



Pigg River Restoration at Power Dam Post Construction Monitoring Report

Prepared For:

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Introduction

Wetland Studies and Solutions, Inc. (WSSI) presents this monitoring report to the Friends of the Rivers of Virginia (FORVA), providing data related to Post-Construction monitoring efforts designed to track changes to the river corridor and adjacent wetlands following the removal of the decommissioned Power Dam on the Pigg River in Rocky Mount Virginia, and in accordance with the *Virginia Water Protection Permit Joint Permit Application #15-1551* (draft dated 6/30/2016). Monitoring activities were performed as outlined in the *Pigg River Restoration at Power Dam Monitoring RFP* (WSSI#1054, dated July 27, 2016, a.k.a. “RFP”).

Field data was collected by WSSI engineering staff during normal baseflow conditions on November 8-10, 2016. A total of twelve (12) cross sections were established at or near those locations outlined in the RFP. Cross section locations, as located by GPS, are shown in **Exhibit 1**. Minor adjustments (relative to the RFP) were made to cross section locations based on field conditions. Half of the monitored cross sections were taken upstream of the dam and the other half below the relic dam structure – with cross section spacing adjusted to focus on areas around the dam where the greatest change was anticipated to occur. Cross sections covered areas far enough upstream to be beyond backwater effects created by the dam and stretched downstream to the point where effects of the dam removal were anticipated to be largely diminished. Cross section locations were also selected to correspond with previous monitoring efforts (Hitt et al., 2009; Bass, 2015).

Methods

The focus of Post-Construction monitoring efforts was the establishment of monitoring locations and documentation of channel conditions immediately following dam removal. WSSI staff began by accessing upstream cross sections via canoe. Upstream access was gained through the Town of Rocky Mount sanitary sewer pumping station (entrance road located near the intersection of Power Dam Road and Scenic River Drive). Cross sections 1-4 were accessed exclusively by canoe. Cross sections 5-12 were accessed via vehicle/foot travel through Town or private property – specifically public land or Town property for sections 5-9, via Hudson Farm Lane (private) for section 10-11 (with thanks to Wendell, a local stakeholder), and through private land on Chestnut Hill Road just downstream of the Pigg River bridge.

Each of the twelve (12) cross section locations was monumented through the placement of 4-ft metal stakes and flagging, plus 18-in pins (rebar) driven flush with the existing grade along the left and right banks – generally at floodplain elevation and far enough back from bank slopes to prevent destabilization associated with bank erosion. Each section location was documented through recordation of GPS coordinates taken at one or both bank pin locations. All sections were established roughly perpendicular to the direction of flow.

At each cross section WSSI staff photo-documented local conditions, including upstream/downstream and channel bank photos. Photo documentation included recording items per VWP guidelines: direction, photographer, date/time, vegetative cover (as applicable), and a brief description. This information is included in **Appendix A**, with each cross section included under a separate tab.

In addition to photographs, WSSI staff surveyed cross section geometry using a laser level and tape to record station/elevation information for all major inflection points, consistent with methodologies used in the *Sediment Capacity and Fate Modeling Report* (Bass, 2015) and standard industry practice. Cross section geometry is depicted in **Appendix B**.

Physical habitat parameters including particle size, embeddedness, woody debris, and thalweg depth measurements were recorded at each section. Observations regarding embeddedness are included with the section descriptions and photographs in **Appendix A**. The presence and quantification of large woody debris, as outlined in previous studies (Hitt et al., 2009), was documented by visual assessment for areas 150 feet upstream and downstream of the measured cross section. Woody debris counts are also given in **Appendix A**. Thalweg measurements were made to document bed elevation changes in the vicinity of the cross section – with depth measurements collected at 5-ft intervals from the cross section location in both the upstream and downstream direction for a distance of approximately 50 ft (in each direction). Thalweg plots are given in **Appendix C**. Thalweg. The method of data collection for bed material size varied depending on local conditions. The particle size distribution at the majority of monitored cross sections was uniformly sandy/silty. Bed material seen at the two downstream-most cross sections was coarse in nature and warranted formal sampling. A Wolman riffle pebble count was performed at these two sections and particle size distribution data is presented in **Appendix D**.

Results

The main focus of Post-Construction monitoring was the establishment of permanent cross sections and documentation of baseline post-dam removal channel conditions. Post-Construction monitoring efforts will lay the groundwork for the next five years of monitoring.

Cross sections were successfully established and are well positioned, based on field observations, to track the changes in channel morphology as sediment moves through the newly restored system. Sections are also located so as to allow for monitoring of changes to overbank wetland areas identified during previous studies.

No evidence of backwater conditions was seen at Cross Section 1, indicating minimal influence associated with the Power Dam at that location. Visible signs of water surface elevation change were seen at Cross Section 3, indicating backwater influence was present at this location prior to dam removal. Cross Section 4-6 showed increasing degrees of water surface elevation drop (from a previously ponded condition), sediment deposition, and downcutting. Cross Section 6 had downcut approximately 20 feet to within a few feet of the new invert at the dam location by the time Post-Construction monitoring was performed. This indicates rapid entrainment and transport of impounded sediments following the construction phase – most likely attributable to the large storm event which occurred on October 7th and 8th (with river stage at the Sandy Level gaging station rising to approximately 1-ft above flood stage).

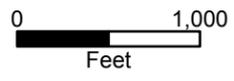
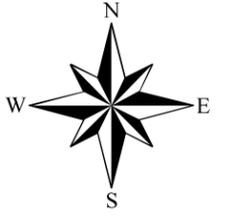
Field conditions showed cross sections downstream of the dam to be effectively bracketing varying degrees of sediment transport and deposition. Section 7-9 were all inundated with fine sediment deposits, with minimal variation in depth and consolidation observed. Cross Section 10 was largely buried by fine sediments, but had local scour in isolated areas of the bed where gravel substrate was detectable. This indicates that Cross Section 10 closely approximates the

downstream extent of the main body of transported sediments. Conversely, bed material at Cross Section 11 was largely composed of gravel material, with only minor silty deposits along the edge of water – representing conditions just downstream of the main depositional area at the time of observation. Conditions at Cross Section 12 indicate minimal effects associated with the dam removal have extended down to the Chestnut Hill Road bridge.

Due to the large storm event immediately following dam removal, sediment transport has been more rapid than was indicated by the previous sediment transport modeling study (Bass, 2015). The pace of change is anticipated to slow, while the extent of sections influenced by dam removal expands over the coming 5-year monitoring period. Post-construction monitoring has established a good framework for documenting these anticipated changes.



Pigg River Restoration at Power Dam-Monitoring
 Permanent Monitoring Locations
 Original Scale: 1"=1000'



- Survey Locations
- Cross Sections

L:\Proposals\GIS\2016\PiggRiverRestoration_PowerDam\PiggRiverRestoration.mxd

Aerial Imagery Source: Virginia Base Mapping Program (VBMP) - 2015 Natural Color Imagery

Appendix A

Cross Section 1

<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>
Left Bank	36.990985	-79.864618
Right Bank	36.990712	-79.864937

Description: Cross Section 1 was located approximately 600 feet downstream of the existing sanitary pump station, accessible via Scenic River Road. Access was by canoe from the upstream pumping station. The cross section was taken in a run with forested conditions on the left bank and agricultural fields on the right bank. (Note: Left and right bank references will always be made facing downstream.) Bank slopes were steep and reasonably well vegetated with minor bank scour visible along the toe of slope.

The instrument setup for this cross section was at the right bank pin (Height of Instrument, HI = 5.40 ft). The cross section plot is given on Sheet 1 of Appendix B and the thalweg plot is on Sheet 1 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.



Photo 1-1

Location, Orientation: XS 1, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 12:12 PM

Taken by: *See note below

Description: View looking upstream from the middle of Cross Section 1

Woody Debris: 7

*Note: All Post-construction photographs taken by A. Chapla, unless otherwise noted.



Photo 1-2

Location, Orientation: XS 1, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 12:14 PM

Description: View looking downstream from the middle of Cross Section 1

Woody Debris: 7



Photo 1-3

Location, Orientation: XS 1, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 12:22 PM

Description: View looking left from the middle of Cross Section 1

Vegetation: 70% herbaceous cover, few trees at top of bank



Photo 1-4

Location, Orientation: XS 1, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 12:23 PM

Description: View looking right from the middle of Cross Section 1

Vegetation: 90% herbaceous cover, no trees



Photo 1-5

Location, Orientation: XS 1, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 12:31 PM

Description: View looking downstream at Cross Section 1 from an upstream position

*Pigg River Restoration at Power Dam
Post Construction Monitoring Report
November 2016
Appendix A*



Photo 1-6

Location, Orientation: XS 1, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 12:32 PM

Description: View looking upstream at Cross Section 1 from a downstream position

Cross Section 2

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.984705	-79.864096
Right Bank	36.984655	-79.864333

Description: Cross Section 2 was located approximately 2,400 feet downstream (south) of Cross Section 1 and 1,200 feet downstream of the power line crossing. Access was by canoe from the upstream pumping station. The cross section was taken in a run with forested conditions on both banks. The right bank slope was steeper but stabilized by root structure. The left bank was formed by a sandy deposit (bar) with little vegetation. The location of this cross section is believed to nearly approximately the upstream extent of backwater created by the Power Dam.

The instrument setup for this cross section was at the right bank (HI = 5.31 ft). The cross section plot is on Sheet 2 of Appendix B, and the thalweg plot is on Sheet 2 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.

This cross section was located adjacent to the overbank wetland area (left bank) identified in permit documents and previous reports as Wetland Site #4.



Photo 2-1

Location, Orientation: XS 2, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 2:06 PM

Description: View looking upstream from the center of Cross Section 2

Woody Debris: 35



Photo 2-2

Location, Orientation: XS 2, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 2:13 PM

Description: View looking downstream from the middle of Cross Section 2

Woody Debris: 25

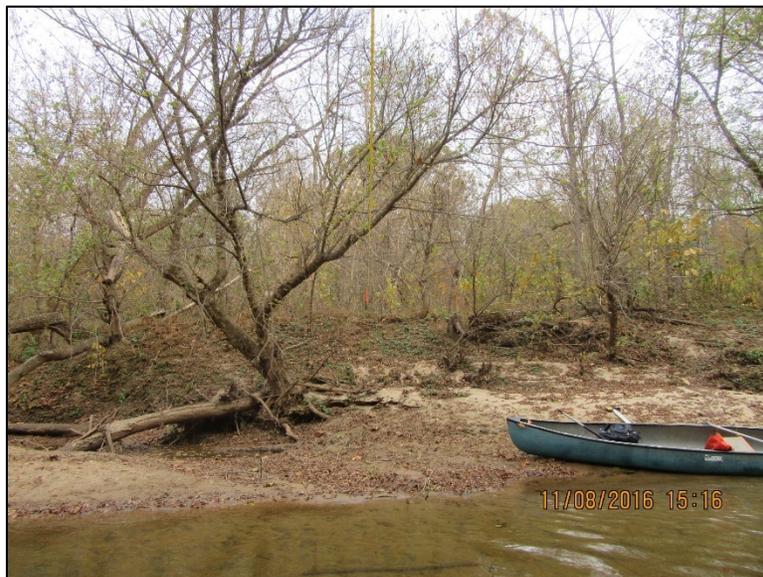


Photo 2-3

Location, Orientation: XS 2, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 2:16 PM

Description: View looking left from the middle of Cross Section 2

Vegetation: 40% herbaceous cover, few trees

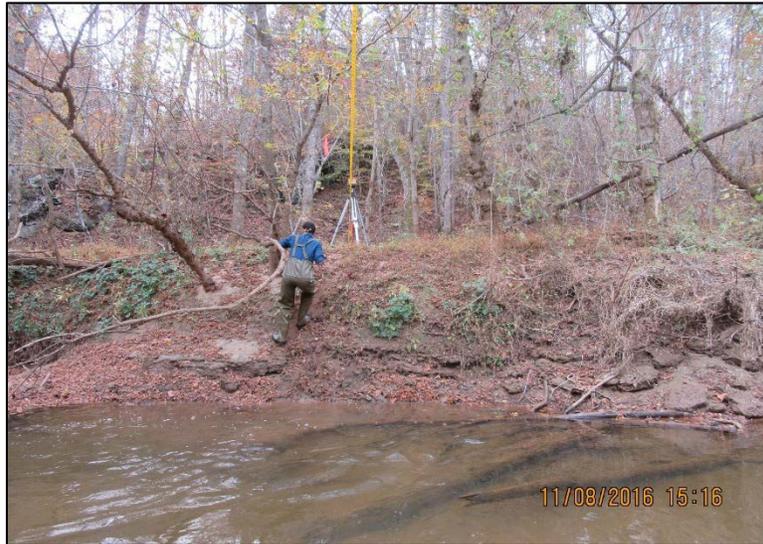


Photo 2-4
Location, Orientation: XS 2, Right Bank
Permit Number: JPA #15-1551
Wetland Data Sheet Reference: n/a
11/8/16, 2:16 PM

Description: View looking right from the middle of Cross Section 2
Vegetation: 50% herbaceous cover, few trees



Photo 2-5
Location, Orientation: XS 2, Upstream looking down
Permit Number: JPA #15-1551
Wetland Data Sheet Reference: n/a
11/8/16, 2:20 PM

Description: View looking downstream at Cross Section 2 from an upstream position

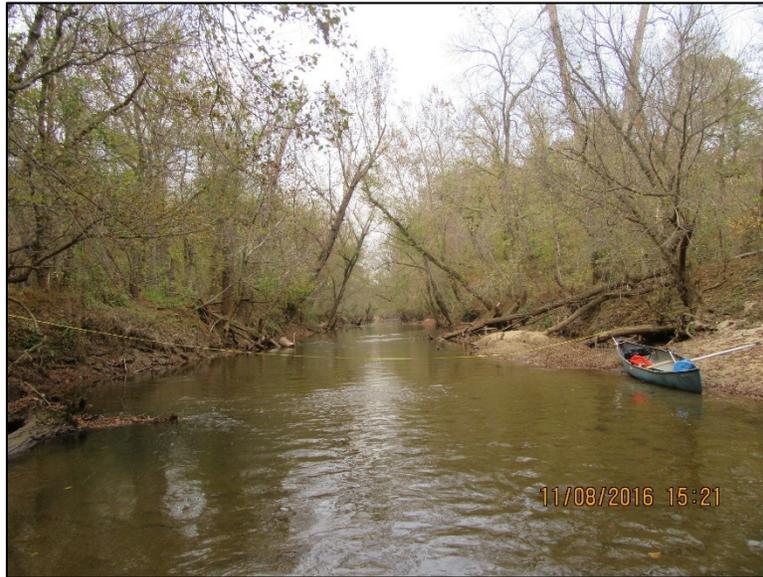


Photo 2-6

Location, Orientation: XS 2, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 2:21 PM

Description: View looking upstream at Cross Section 2 from a downstream position



Photo 2-7

Location, Orientation: XS 2, Bed Material

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 2:23 PM

Description: Bed material at Cross Section 2 was almost entirely silt

Cross Section 3

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.980573	-79.855954
Right Bank	36.980669	-79.855792

Description: Cross Section 3 was located approximately 2,600 feet downstream of Cross Section 2, 500 feet southeast of the south end of Scenic River Road, and just downstream of a large meander bend. Access was by canoe from the upstream pumping station. The cross section was taken in a shallow run with forested conditions on both banks. Both banks were poorly vegetated on the lower half with noticeable scour of fine sediment deposits occurring along the toes of slope. The lack of lower bank vegetation and fine sediment deposits are the result of backwater conditions created by the dam. Lower bank areas are now becoming exposed due to the lower water levels present following dam removal. The left bank was protected by root structure. The right bank was composed of a steep sloped, fine-grained sediment deposit.

The instrument setup for this cross section was at the right bank (HI = 4.74 ft). The cross section plot is on Sheet 3 of Appendix B, and the thalweg plot is on Sheet 3 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.

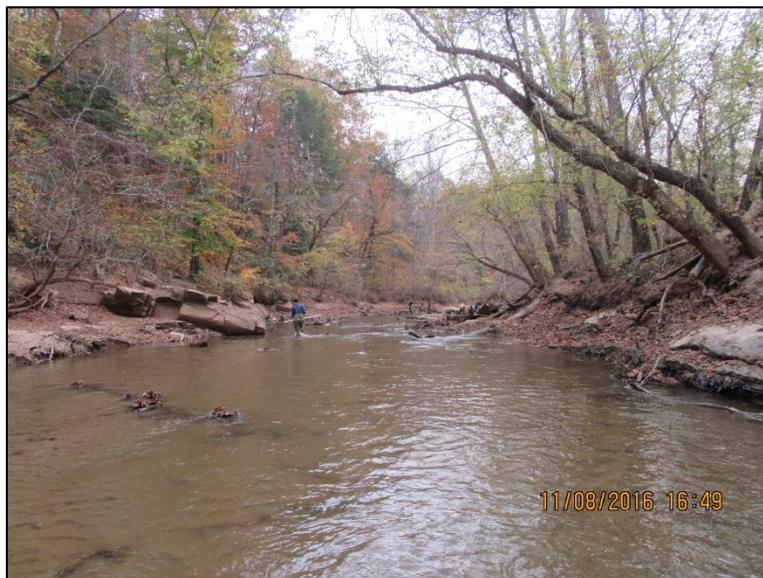


Photo 3-1

Location, Orientation: XS 3, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 3:49 PM

Description: View looking upstream from the center of Cross Section 3

Woody Debris: 50



Photo 3-2

Location, Orientation: XS 3, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 4:01 PM

Description: View looking downstream from the middle of Cross Section 3

Woody Debris: 40



Photo 3-3

Location, Orientation: XS 3, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 3:38 PM

Description: View looking left from the middle of Cross Section 3

Vegetation: 40% herbaceous plants, few trees



Photo 3-4

Location, Orientation: XS 3, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 3:38PM

Description: View looking right from the middle of Cross Section 3

Vegetation: 30% herbaceous cover and a few trees at top of bank

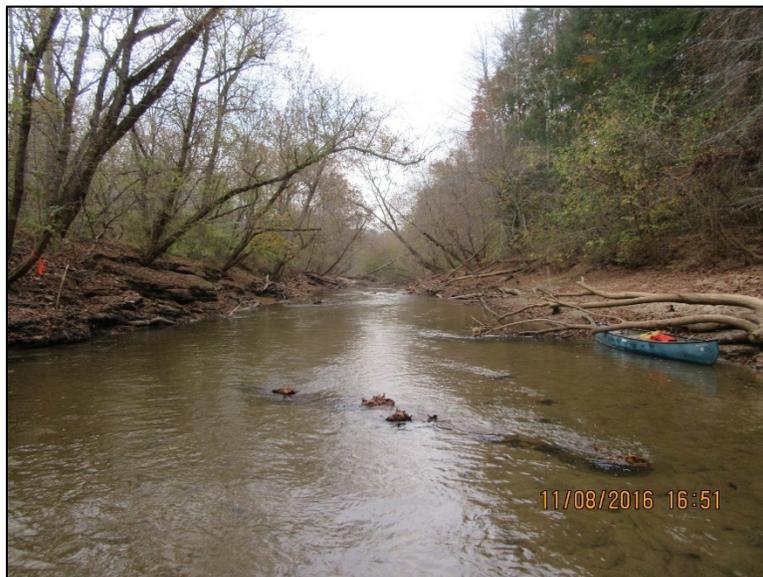


Photo 3-5

Location, Orientation: XS 3, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 3:51 PM

Description: View looking downstream at Cross Section 3 from an upstream position



Photo 3-6

Location, Orientation: XS 3, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 4:03 PM

Description: View looking upstream at Cross Section 3 from a downstream position



Photo 3-7

Location, Orientation: XS 3, Bed Material

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 4:03 PM

Description: Bed material at Cross Section 3 was almost entirely silt

Cross Section 4

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.985663	-79.856937
Right Bank	36.985403	-79.856873
Thalweg	36.985530	-79.856930

Description: Cross Section 4 was located approximately 1,600 feet downstream of Cross Section 3, east of Scenic River Road, south of the power line easement, and west of Power Dam Road in a short, straight, run between two sharp meander pools. Access was by canoe from the upstream pumping station. The cross section was bounded on both banks by forested conditions. The signs of past inundation and backwater effects from the dam were strongly visible at this cross section. A terraced channel cross section was observed with a narrower baseflow channel formed by fine sediment deposits along both banks. The left inner bank face was vertical, approximately 4-ft high, and showed signs of periodic mass failure (Photo 4-3). Rooting depth played a lesser role in stabilizing banks in this section relative to previous sections, due to the significant backwater depth present prior to dam removal.

The instrument setup for this cross section was at the right bank (HI = 5.48 ft). The cross section plot is on Sheet 4 of Appendix B, and the thalweg plot is on Sheet 4 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy/silty) nature of bed sediments.

This cross section was located adjacent to the overbank wetland area (right bank) identified in permit documents and previous reports as Wetland Site #3.



Photo 4-1

Location, Orientation: XS 4, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 5:19 PM

Description: View looking upstream from the center of Cross Section 4
Woody Debris: 75



Photo 4-2

Location, Orientation: XS 4, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 5:25 PM

Description: View looking downstream from the middle of Cross Section 4

Woody Debris: 50



Photo 4-3

Location, Orientation: XS 4, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 4:39 PM

Description: View looking left from the middle of Cross Section 4

Vegetation: 80% herbaceous plants and a few trees at top of bank



Photo 4-4

Location, Orientation: XS 4, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 4:40 PM

Description: View looking right from the middle of Cross Section 4

Vegetation: 40% herbaceous on lower terrace, small shrubs and a few trees at top of bank



Photo 4-5

Location, Orientation: XS 4, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 5:13 PM

Description: View looking downstream at Cross Section 4 from an upstream position



Photo 4-6

Location, Orientation: XS 4, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 5:27 PM

Description: View looking upstream at Cross Section 4 from a downstream position



Photo 4-7

Location, Orientation: XS 4, Bed Material

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/8/16, 5:14 PM

Description: Bed material at Cross Section 4 was almost entirely silt

Cross Section 5

<i><u>Location</u></i>	<i><u>Latitude</u></i>	<i><u>Longitude</u></i>
Left Bank	36.991448	-79.857178
Right Bank		

Description: Cross Section 5 was located approximately 2,000 feet downstream of Cross Section 4; approximately 800 feet downstream (north) of the power line easement. Access was by canoe from the upstream pumping station. The cross section was bounded on both banks by forested conditions. The significant backwater depth (> 10 ft) created by the dam resulted in the development of a narrow terraced channel, with the confined baseflow channel flanked by wide mudflats. Due to the recent drop in water level associated with dam removal no vegetative establishment was seen inside the top of banks (~15-ft high), or edge of the previous permanent pool water surface. The left inner bank face was vertical, approximately 4-ft high, and showing signs of periodic mass failure (Photo 5-3). The right inner bank was more gradually sloping with signs of cyclical deposition and scour. (Photo 5-4).

The instrument setup for this cross section was at the right bank (HI = 4.01 ft). The cross section plot is on Sheet 5 of Appendix B, and the thalweg plot is on Sheet 5 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.

This cross section was located adjacent to a narrow band of wetlands (as previously delineated) located on the left bank – the upstream end of the area identified in permit documents and previous reports as Wetland Site #2.



Photo 5-1

Location, Orientation: XS 5, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:20 AM

Description: View looking upstream from the center of Cross Section 5

Woody Debris: 11



Photo 5-2

Location, Orientation: XS 5, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:32 AM

Description: View looking downstream from the middle of Cross Section 5

Woody Debris: 7



Photo 5-3

Location, Orientation: XS 5, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:36 AM

Description: View looking left from the middle of Cross Section 5

Vegetation: Small trees at bankfull, no vegetation below top of bank



Photo 5-4

Location, Orientation: XS 5, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:37 AM

Description: View looking right from the middle of Cross Section 5
Vegetation: Small trees and grass at bankfull, no vegetation below top of bank



Photo 5-5

Location, Orientation: XS 5, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:21 AM

Description: View looking downstream at Cross Section 5 from an upstream position



Photo 5-6

Location, Orientation: XS 5, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:34 AM

Description: View looking upstream at Cross Section 5 from a downstream position



Photo 5-7

Location, Orientation: XS 5, Bed Material

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 10:37 AM

Description: Bed material at Cross Section 5 was almost entirely silt

Cross Section 6

<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>
Left Bank		
Right Bank	36.995027	-79.859314

Description: Cross Section 6 was located approximately 300 feet upstream of the Power Dam structure. Access was by foot via the trail paralleling Power Dam Road. The cross section was bounded on both banks by forested conditions. During and following dam removal, flows cut through the deep sediment deposits behind the dam. At the time of post-construction monitoring thalweg elevation at this section appeared to be within two to three feet of invert elevation at the location of the dam breach. This section was approximately 30-ft deep and no vegetation had yet established within the channel section below top of bank. Severe bed/bank scour were occurring in addition to mass failure of steep bank sections. Large woody debris was serving to reduce localized scour in some locations while intensifying it in others.

Bed material and lower bank sediments were very soft and unconsolidated, with significant bedload transport occurring, even during the low flow conditions observed during monitoring.

The instrument setup for this cross section was at the right bank (HI = 2.75 ft). The cross section plot is on Sheet 6 of Appendix B, and the thalweg plot is on Sheet 6 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.

This cross section was located adjacent to a wider area of wetlands (as previously delineated) located on the left bank – the lower end of the area identified in permit documents and previous reports as Wetland Site #2.



Photo 6-1 (combined image)
 Location, Orientation: XS 6, Looking Upstream
 Permit Number: JPA #15-1551
 Wetland Data Sheet Reference: n/a
 11/9/16, 12:32 PM
 Description: View looking upstream from the center of Cross Section 6
 Woody Debris: 100+



Photo 6-2 (combined image)
Location, Orientation: XS 6, Looking Downstream
Permit Number: JPA #15-1551
Wetland Data Sheet Reference: n/a
11/9/16, 12:33 PM
Description: View looking downstream from the middle of Cross Section 6
Woody Debris: 100+



Photo 6-3
Location, Orientation: XS 6, Left Bank
Permit Number: JPA #15-1551
Wetland Data Sheet Reference: n/a
11/9/16, 12:34 PM
Description: View looking left from the middle of Cross Section 6

Vegetation: 10% herbaceous cover, large trees and shrubs at top of bank



Photo 6-4

Location, Orientation: XS 6, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 12:34 PM

Description: View looking right from the middle of Cross Section 6

Vegetation: 10% herbaceous cover, large trees and shrubs at top of bank

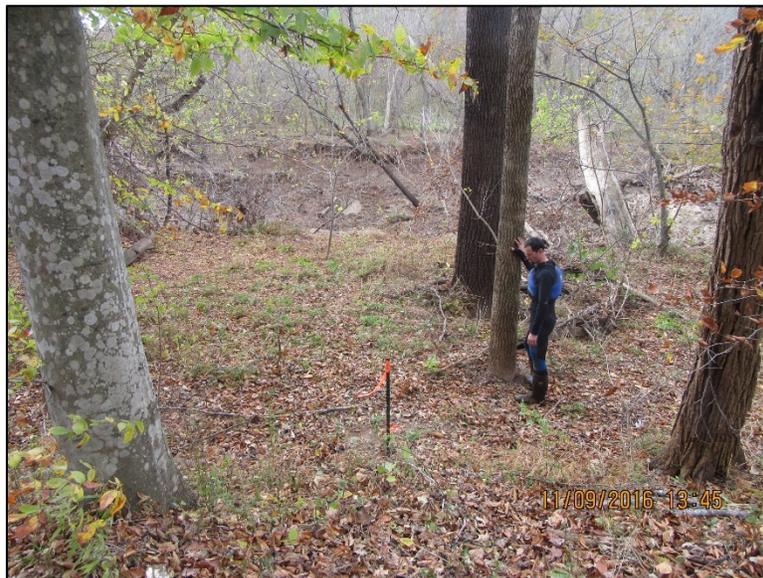


Photo 6-5

Location, Orientation: XS 6, Right bank looking left

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 12:45 PM

Description: View looking at the right bank pin from its right side



Photo 6-6

Location, Orientation: XS 6, East toward the right bank pin location

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 12:45 PM

Description: View looking at the right bank pin from the top of bank.



Photo 6-7

Location, Orientation: XS 6, Looking downstream (north)

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 12:47 PM

Description: View looking downstream at Cross Section 6 from an upstream position



Photo 6-8

Location, Orientation: XS 6, looking south (upstream) toward XS 6

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 12:49 PM

Description: View looking upstream at Cross Section 6 from a downstream position



Photo 6-9 (combined image)
Location, Orientation: XS 6, Right Bank Panorama
Permit Number: JPA #15-1551
Wetland Data Sheet Reference: n/a
11/9/16, 12:50 PM
Description: Panoramic view of channel from right bank position.

Cross Section 7

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.997204	-79.860491
Right Bank	36.997218	-79.859878

Description: Cross Section 7 was located approximately 450 feet downstream of the Power Dam Road bridge. Vehicular access was gained via farm field roads on treatment plant property. The cross section was bounded on the left bank by forest and on the right bank by a narrow band of trees along the top of bank with agricultural fields just beyond. This section had mature woody vegetation to within one to two feet of the baseflow water surface elevation. The water surface width at this section had significantly widened (to more than 50 feet) from approximately 10-ft at Cross Section 5 and 20-ft at Cross Section 6. Banks were relatively stable, with the cut bank located on river left. Fine sediment released from behind the dam had buried bed features and filled the thalweg, resulting in little variation in flow depth across the section. Recent sandy deposits were also visible along the banks. Woody debris along the right bank had trapped sediment resulting in the formation of a 10-15-ft wide side channel bar. These side channel deposits extended approximately two feet above the observed water surface at the time of monitoring.

The instrument setup for this cross section was at the right bank (HI = 4.81 ft). The cross section plot is on Sheet 7 of Appendix B, and the thalweg plot is on Sheet 7 of Appendix C. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.



Photo 7-1

Location, Orientation: XS 7, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:01 PM

Description: View looking upstream from the middle of Cross Section 7

Woody Debris: 30



Photo 7-2

Location, Orientation: XS 7, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:08 PM

Description: View looking downstream from the middle of Cross Section 7

Woody Debris: 12



Photo 7-3

Location, Orientation: XS 7, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:02 PM

Description: View looking left from the middle of Cross Section 7

Vegetation: 70% herbaceous cover, few trees



Photo 7-4

Location, Orientation: XS 7, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:08 PM

Description: View looking right from the middle of Cross Section 7

Vegetation: 30% herbaceous plants, trees on top of bank



Photo 7-5

Location, Orientation: XS 7, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:27 PM

Description: View looking downstream at Cross Section 7 from an upstream position



Photo 7-6

Location, Orientation: XS 7, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:28 PM

Description: View looking upstream at Cross Section 7 from a downstream position



Photo 7-7

Location, Orientation: XS 7, Bed Material

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:10 PM

Description: Bed material at Cross Section 7 was almost entirely **silt**



Photo 7-8

Location, Orientation: XS 7, Tributary

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 3:24 PM

Description: View of tributary coming in just downstream of Cross Section 7

Cross Section 8

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.998831	-79.856019
Right Bank	36.998555	-79.856062

Description: Cross Section 8 was located approximately 2,000 feet downstream of the dam, or 1,400 feet downstream of Cross Section 7, due north of the existing Town of Rocky Mount Sewage Treatment Plant. Vehicular access was gained via farm field roads on treatment plant property. The cross section was bounded on the left bank by forest and on the right bank by a narrow band of trees along the top of bank with agricultural fields just beyond. This section had mature woody vegetation to within one foot of the baseflow water surface elevation. The water surface width at this section was consistent with that seen at Cross Section 7, but no side channel bars or recent deposits of sediment were visible above the observed water surface elevation. Banks were relatively stable due to good coverage by woody root structure. Fine sediment released from behind the dam had buried bed features and filled the thalweg, resulting in little variation in flow depth across the section.

The instrument setup for this cross section was at the right bank (HI = 3.72 ft). The cross section plot is on Sheet 8 of Appendix B. No thalweg survey was performed at this cross section due to the uniform flow depth in the upstream and downstream directions and poor thalweg formation. Local scour pockets were observed only around isolated pieces of woody debris. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.

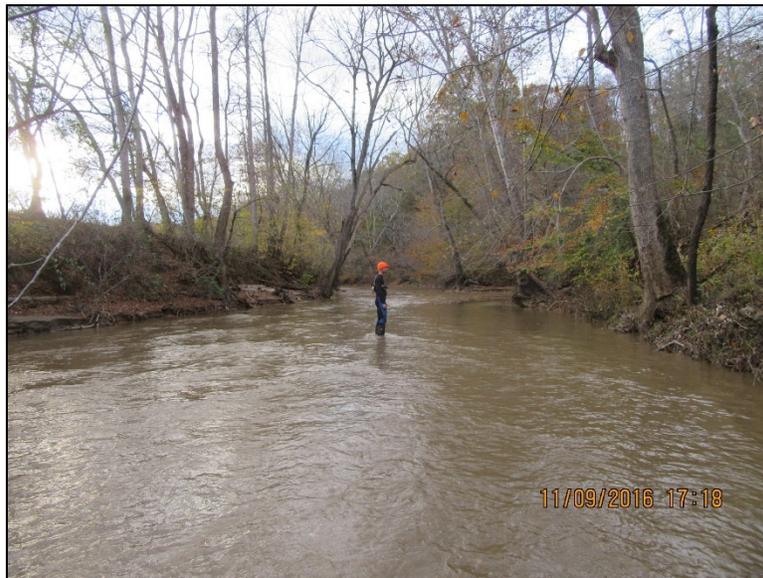


Photo 8-1

Location, Orientation: XS 8, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:18 PM

Description: View looking upstream from the middle of Cross Section 8
Woody Debris: 10-15



Photo 8-2

Location, Orientation: XS 8, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:19 PM

Description: View looking downstream from the middle of Cross Section 8

Woody Debris: 10-15



Photo 8-3

Location, Orientation: XS 8, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:18 PM

Description: View looking left from the middle of Cross Section 8

Vegetation: 60% herbaceous cover, small trees



Photo 8-4

Location, Orientation: XS 8, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:18 PM

Description: View looking right from the middle of Cross Section 8

Vegetation: 30% herbaceous plants, trees

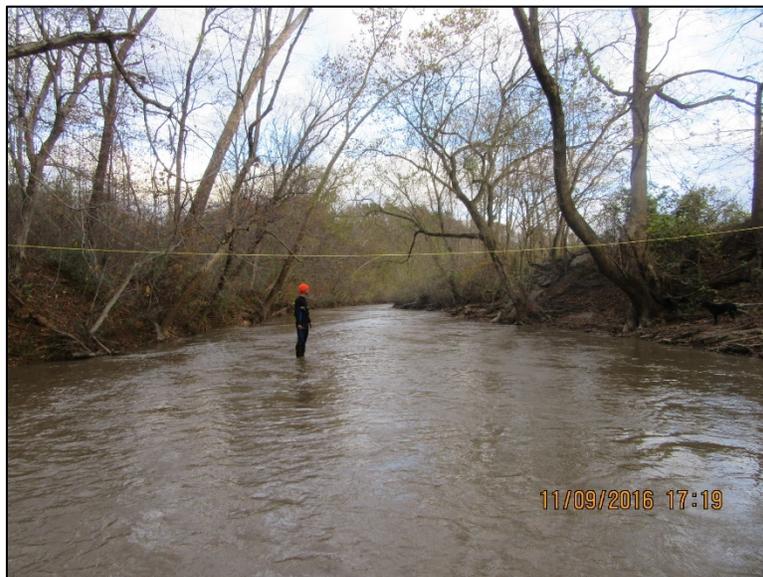


Photo 8-5

Location, Orientation: XS 8, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:19 PM

Description: View looking downstream at Cross Section 8 from an upstream position



Photo 8-6

Location, Orientation: XS 8, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:21 PM

Description: View looking upstream at Cross Section 8 from a downstream position



Photo 8-7

Location, Orientation: XS 8, Bed Material

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:22 PM

Description: Bed material at Cross Section 8 was almost entirely silt

Cross Section 9

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.995239	-79.856860
Right Bank	36.995536	-79.856751

Description: Cross Section 9 was located approximately 1.0 mi downstream of the dam, or 3,300 feet downstream of Cross Section 8. The section was located at the southwest corner of the field at the downstream boundary of sewage treatment plant property, just before a sharp left meander. Vehicular access was gained via farm field roads on treatment plant property.

The cross section was bounded on both banks by a narrow band of trees along the top of bank with agricultural fields just beyond. Woody root structure made the steep banks relatively stable, despite significant incision (~14-ft bank heights). The water surface width at this section was consistent with that seen at Cross Section 8. Side channel bars composed of silty sand deposits were seen at or just above the observed water surface, with material slightly finer in texture than that seen in upstream sections. Banks were relatively stable due to good coverage by woody root structure. Fine sediment had buried bed features and filled the thalweg, resulting in little variation in flow depth across the section.

The instrument setup for this cross section was at the right bank (HI = 5.69 ft). The cross section plot is on Sheet 9 of Appendix B. No thalweg survey was performed at this cross section, but a consistent flow depth of 2.0 ft was observed upstream and downstream of the section. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments.



Photo 9-1

Location, Orientation: XS 9, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 5:21 PM

Description: View looking upstream from the middle of Cross Section 9
Woody Debris: 10-15



Photo 9-2

Location, Orientation: XS 9, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 5:18 PM

Description: View looking downstream from the middle of Cross Section 9

Woody Debris: 10-15



Photo 9-3

Location, Orientation: XS 9, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 4:54 PM

Description: View looking left from the middle of Cross Section 9

Vegetation: 60% herbaceous cover with small trees on top of bank



Photo 9-4

Location, Orientation: XS 9, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 5:14 PM

Description: View looking right from the middle of Cross Section 9

Vegetation: 50% herbaceous cover on bank (mainly upper portion)

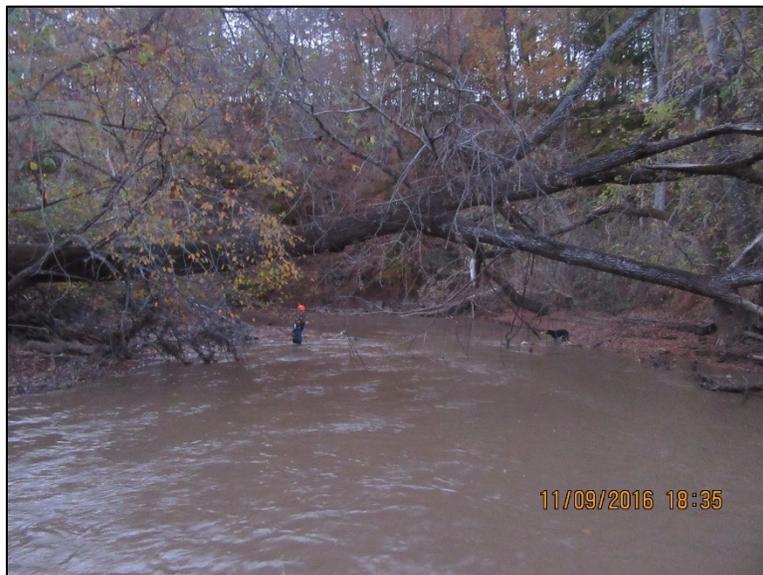


Photo 9-5

Location, Orientation: XS 9, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 5:35 PM

Description: View looking downstream at Cross Section 9 from an upstream position



Photo 9-6

Location, Orientation: XS 9, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/9/16, 5:22 PM

Description: View looking upstream at Cross Section 9 from a downstream position

Cross Section 10

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.990961	-79.850516
Right Bank	36.990694	-79.850709

Description: Cross Section 10 was located approximately 1.5 mi downstream of the dam, or 2,700 feet downstream of Cross Section 9, east of Power Dam Road and north of the power line easement-accessed via vehicle from Hudson Farm Lane. The section was flanked by fields on both sides, with a narrow band of trees along the tops of bank. Mature trees dotted the banks down to the edge of the observed water surface and root structure afforded good bank stability despite steep slopes and an incised section (~12-ft bank height). The water surface width at this section was consistent with that seen at Cross Section 9. Side channel bars composed of silty sand deposits were seen at or just above the observed water surface, with material slightly finer in texture than that seen in upstream sections. Fine sediment had buried bed features and filled the thalweg at the section location, but investigation of conditions upstream and downstream revealed a narrow band of exposed gravel (5-10 feet wide) approximately 50 feet upstream of the cross section in an area of local scour created by woody debris. This allowed observation/approximation of the depth of deposited fine sediment – estimated at 1.0 ft upstream and 2.5 feet downstream of the section.

The instrument setup for this cross section was at the left bank (HI = 5.31 ft). The cross section plot is on Sheet 10 of Appendix B. No thalweg survey was performed at this cross section due to the observation of largely uniform flow depth and unconsolidated bed material. However, as noted above, local scour holes were present. Approximately 30-40 feet downstream of the cross section wading was precluded by deep (>2 ft) silty deposits. No pebble count was taken at this location due the uniform fine-grained (sandy) nature of bed sediments. The small gravel (~1-in diameter) area was not representative of the overall bed conditions.

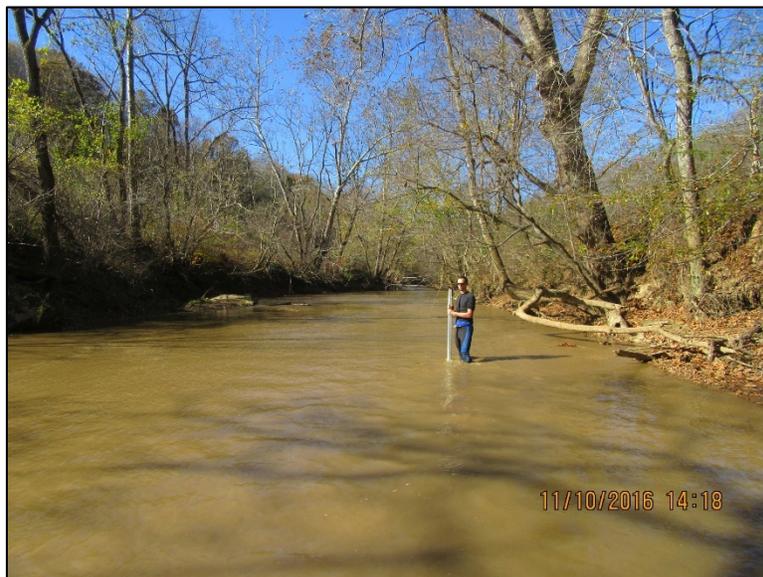


Photo 10-1

Location, Orientation: XS 10, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 1:18 PM

Description: View looking upstream from the middle of Cross Section 10

Woody Debris: 5



Photo 10-2

Location, Orientation: XS 10, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 1:19 PM

Description: View looking downstream from the middle of Cross Section 10

Woody Debris: 5



Photo 10-3

Location, Orientation: XS 10, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 1:18 PM

Description: View looking left from the middle of Cross Section 10

Vegetation: 70% herbaceous cover, trees



Photo 10-4

Location, Orientation: XS 10, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 1:18 PM

Description: View looking right from the middle of Cross Section 10

Vegetation: 70% herbaceous cover, some trees higher on bank

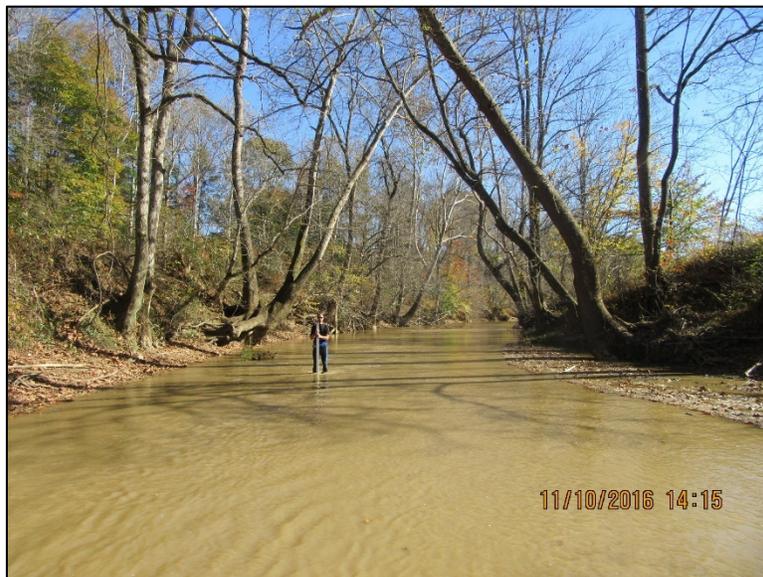


Photo 10-5

Location, Orientation: XS 10, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 1:15 PM

Description: View looking downstream at Cross Section 10 from an upstream position



Photo 10-6

Location, Orientation: XS 10, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 1:17 PM

Description: View looking upstream at Cross Section 10 from a downstream position

Cross Section 11

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	36.991708	-79.845110
Right Bank	36.991595	-79.845424

Description: Cross Section 11 was located approximately 2.6 mi downstream of the dam, or 1.1 mi downstream of Cross Section 10, north of the power line easement and approximately 1/3rd mi east of Cross Section 10 (as the crow flies) – accessed via vehicle from Hudson Farm Lane. The section was flanked by fields on the left bank and dense forest on the right bank, with a narrow band of trees along the left top of bank. Mature trees grew along the banks to within a few feet of the observed water surface elevation. Banks were stable and slopes much more gradual than other cross sections (generally 2:1 or less). Top of bank height on the right bank was significantly lower than in previous sections (approx. 5 ft). The water surface width at this section was consistent with that seen at Cross Section 10. Thin unconsolidated silty deposits a few inches thick were observed along the edges of water. Bed material features were undisturbed. Embeddedness was estimated at approximately 50% (excluding side-channel silt deposit areas), with gravel particles well-embedded in finer sand and gravel material. The section was taken at the downstream end of a riffle feature.

The instrument setup for this cross section was at the left bank (HI = 5.24 ft). The cross section plot is on Sheet 11 of Appendix B and the thalweg plot is on Sheet 7 of Appendix C. Pebble count information is summarized on Sheet 1 of Appendix D and indicates a gravel-dominated bed composition.



Photo 11-1

Location, Orientation: XS 11, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 2:39 PM

Description: View looking upstream from the middle of Cross Section 11

Woody Debris: 15



Photo 11-2

Location, Orientation: XS 11, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 2:51 PM

Description: View looking downstream from the middle of Cross Section 11

Woody Debris: 15



Photo 11-3

Location, Orientation: XS 11, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 2:41 PM

Description: View looking left from the middle of Cross Section 11

Vegetation: 30% herbaceous cover, trees



Photo 11-4

Location, Orientation: XS 11, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 2:41 PM

Description: View looking right from the middle of Cross Section 11

Vegetation: 60% herbaceous cover and small trees going up slope, bamboo/forest at bankfull



Photo 11-5

Location, Orientation: XS 11, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 2:53 PM

Description: View looking downstream at Cross Section 11 from an upstream position



Photo 11-6

Location, Orientation: XS 11, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 3:04 PM

Description: View looking upstream at Cross Section 11 from a downstream position

Cross Section 12

<i>Location</i>	<i>Latitude</i>	<i>Longitude</i>
Left Bank	37.002258	-79.825398
Right Bank	37.002247	-79.825677

Description: Cross Section 12 was located approximately 5.2 mi downstream of the dam, or 2.6 mi downstream of Cross Section 11, approximately 300 feet downstream of the Chestnut Hill Road bridge. The section was accessed by parking along the road and walking through the private property on the right bank (with permission). The section was flanked by yard/fields on the right bank (with a narrow band of trees at the top of bank) and forest on the left bank. Banks were steep (~1:1), but stable due to stability afforded by mature woody vegetation and root mass. The section was taken at the head of a riffle feature. The top of bank height was greater than the that seen in Cross Section 11, but generally less than other sections downstream of the dam. The water surface width was approximately 50% wider than in previous sections – partially due to the larger watershed area which includes Power Mill Creek. No fine sediment deposition was observed at the cross section, only a high washload indicated by the high turbidity despite little rain prior to the monitoring period. Embeddedness was estimated at approximately 50%, with gravel particles well embedded in finer sand and gravel material.

The instrument setup for this cross section was at the right bank (HI = 5.34 ft). The cross section plot is on Sheet 12 of Appendix B and the thalweg plot is on Sheet 8 of Appendix C. Pebble count information is summarized on Sheet 2 of Appendix D and indicates a gravel-dominated bed composition.



Photo 12-1

Location, Orientation: XS 12, Looking Upstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 10:25 AM

Description: View looking upstream from the middle of Cross Section 12

Woody Debris: 5



Photo 12-2

Location, Orientation: XS 12, Looking Downstream

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 10:35 AM

Description: View looking downstream from the middle of Cross Section 12

Woody Debris: 5



Photo 12-3

Location, Orientation: XS 12, Left Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 10:35 AM

Description: View looking left from the middle of Cross Section 12

Vegetation: 70% herbaceous cover, trees



Photo 12-4

Location, Orientation: XS 12, Right Bank

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 10:35 AM

Description: View looking right from the middle of Cross Section 12

Vegetation: 70% herbaceous cover, trees at top of bank

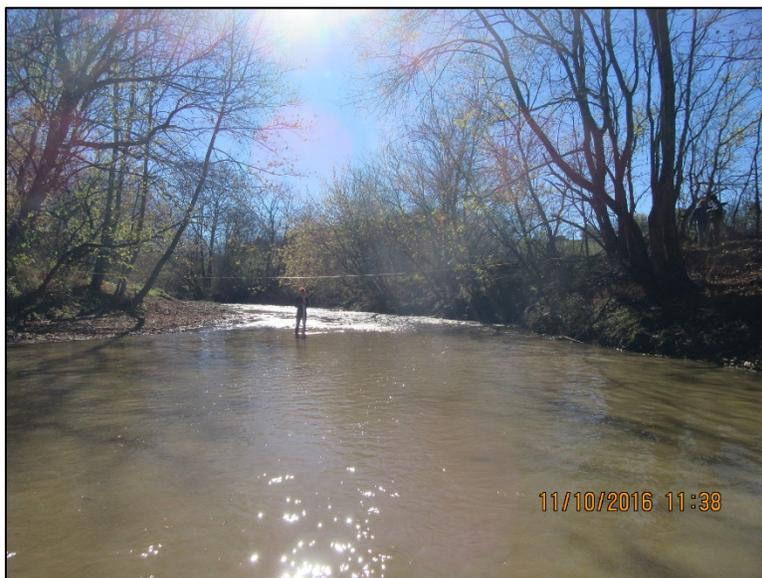


Photo 12-5

Location, Orientation: XS 12, Upstream looking down

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

11/10/16, 10:38 AM

Description: View looking downstream at Cross Section 12 from an upstream position



Photo 12-6

Location, Orientation: XS 12, Downstream looking up

Permit Number: JPA #15-1551

Wetland Data Sheet Reference: n/a

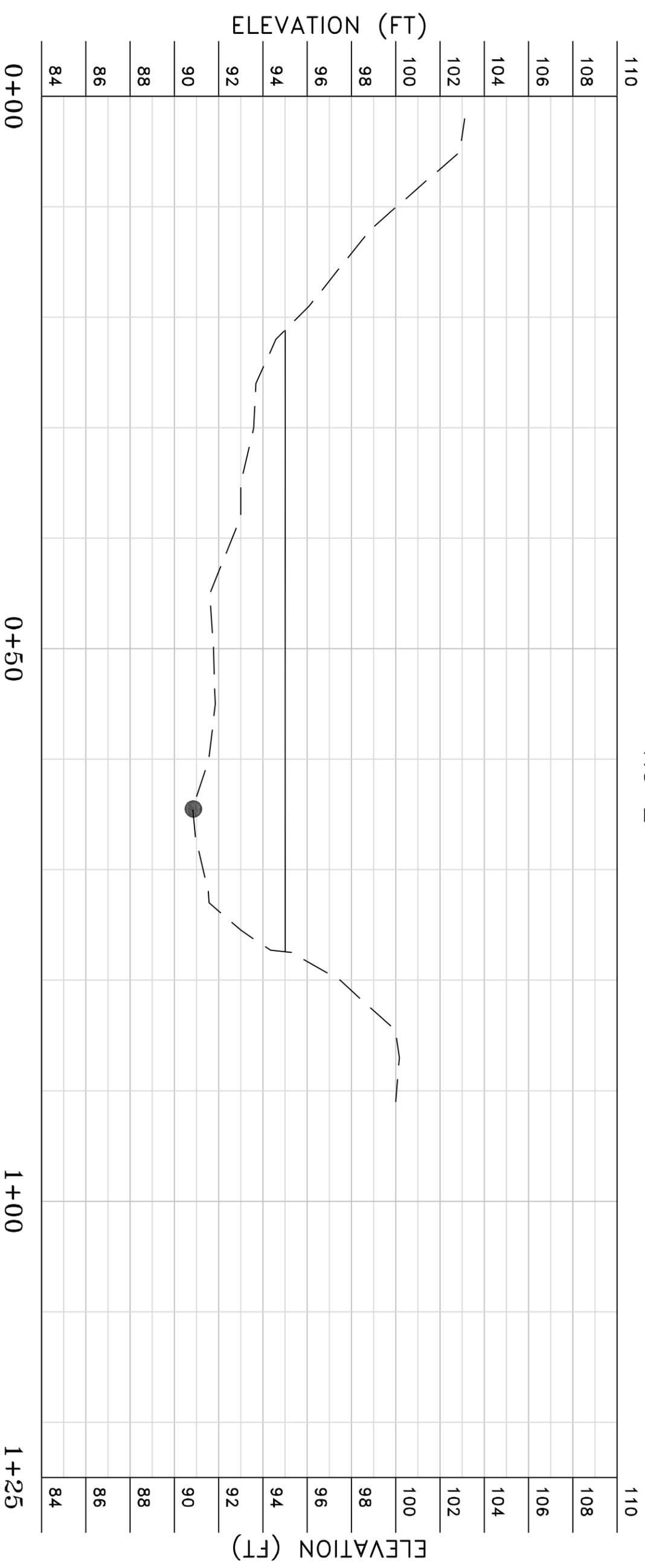
11/10/16, 10:39 AM

Description: View looking upstream at Cross Section 12 from a downstream position

Appendix B

(Elevations given in the following plots are all taken relative to the adjacent end pin location corresponding to the subject cross section. An assumed end pin elevation of 100 ft was used for all cross sections.)

	EXISTING GROUND
	WATER SURFACE
	THALWEG



PROFILE SCALE:
 HORIZ: 1" = 10'
 VERT: 1" = 5'



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Post Construction XS 2

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No.	Date	Description		

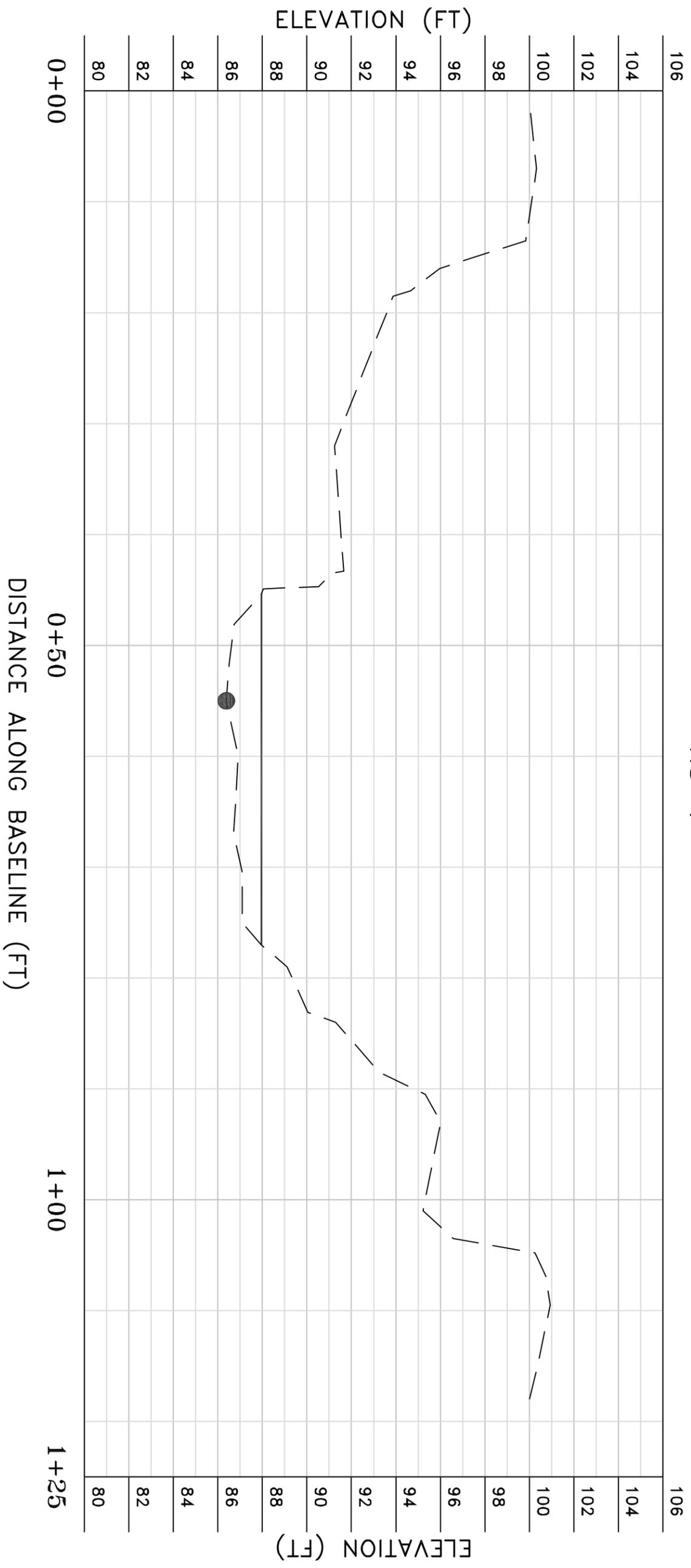
DATE: NOVEMBER, 2016 SCALE: AS NOTED

Boundary and Topo Source:
 WSSN and Orange Digital Data

Design	Draft	Approved
AMC	AMC	NAS

Sheet #
 2 of 11

Complete File Name:
 11/01/2016 09:58:00 AM



PROFILE SCALE:
 HORIZ: 1"=10'
 VERT: 1"=5'

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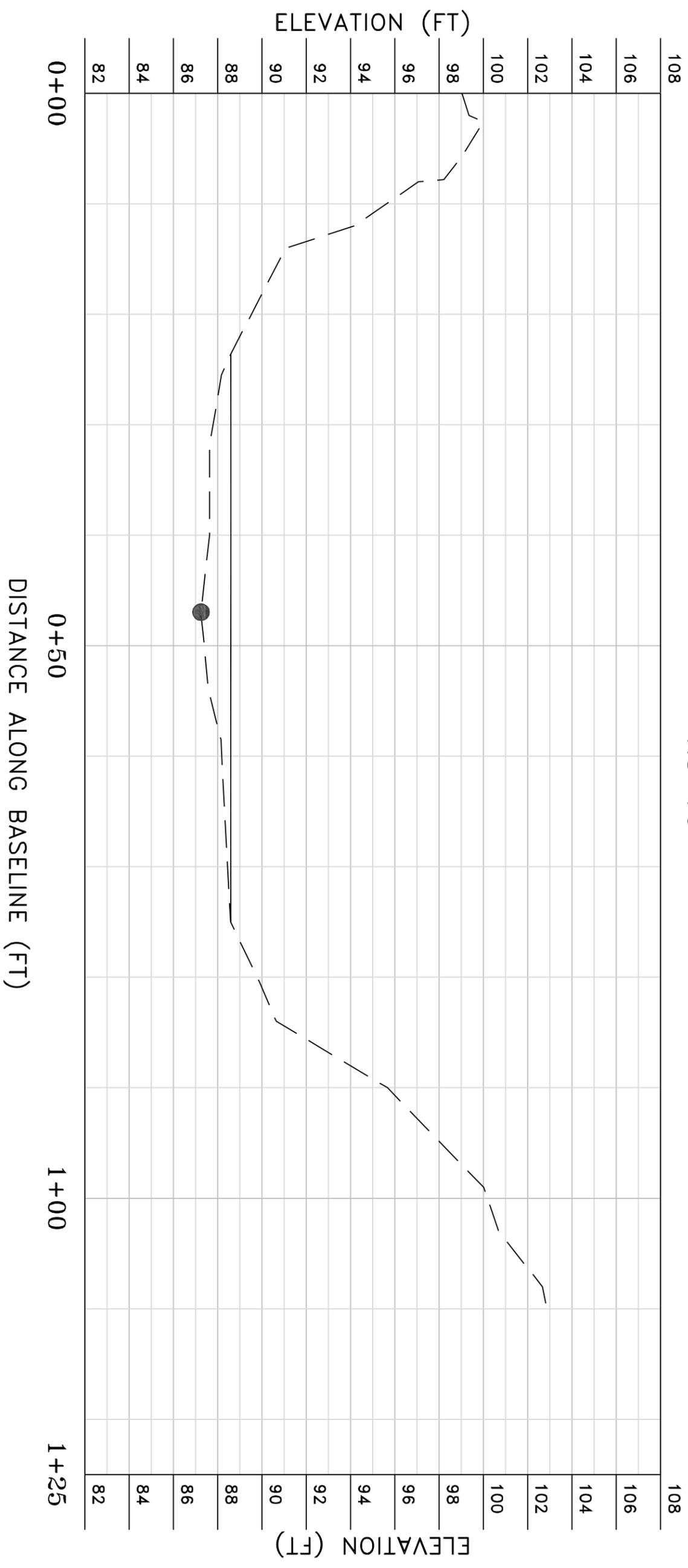
REVISIONS				Rev. By	App. By
No.	Date	Description			

DATE: NOVEMBER, 2016 SCALE: AS NOTED

Boundary and Topo Source:
 WSSS and Orange Digital Data

Design	Draft	Approved
AMC	AMC	NAS

Sheet #
 4 of 11
 Computer File Name:
 11/09/2016 09:50:00 AM



XS 10

PROFILE SCALE:
 HORIZ: 1" = 10'
 VERT: 1" = 5'

DISTANCE ALONG BASELINE (FT)

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DATE: NOVEMBER, 2016 SCALE: AS NOTED

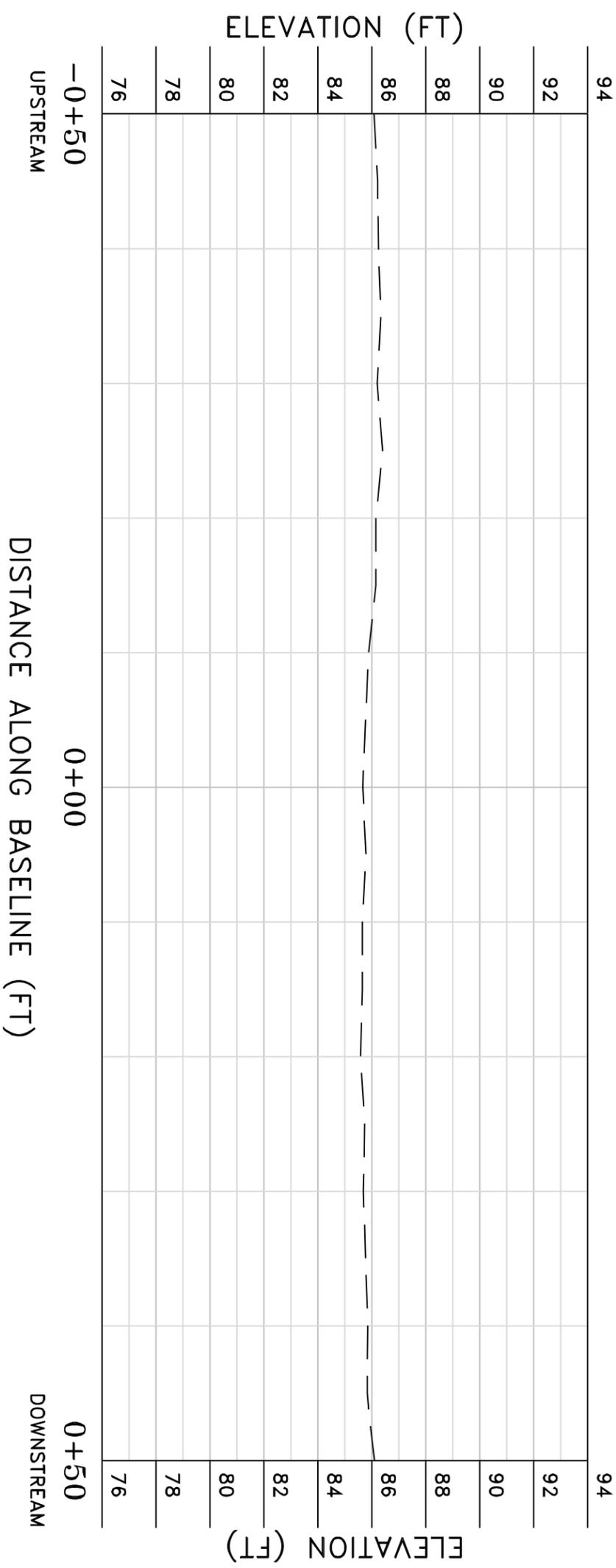
Boundary and Topo Source: WSSS and Orange Digital Data			
Design	Draft	Approved	
AMC	AMC	NAS	

Appendix C

(Elevations given in the following plots are all taken relative to the adjacent end pin location corresponding to the subject cross section. An assumed end pin elevation of 100 ft was used for all cross sections.)

— — — — —
EXISTING GROUND

Thalweg XS 11



PROFILE SCALE:
 HORIZ: 1"=10'
 VERT: 1"=5'
 (ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)

REVISIONS			Rev. By	App. By
No.	Date	Description		

DATE: NOVEMBER, 2016 SCALE: AS NOTED

Boundary and Logo Source: WSS and Orange Digital Data			
Design	Draft	Approved	
AMC	AMC	NAS	

Sheet #
7 of 8

Pigg River Dam Removal Restoration - Monitoring
 Rocky Mount, Virginia

Post Construction Thalweg XS 11

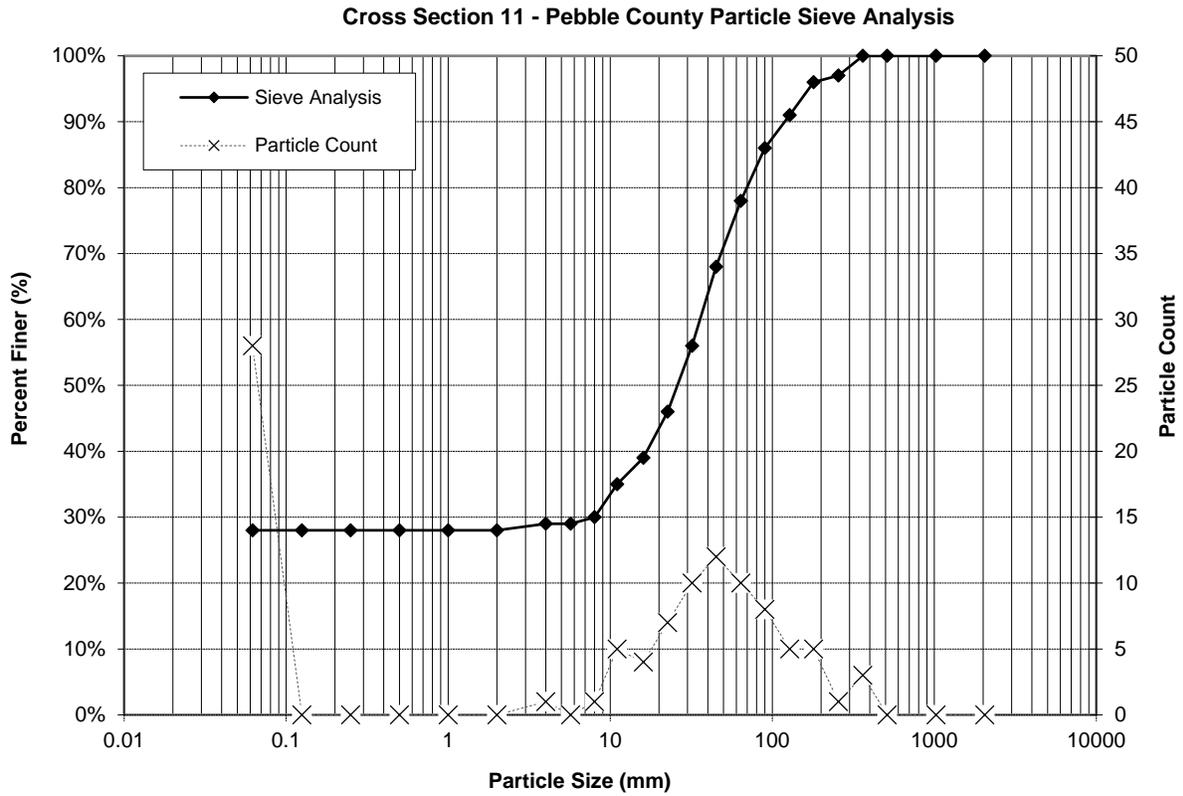
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Appendix D

RIFFLE CROSS SECTION PEBBLE COUNT DATA WITH PARTICLE SIZE ANALYSIS							
Project Name: Pigg River Monitoring (WSSI# 22906.01)							
Stream ID & XS Station: XS11					Date: Nov 2016		
Evaluators: NAS, AMC					FORVA		
Pebble Count Data							
		Particle		Particle Count	ITEM %	CUM %	
	Description	Size (mm)		Total			Particle Size Analysis
	Silt/Clay	0	0.062	28	28%	28%	
SAND	Very Fine	0.062	0.125	0	0%	28%	Silt/Clay (%) 28%
	Fine	0.125	0.25	0	0%	28%	Sand (%) 0%
	Medium	0.25	0.5	0	0%	28%	Gravel (%) 50%
	Coarse	0.5	1.0	0	0%	28%	Cobble (%) 19%
	Very Coarse	1.0	2.0	0	0%	28%	Boulder (%) 3%
GRAVEL	Very Fine	2.0	4.0	1	1%	29%	Bedrock (%) 0%
	Fine	4.0	5.7	0	0%	29%	
	Fine	5.7	8.0	1	1%	30%	D16 (mm) S/C
	Medium	8.0	11.03	5	5%	35%	D35 (mm) 11.03
	Medium	11.3	16.0	4	4%	39%	D50 (mm) 26.36
	Coarse	16.0	22.6	7	7%	46%	D84 (mm) 83.50
	Coarse	22.6	32.0	10	10%	56%	D95 (mm) 169.60
	Very Coarse	32	45	12	12%	68%	D100 (mm) 335.0
	Very Coarse	45	64	10	10%	78%	
COBBLE	Small	64	90	8	8%	86%	
	Small	90	128	5	5%	91%	
	Large	128	180	5	5%	96%	
	Large	180	256	1	1%	97%	
BOULDER	Small	256	362	3	3%	100%	
	Small	362	512	0	0%	100%	
	Medium	512	1024	0	0%	100%	
	Large - Vry Large	1024	2048	0	0%	100%	
	Bedrock	2048		0	0%	100%	
		Total Particles		100			



RIFFLE CROSS SECTION PEBBLE COUNT DATA WITH PARTICLE SIZE ANALYSIS						
Project Name: Pigg River Monitoring (WSSI# 22906.01)						
Stream ID & XS Station: XS12					Date: Nov 2016	
Evaluators: NAS, AMC					FORVA	
Pebble Count Data						
Particle				Particle Count	ITEM %	CUM %
Description	Size (mm)		Total			
	Silt/Clay	0	0.062	12	12%	12%
SAND	Very Fine	0.062	0.125	0	0%	12%
	Fine	0.125	0.25	0	0%	12%
	Medium	0.25	0.5	0	0%	12%
	Coarse	0.5	1.0	0	0%	12%
	Very Coarse	1.0	2.0	0	0%	12%
GRAVEL	Very Fine	2.0	4.0	0	0%	12%
	Fine	4.0	5.7	0	0%	12%
	Fine	5.7	8.0	0	0%	12%
	Medium	8.0	11.03	3	3%	15%
	Medium	11.3	16.0	5	5%	20%
	Coarse	16.0	22.6	5	5%	25%
	Coarse	22.6	32.0	19	19%	44%
	Very Coarse	32	45	19	19%	63%
BOULDER	Very Coarse	45	64	14	14%	77%
	Small	64	90	15	15%	92%
	Small	90	128	4	4%	96%
	Large	128	180	3	3%	99%
BOULDER	Large	180	256	1	1%	100%
	Small	256	362	0	0%	100%
	Small	362	512	0	0%	100%
	Medium	512	1024	0	0%	100%
BOULDER	Large - Vry Large	1024	2048	0	0%	100%
	Bedrock	2048		0	0%	100%
Total Particles				100		

Particle Size Analysis	
Silt/Clay (%)	12%
Sand (%)	0%
Gravel (%)	65%
Cobble (%)	23%
Boulder (%)	0%
Bedrock (%)	0%
D16 (mm)	12.02
D35 (mm)	27.55
D50 (mm)	36.11
D84 (mm)	76.13
D95 (mm)	118.50
D100 (mm)	200.0

