not Used**

List the dbh measurements of individual trees (at least 4 in) within the buffer on each side of the stream below:

Left Side					Right Side				

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. **37.0**

Left Side: 25 Right Side: 12

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. **32.0**

Left Side: 20 Right Side: 12

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				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				6 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.

4.63 %

Left Side				Right Side			
2	2	2	2	2	2	5	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.

125 %

Left Side				Right Side			
200	100	100	200	100	100	100	100

Sample Variable 12 within the entire catchment of the stream.

12 V_{WLUSE} Weighted Average of Runoff Score for watershed:

0.68

Land Use (Choose From Drop List)	Runoff Score	% in Catchment	Running Percent (not >100)
Forest and native range (>75% ground cover)	1	60	60
Impervious areas (parking lots, roofs, driveways, etc)	0	15	75
Open space (pasture, lawns, parks, etc.), grass cover >75%	0.3	25	100

Stream 6

Variable	Value	VSI
$V_{CCANOPY}$	Not Used, <20%	Not Used
V_{EMBED}	2.7	0.71
$V_{SUBSTRATE}$	0.70 in	0.35
V_{BERO}	40 %	0.86
V_{LWD}	5.0	0.63
V_{TDBH}	Not Used	Not Used
V_{SNAG}	37.0	0.50
V_{SSD}	32.0	0.49
V_{SRICH}	0.00	0.00
$V_{DETRITUS}$	4.6 %	0.06
V_{HERB}	125 %	1.00
V_{WLUSE}	0.68	0.72

Notes:

West Virginia Stream and Wetland Valuation Metric

(Stream Valuation Metric - Worksheet 1 of 3)

USACE FILE NO./Project Name:	**I-79 New Interchange Morgantown, WV Stream 6**	
STREAM CLASSIFICATION:	**Ephemeral**	
STREAM IMPACT LENGTH:	**0**	**FORM OF MITIGATION:**

Column No. 1- Impact Existing Condition (Debit)

HGM Score (attach data forms):		Average
Hydrology	0.6	0.46333333
Biogeochemical Cycling	0.47	
Habitat	0.32	

PART I - Physical, Chemical and Biological Indicators

	Points Scale	Range	Site Score
PHYSICAL INDICATOR (Applies to all streams classifications)			
USEPA RBP (High Gradient Data Sheet)			
1. Epifaunal Substrate/Available Cover	0-20	0-1	0
2. Embeddedness	0-20		12
3. Velocity/ Depth Regime	0-20		0
4. Sediment Deposition	0-20		13
5. Channel Flow Status	0-20		0
6. Channel Alteration	0-20		8
7. Frequency of Riffles (or bends)	0-20		0
8. Bank Stability (LB & RB)	0-20		14
9. Vegetative Protection (LB & RB)	0-20		14
10. Riparian Vegetative Zone Width (LB & RB)	0-20		11
Total RBP Score	Marginal		72
Sub-Total			0.36
CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WVDEP Water Quality Indicators (General)			
Specific Conductivity		0-1	
300-399 - 70 points	0-90		371
pH			
6.0-8.0 = 80 points	0-80		7.79
DO			
<5.0 = 10 points	10-30		8.52
Sub-Total			0.9
BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams)			
WV Stream Condition Index (WVSCI)			
0	0-100	0-1	0
Sub-Total			0

PART II - Index and Unit Score

Index	Linear Feet	Unit Score
0.546666667	0	0

APPENDIX E
Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: New I-79 Interchange City/County: Morgantown/Monongalia Sampling Date: 7/24/13
Applicant/Owner: West Virginia Department of Transportation State: West Virginia Sampling Point: T1A
Investigator(s): Jennifer Walker, Krista Carter Section, Township, Range:
Landform (hillslope, terrace, etc.): Stream Valley Local relief (concave, convex, none): Concave Slope (%): 2%
Subregion (LRR or MLRA): LRR Lat: 39° 38' 36.7" Long: 80° 00' 28.3" Datum: WGS 84
Soil Map Unit Name: Udorthents, cut and fill (U1) NWI classification: Not mapped
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation N___, Soil N___, or Hydrology N___ significantly disturbed? Are "Normal Circumstances" present? Yes X___ No ____
Are Vegetation N___, Soil N___, or Hydrology N___ 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 X___ No ____	**Is the Sampled Area within a Wetland?** **Yes** X___ **No** ____
Hydric Soil Present?	Yes X___ No ____	
Wetland Hydrology Present?	Yes X___ No ____	

Remarks: Wetland hydrology confirmed. Vegetation met dominance test and hydric soils confirmed. This plot is located in a wetland.

HYDROLOGY

Wetland Hydrology Indicators:

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

____ Surface Water (A1)
X___ 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)
X___ 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)
X___ 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)
X___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X___ Depth (inches): ____
Water Table Present? Yes X___ No ____ Depth (inches): 3"
Saturation Present? (includes capillary fringe) Yes ____ No X___ Depth (inches): ____

Wetland Hydrology Present? **Yes** X___ **No** ____

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

Remarks: Drainage patterns observed throughout wetland. This secondary indicator was supported by a hydrogen sulfide odor and water observed at 3 inches in soil pit.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: T1A

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		
50% of total cover:	20% of total cover		
Sapling Stratum (Plot size: 15 feet)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		
50% of total cover:	= 20% of total cover		
Shrub Stratum (Plot size: 15 feet)			
1. Salix nigra	15	Y	OBL
2. Rosa multiflora	1	N	FACU
3.			
4.			
5.			
6.			
	= Total Cover		
50% of total cover:	= 20% of total cover		
Herb Stratum (Plot size: 5 feet)			
1. Leersia oryzoides	40	Y	OBL
2. Impatiens pallida	25	Y	FACW
3. Typha angustifolia	15	N	OBL
4. Scirpus atrovirens	5	N	OBL
5. Carex lurida	15	N	OBL
6. Equisetum arvense	2	N	FAC
7.			
8.			
9.			
10.			
11.			
	102 = Total Cover		
50% of total cover:	51 = 20% of total cover		20.4
Woody Vine Stratum (Plot size: 30 feet)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	= 20% of total cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

_____ 1 - Rapid Test for Hydrophytic Vegetation

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

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

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

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.): Photograph 1.

SOIL Sampling Point: T1A

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

	Matrix		Redox Features					
Depth (inches)	**Color (moist)**	**%**	**Color (moist)**	**%**	**Type[1]**	**Loc[2]**	**Texture**	**Remarks**
0-4	2.5 Y 4/2	98	10 YR 5/6	2	C	M	SCL	Partially decayed organics
4-6	2.5 Y 5/2	97	7.5 YR 4/6	3	C	M	SCL	To surface (0-4")
6-12	2.5 Y 4/1	98	7.5 YR 4/6	2	C	M	SCL	
12+								Some fill observed in form of coarse fragments

[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)
X 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)
X Depleted Matrix (F3)
_____ Redox Dark Surface (F6)
_____ Depleted Dark Surface (F7)
_____ Redox Depressions (F8)
_____ Iron-Manganese Masses (F12) **(LRR MLRA 136)**
_____ Umbric Surface (F13) **(MLRA 136, 122)**
_____ Piedmont Floodplain Soils (F19) **(MLRA 148)**
_____ Red Parent Material (F21) **(MLRA 127, 147)**

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)**
_____ 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** X **No** _____

Remarks: Hydrogen sulfide odor detected within 12 inches of soil surface. Hydric soil confirmed at this plot location.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: New I-79 Interchange City/County: Morgantown/Monongalia Sampling Date: 7/24/13
Applicant/Owner: West Virginia Department of Transportation State: West Virginia Sampling Point: T1B
Investigator(s): Jennifer Walker, Krista Carter Section, Township, Range:
Landform (hillslope, terrace, etc.): Stream Terrace Local relief (concave, convex, none): Convex Slope (%): 3%
Subregion (LRR or MLRA): LRR Lat: 39° 38' 35.7" Long: 80° 00' 28.4" Datum: WGS 84
Soil Map Unit Name: Udorthents, cut and fill (U1) NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation N___, Soil N___, or Hydrology N___ significantly disturbed? Are "Normal Circumstances" present? Yes X___ No ____
Are Vegetation N___, Soil N___, or Hydrology N___ 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 X Hydric Soil Present? Yes ____ No X Wetland Hydrology Present? Yes ____ No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X

Remarks: Plot lacks a predominance of hydrophytic vegetation. No indicators of wetland hydrology were observed. Hydric soils lacking. This plot is located in upland.

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: No field indicators of hydrology observed.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: T1B

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species?	Indicator Status
1. Crataegus mollis	25%	Y	FACU
2. Pinus virginiana	25%	Y	UPL
3.			
4.			
5.			
6.			
	50 = Total Cover		
50% of total cover::	25	20% of total cover:	10
Sapling Stratum (Plot size: 15 feet)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		
50% of total cover::		= 20% of total cover:	
Shrub Stratum (Plot size: 15 feet)			
1. Rosa multiflora	5	N	FACU
2. Rubus allegheniensis	5	N	FACU
3. Lonicera canadensis	35	Y	FACU
4.			
5.			
6.			
	45 = Total Cover		
50% of total cover::	22.5	= 20% of total cover:	9
Herb Stratum (Plot size: 5 feet)			
1. Coronilla varia	55	Y	UPL
2. Toxicodendron radicans	2	N	FAC
3. Galium mollugo	10	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	67 = Total Cover		
50% of total cover::	33.5	= 20% of total cover:	13.4
Woody Vine Stratum (Plot size: 30 feet)			
1. Vitis riparia	10	Y	FACW
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover::	5	= 20% of total cover:	2

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 10	x 2 = 20
FAC species 2	x 3 = 6
FACU species 80	x 4 = 320
UPL species 80	x 5 = 400
Column Totals: 172 (A)	746 (B)

Prevalence Index = B/A = 4.34

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

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

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

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.): Photograph 2.

SOIL Sampling Point: T1B

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

	Matrix		Redox Features					
Depth (inches)	**Color (moist)**	**%**	**Color (moist)**	**%**	**Type[1]**	**Loc[2]**	**Texture**	**Remarks**
Refusal								Fill/large rock to surface; soil profile could not be obtained

[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 MLRA 136)**
_____ Umbric Surface (F13) **(MLRA 136, 122)**
_____ Piedmont Floodplain Soils (F19) **(MLRA 148)**
_____ Red Parent Material (F21) **(MLRA 127, 147)**

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)**
_____ 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: A soil profile could not be obtained due to large rock/fill at plot location. Hydric soil is lacking at this plot.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: New I-79 Interchange City/County: Morgantown/Monongalia Sampling Date: 7/25/13
Applicant/Owner: West Virginia Department of Transportation State: West Virginia Sampling Point: T2A
Investigator(s): Jennifer Walker, Krista Carter Section, Township, Range:
Landform (hillslope, terrace, etc.): Toe or Road Embankment Local relief (concave, convex, none): Concave Slope (%): 4%
Subregion (LRR or MLRA): LRR Lat: 39° 38' 26.7" Long: 80° 00' 13.6" Datum: WGS 84
Soil Map Unit Name: Udorthents, cut and fill (U1) NWI classification: Not mapped
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation N___, Soil N___, or Hydrology N___ significantly disturbed? Are "Normal Circumstances" present? Yes X___ No ____
Are Vegetation N___, Soil N___, or Hydrology N___ 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 X___ No ____ Hydric Soil Present? Yes X___ No ____ Wetland Hydrology Present? Yes X___ No ____	**Is the Sampled Area within a Wetland?** **Yes** X___ **No** ___
Remarks: Plot is characterized by wetland hydrology, a predominance of hydrophytic vegetation, and hydric soils.	

HYDROLOGY

Wetland Hydrology Indicators:

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

- X___ Surface Water (A1)
- X___ 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)
- X___ 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)
- X___ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X___ No ____ Depth (inches): 1/2"
Water Table Present? Yes X___ No ____ Depth (inches): 3
Saturation Present? (includes capillary fringe) Yes ____ No X___ Depth (inches): ____

Wetland Hydrology Present? **Yes** X___ **No** ____

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

Remarks: Approximately 0.5 inch standing water observed. Water at 3 inches in soil pit. Drainage patterns observed through area from nearby highway embankment (Indicators B10 and D2).

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: T2A

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	2	Y	FAC
2.			
3.			
4.			
5.			
6.			
	2 = Total Cover		
50% of total cover::	1	20% of total cover:	0.4
Sapling Stratum (Plot size: 15 feet)			
1. Acer rubrum	2	Y	FAC
2.			
3.			
4.			
5.			
6.			
	2 = Total Cover		
50% of total cover::	1	= 20% of total cover:	0.4
Shrub Stratum (Plot size: 15 feet)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		
50% of total cover::		= 20% of total cover:	
Herb Stratum (Plot size: 5 feet)			
1. Eupatorium perfoliatum	10	N	FACW
2. Typha angustifolia	2	N	OBL
3. Juncus effuses	65	Y	FACW
4. Eupatorium pilosum	20	Y	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	97 = Total Cover		
50% of total cover::	48.5	= 20% of total cover:	19.4
Woody Vine Stratum (Plot size: 30 feet)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover::		= 20% of 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: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

_____ 1 - Rapid Test for Hydrophytic Vegetation

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

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

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

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (Include photo numbers here or on a separate sheet.): Photograph 3.

SOIL Sampling Point: T2A

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

	Matrix		Redox Features					
Depth (inches)	**Color (moist)**	**%**	**Color (moist)**	**%**	**Type[1]**	**Loc[2]**	**Texture**	**Remarks**
0-6								Partially decomposed organics to surface (0-6") limited to roots and leaf matter
6-12	2.5 Y 5/1	40					SCL	50% fresh organics
12-18	2.5 Y 5/1	97	2.5 Y 6/8	3	C	M	SCL	10% decayed organics (6-12") some coarse fragments at 6"

[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, 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)
X Depleted Matrix (F3)
_____ Redox Dark Surface (F6)
_____ Depleted Dark Surface (F7)
_____ Redox Depressions (F8)
_____ Iron-Manganese Masses (F12) **(LRR MLRA 136)**
_____ Umbric Surface (F13) **(MLRA 136, 122)**
_____ Piedmont Floodplain Soils (F19) **(MLRA 148)**
_____ Red Parent Material (F21) **(MLRA 127, 147)**

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)**
_____ 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** X **No** ___

Remarks: Hydric soil indicators observed in field.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: New I-79 Interchange City/County: Morgantown/Monongalia Sampling Date: 7/25/13
Applicant/Owner: West Virginia Department of Transportation State: West Virginia Sampling Point: T2B
Investigator(s): Jennifer Walker, Krista Carter Section, Township, Range:
Landform (hillslope, terrace, etc.): Road Right of Way Local relief (concave, convex, none): Convex Slope (%): 4%
Subregion (LRR or MLRA): LRR Lat: 39° 38' 26.6" Long: 80° 00' 13.9" Datum: WGS 84
Soil Map Unit Name: Udorthents, cut and fill (U1) NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation N___, Soil N___, or Hydrology N___ significantly disturbed? Are "Normal Circumstances" present? Yes X___ No ____
Are Vegetation N___, Soil N___, or Hydrology N___ 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 X Hydric Soil Present? Yes ____ No X Wetland Hydrology Present? Yes ____ No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X

Remarks: Wetland hydrology, hydrophytic vegetation, and hydric soils are all lacking. This plot is not located in a wetland.

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: No field indicators of wetland were observed.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: T2B

Tree Stratum (Plot size: 30 feet)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	25	Y	FAC
2.			
3.			
4.			
5.			
6.			
	25 = Total Cover		
50% of total cover::	12.5	20% of total cover:	5
Sapling Stratum (Plot size: 15 feet)			
1.			
2.			
3.			
4.			
5.			
6.			
	= Total Cover		
50% of total cover::		20% of total cover:	
Shrub Stratum (Plot size: 15 feet)			
1. Lonicera Canadensis	35	Y	FACU
2. Rubus allegheniensis	25	Y	FACU
3.			
4.			
5.			
6.			
	60 = Total Cover		
50% of total cover::	30	20% of total cover:	12
Herb Stratum (Plot size: 5 feet)			
1. Coronilla varia	45	Y	UPL
2. Solidago gigantea	45	Y	FACW
3. Lespedeza cuneata	20	N	FACU
4. Erigeron strigosus	20	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	130 = Total Cover		
50% of total cover::	65	20% of total cover:	26
Woody Vine Stratum (Plot size: 30 feet)			
1. Vitis riparia	30	Y	FACW
2.			
3.			
4.			
5.			
	30 = Total Cover		
50% of total cover::	15	20% of total cover:	6

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 75	x 2 = 150
FAC species 25	x 3 = 75
FACU species 100	x 4 = 400
UPL species 45	x 5 = 225
Column Totals: 245 (A)	850 (B)

Prevalence Index = B/A = 3.47

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

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

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

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.): Photograph 4.

SOIL Sampling Point: T2B

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

	Matrix		Redox Features					
Depth (inches)	**Color (moist)**	**%**	**Color (moist)**	**%**	**Type[1]**	**Loc[2]**	**Texture**	**Remarks**
0-12	10 YR 4/3	100					SL	Coarse fragments to surface
12-18	10 Y 4/3	100						Coarse fragments small pieces of coal and some sand observed

[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 MLRA 136)**
_____ Umbric Surface (F13) **(MLRA 136, 122)**
_____ Piedmont Floodplain Soils (F19) **(MLRA 148)**
_____ Red Parent Material (F21) **(MLRA 127, 147)**

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)**
_____ 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: No field indicators of hydric soil observed.

APPENDIX F
Site Photographs

PHOTOGRAPHIC LOG

Photograph Number and Description **Page**

WETLAND DELINEATION & AQUATIC RESOURCE INVENTORY

Photo #1 View of Wetland Plot T1A.

Photo #2 View of Upland Plot T1B.

Photo #3 View of Wetland Plot T2A.

Photo #4 View of Upland Plot T2B.

Photo #5 Main Sampling Reach on Stream 1 looking upstream.

Photo #6 Main Sampling Reach on Stream 1 looking downstream with CR 46/3 to left of photo.

Photo #7 Stream 2 looking upstream.

Photo #8 Stream 3 looking downstream. Old Martin Hollow Road to left of photo.

Photo #9 Stream 4 looking upstream.

Photo #10 Stream 5 looking downstream.

Photo #11 Stream 5 culvert under I-79.

Photo #12 Stream 6 near Wetland A.

Photo #13 Stream 6 with CR 46/3 to the left of photo.

Photo #14 Typical concrete gutter along I-79 in study area.

Photo #15 AMD Treatment Pond (Pond 1) located east of I-79 on Consol Property.

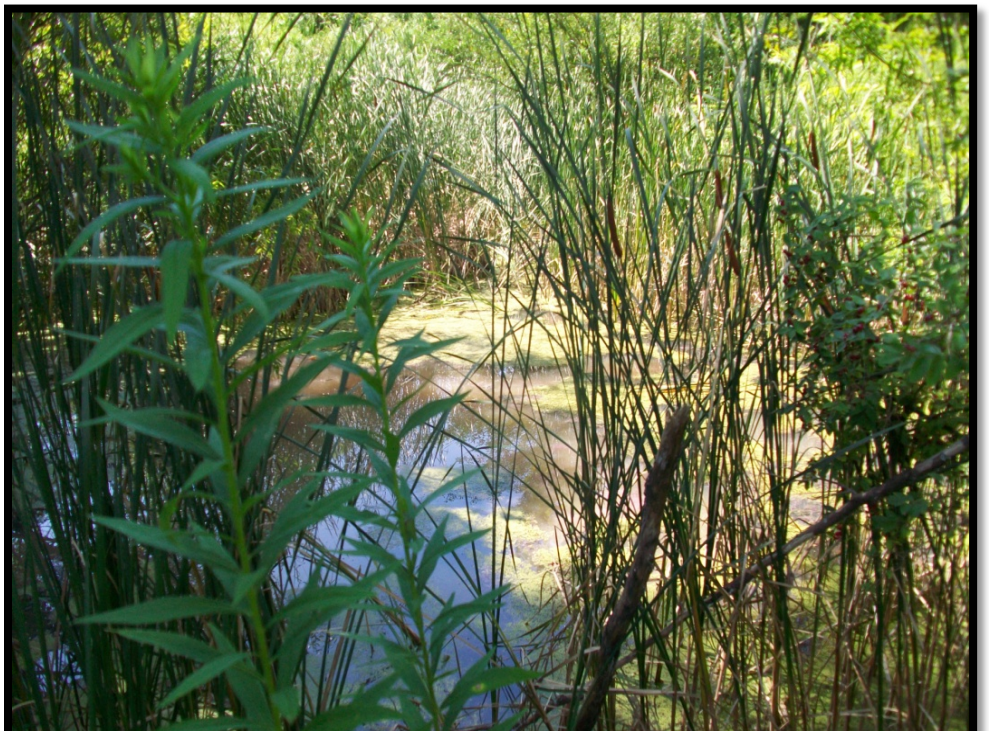

Photo #16 One of man-made ponds (Pond 2) located on Lynch Property.

Photo #17 Another view of man-made pond (Pond 4) associated with former mining operations on Lynch Property.

Photo #18 View of AMD treatment ditch on Consol Property.