# Baseline Assessment – Stream Attributes

# Reach S-DD4 (Pipeline ROW)
# Intermittent
# Spread I
# Pittsylvania County, Virginia

| Data | Included |
|---|---|
| Photos | ✓ |
| SWVM Form | ✓ |
| FCI Calculator and HGM Form | N/A –slope less than 4% |
| RBP Physical Characteristics Form | ✓ |
| Water Quality Data | ✓ |
| RBP Habitat Form | ✓ |
| RBP Benthic Form | ✓ |
| Benthic Identification Sheet | N/A – Lack of habitat |
| Wolman Pebble Count | ✓ |
| RiverMorph Data Sheet | ✓ |
| USM Form (Virginia Only) | ✓ |
| Longitudinal Profile and Cross Sections | ✓ |

# Spread I Stream S-DD4 (Pipeline ROW) Pittsylvania County

Photo Type: DS VIEW
Location, Orientation, Photographer Initials: Downstream view of ROW looking E, CB/BH

# Spread I Stream S-DD4 (Pipeline ROW) Pittsylvania County

Photo Type: US VIEW
Location, Orientation, Photographer Initials: Upstream view of ROW looking W, CB/BH

# Spread I Stream S-DD4 (Pipeline ROW) Pittsylvania County

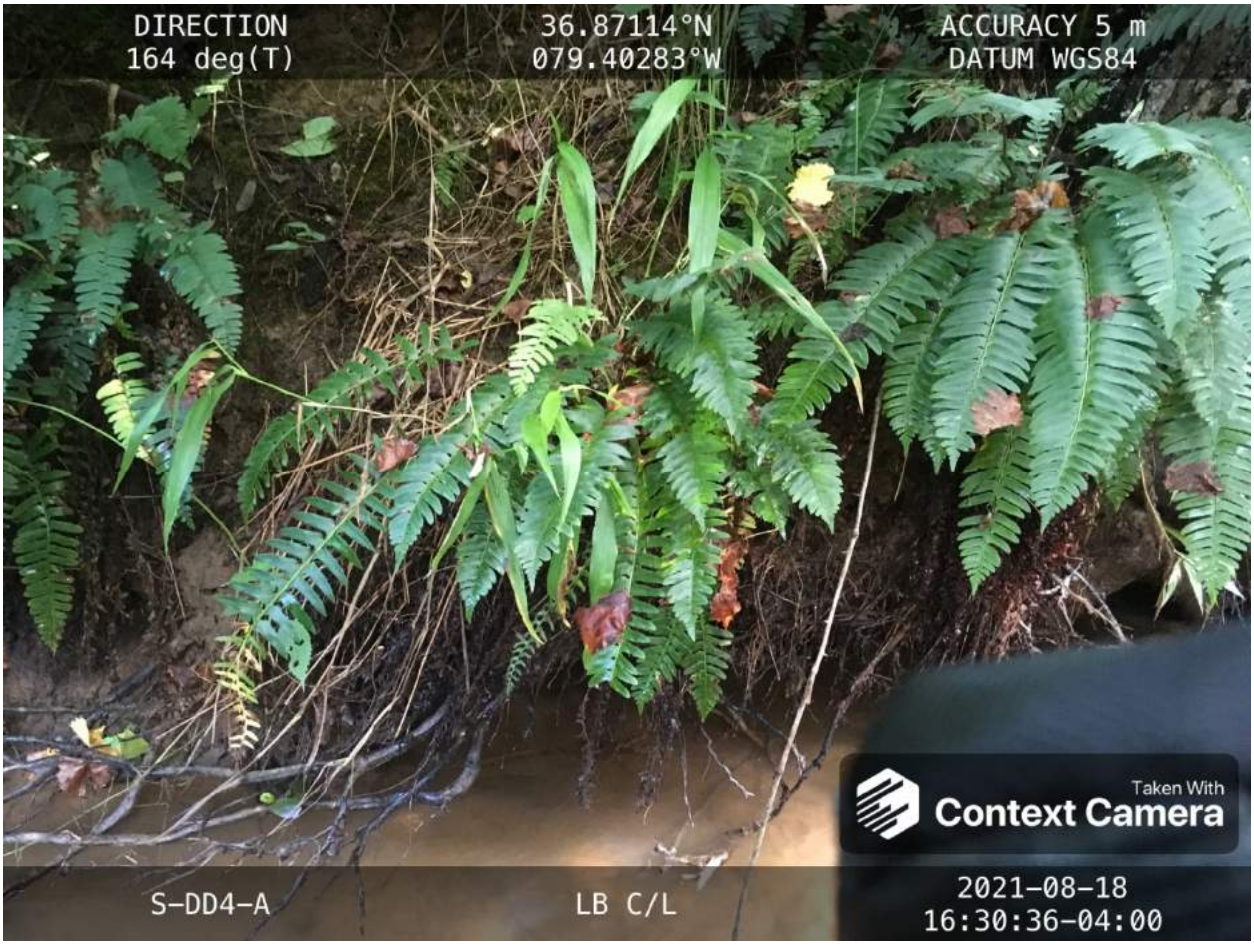



Photo Type: LB CL
Location, Orientation, Photographer Initials: Standing on LB looking at RB along pipe centerline looking N, CB/BH

# Spread I Stream S-DD4 (Pipeline ROW) Pittsylvania County

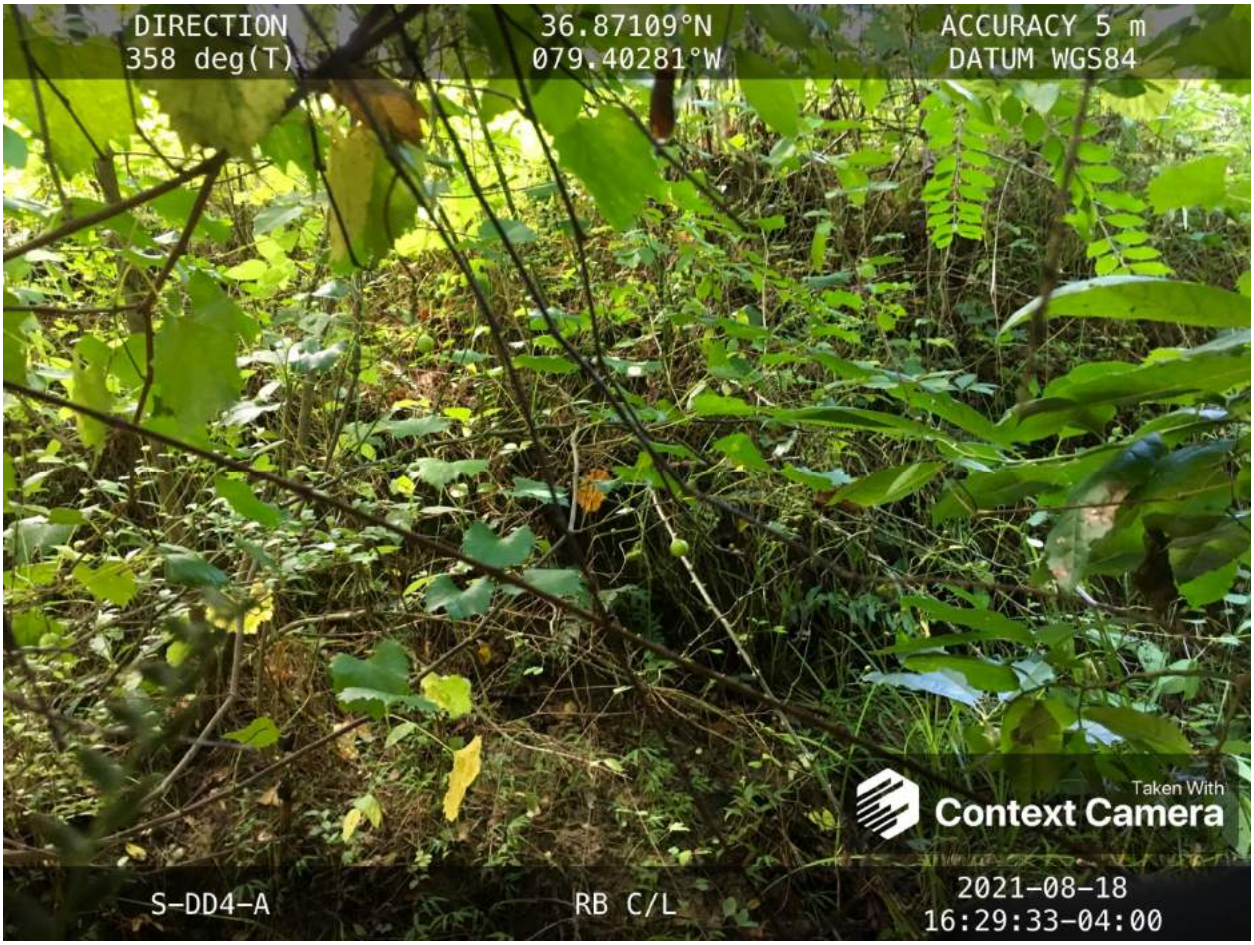



Photo Type: RB CL
Location, Orientation, Photographer Initials: Standing on RB looking at LB along pipe centerline looking S, CB/BH

# Spread I Stream S-DD4 (Pipeline ROW) Pittsylvania County

Photo Type: DS COND
Location, Orientation, Photographer Initials: Downstream conditions outside of ROW looking E, CB/BH

Pending lab processing and identification for WVSCI score

West Virginia Stream and Wetland Valuation Metric (SWVM)
Version 2.1, September 2017

| USACE FILE NO./ Project Name: (v2.1, Sept 2015) | Mountain Valley Pipeline | IMPACT COORDINATES: (in Decimal Degrees) | Lat. | 36.871478 | Lon. | -79.403904 | WEATHER: | 30% Cloud Cover | DATE: | 8/18/2021 |
|---|---|---|---|---|---|---|---|---|---|---|
| IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments) | S-DD4; 24.71 Acres | MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size {acreage}, unaltered or impairments) | | | | | | | Comments: | |
| STREAM IMPACT LENGTH: | 147 | FORM OF MITIGATION: | RESTORATION (Levels I-III) | MIT COORDINATES: (in Decimal Degrees) | Lat. | | Lon. | | PRECIPITATION PAST 48 HRS: | Yes | Mitigation Length: | |

| Column No. 1- Impact Existing Condition (Debit) | | | | Column No. 2- Mitigation Existing Condition - Baseline (Credit) | | | | Column No. 3- Mitigation Projected at Five Years Post Completion (Credit) | | | | Column No. 4- Mitigation Projected at Ten Years Post Completion (Credit) | | | | Column No. 5- Mitigation Projected at Maturity (Credit) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stream Classification: | Intermittent | | | Stream Classification: | | | | Stream Classification: | 0 | | | Stream Classification: | 0 | | | Stream Classification: | 0 | | |
| Percent Stream Channel Slope | 1.55 | | | Percent Stream Channel Slope | | | | Percent Stream Channel Slope | 0 | | | Percent Stream Channel Slope | 0 | | | Percent Stream Channel Slope | 0 | | |
| HGM Score (attach data forms): | | | | HGM Score (attach data forms): | | | | HGM Score (attach data forms): | | | | HGM Score (attach data forms): | | | | HGM Score (attach data forms): | | | |
| | | | Average | | | | Average | | | | Average | | | | Average | | | | Average |
| Hydrology | | | | Hydrology | | | | Hydrology | | | | Hydrology | | | | Hydrology | | | |
| Biogeochemical Cycling | | | 0 | Biogeochemical Cycling | | | 0 | Biogeochemical Cycling | | | 0 | Biogeochemical Cycling | | | 0 | Biogeochemical Cycling | | | 0 |
| Habitat | | | | Habitat | | | | Habitat | | | | Habitat | | | | Habitat | | | |
| PART I - Physical, Chemical and Biological Indicators | | | | PART I - Physical, Chemical and Biological Indicators | | | | PART I - Physical, Chemical and Biological Indicators | | | | PART I - Physical, Chemical and Biological Indicators | | | | PART I - Physical, Chemical and Biological Indicators | | | |
| | Points Scale | Range | Site Score | | Points Scale | Range | Site Score | | Points Scale | Range | Site Score | | Points Scale | Range | Site Score | | Points Scale | Range | Site Score |
| PHYSICAL INDICATOR (Applies to all streams classifications) | | | | PHYSICAL INDICATOR (Applies to all streams classifications) | | | | PHYSICAL INDICATOR (Applies to all streams classifications) | | | | PHYSICAL INDICATOR (Applies to all streams classifications) | | | | PHYSICAL INDICATOR (Applies to all streams classifications) | | | |
| USEPA RBP (High Gradient Data Sheet) | | | | USEPA RBP (Low Gradient Data Sheet) | | | | USEPA RBP (High Gradient Data Sheet) | | | | USEPA RBP (High Gradient Data Sheet) | | | | USEPA RBP (High Gradient Data Sheet) | | | |
| 1. Epifaunal Substrate/Available Cover | 0-20 | 0-1 | 13 | 1. Epifaunal Substrate/Available Cover | 0-20 | 0-1 | | 1. Epifaunal Substrate/Available Cover | 0-20 | 0-1 | | 1. Epifaunal Substrate/Available Cover | 0-20 | 0-1 | | 1. Epifaunal Substrate/Available Cover | 0-20 | 0-1 | |
| 2. Embeddedness | 0-20 | | 1 | 2. Pool Substrate Characterization | 0-20 | | | 2. Embeddedness | 0-20 | | | 2. Embeddedness | 0-20 | | | 2. Embeddedness | 0-20 | | |
| 3. Velocity/ Depth Regime | 0-20 | | 5 | 3. Pool Variability | 0-20 | | | 3. Velocity/ Depth Regime | 0-20 | | | 3. Velocity/ Depth Regime | 0-20 | | | 3. Velocity/ Depth Regime | 0-20 | | |
| 4. Sediment Deposition | 0-20 | | 1 | 4. Sediment Deposition | 0-20 | | | 4. Sediment Deposition | 0-20 | | | 4. Sediment Deposition | 0-20 | | | 4. Sediment Deposition | 0-20 | | |
| 5. Channel Flow Status | 0-20 | | 9 | 5. Channel Flow Status | 0-20 | | | 5. Channel Flow Status | 0-20 | | | 5. Channel Flow Status | 0-20 | | | 5. Channel Flow Status | 0-20 | | |
| 6. Channel Alteration | 0-20 | | 19 | 6. Channel Alteration | 0-20 | | | 6. Channel Alteration | 0-20 | | | 6. Channel Alteration | 0-20 | | | 6. Channel Alteration | 0-20 | | |
| 7. Frequency of Riffles (or bends) | 0-20 | | 6 | 7. Channel Sinuosity | 0-20 | | | 7. Frequency of Riffles (or bends) | 0-20 | | | 7. Frequency of Riffles (or bends) | 0-20 | | | 7. Frequency of Riffles (or bends) | 0-20 | | |
| 8. Bank Stability (LB & RB) | 0-20 | | 14 | 8. Bank Stability (LB & RB) | 0-20 | | | 8. Bank Stability (LB & RB) | 0-20 | | | 8. Bank Stability (LB & RB) | 0-20 | | | 8. Bank Stability (LB & RB) | 0-20 | | |
| 9. Vegetative Protection (LB & RB) | 0-20 | | 9 | 9. Vegetative Protection (LB & RB) | 0-20 | | | 9. Vegetative Protection (LB & RB) | 0-20 | | | 9. Vegetative Protection (LB & RB) | 0-20 | | | 9. Vegetative Protection (LB & RB) | 0-20 | | |
| 10. Riparian Vegetative Zone Width (LB & RB) | 0-20 | | 18 | 10. Riparian Vegetative Zone Width (LB & RB) | 0-20 | | | 10. Riparian Vegetative Zone Width (LB & RB) | 0-20 | | | 10. Riparian Vegetative Zone Width (LB & RB) | 0-20 | | | 10. Riparian Vegetative Zone Width (LB & RB) | 0-20 | | |
| Total RBP Score | Marginal | | 95 | Total RBP Score | Poor | | 0 | Total RBP Score | Poor | | 0 | Total RBP Score | Poor | | 0 | Total RBP Score | Poor | | 0 |
| Sub-Total | | | 0.475 | Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 |
| CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | CHEMICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | |
| WVDEP Water Quality Indicators (General) | | | | WVDEP Water Quality Indicators (General) | | | | WVDEP Water Quality Indicators (General) | | | | WVDEP Water Quality Indicators (General) | | | | WVDEP Water Quality Indicators (General) | | | |
| Specific Conductivity | | | | Specific Conductivity | | | | Specific Conductivity | | | | Specific Conductivity | | | | Specific Conductivity | | | |
| <=99 - 90 points | 0-90 | 0-1 | 65.9 | | 0-90 | 0-1 | | | 0-90 | 0-1 | | | 0-90 | 0-1 | | | 0-90 | 0-1 | |
| pH | | | | pH | | | | pH | | | | pH | | | | pH | | | |
| 6.0-8.0 = 80 points | 0-80 | | 6.41 | | 5-90 | | | | 5-90 | | | | 5-90 | | | | 5-90 | | |
| DO | | | | DO | | | | DO | | | | DO | | | | DO | | | |
| >5.0 = 30 points | 10-30 | | 7.5 | | 10-30 | | | | 10-30 | | | | 10-30 | | | | 10-30 | | |
| Sub-Total | | | 1 | Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 |
| BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | | BIOLOGICAL INDICATOR (Applies to Intermittent and Perennial Streams) | | | |
| WV Stream Condition Index (WVSCI) | | | | WV Stream Condition Index (WVSCI) | | | | WV Stream Condition Index (WVSCI) | | | | WV Stream Condition Index (WVSCI) | | | | WV Stream Condition Index (WVSCI) | | | |
| 0 | 0-100 | 0-1 | | | 0-100 | 0-1 | | | 0-100 | 0-1 | | | 0-100 | 0-1 | | | 0-100 | 0-1 | |
| Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 | Sub-Total | | | 0 |

| PART II - Index and Unit Score | | |
|---|---|---|
| Index | Linear Feet | Unit Score |
| 0.738 | 147 | 108.4125 |

| PART II - Index and Unit Score | | |
|---|---|---|
| Index | Linear Feet | Unit Score |
| 0 | 0 | 0 |

| PART II - Index and Unit Score | | |
|---|---|---|
| Index | Linear Feet | Unit Score |
| 0 | 0 | 0 |

| PART II - Index and Unit Score | | |
|---|---|---|
| Index | Linear Feet | Unit Score |
| 0 | 0 | 0 |

| PART II - Index and Unit Score | | |
|---|---|---|
| Index | Linear Feet | Unit Score |
| 0 | 0 | 0 |

# PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | | |
|---|---|---|
| STREAM NAME S-DD4 | LOCATION Pittsylvania | |
| STATION # _____ RIVERMILE _____ | STREAM CLASS Intermittent | |
| LAT 36.871478 LONG -79.403907 | RIVER BASIN Banister | |
| STORET # | AGENCY VADEQ | |
| INVESTIGATORS CB, BH | | |
| FORM COMPLETED BY CB, BH | DATE 8/18/21 TIME 230 | REASON FOR SURVEY Baseline Assessment |

**WEATHER CONDITIONS**

**Now**

30 %

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

**Past 24 hours**

- ☐
- ☑
- ☐
- ☐ ____%
- ☐

**Has there been a heavy rain in the last 7 days?**

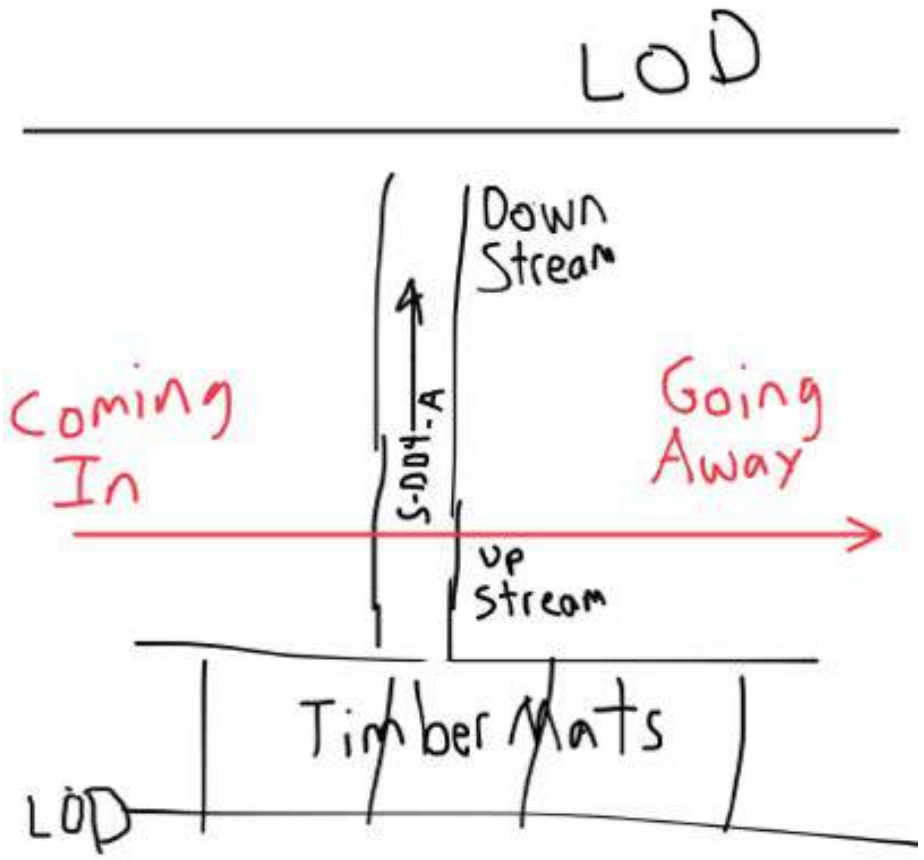
☑ Yes ☐ No

**Air Temperature** 29 $^0$ C

**Other** _____

**SITE LOCATION/MAP**

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




**STREAM CHARACTERIZATION**

**Stream Subsystem**
☐ Perennial ☑ Intermittent ☐ Tidal

**Stream Type**
☐ Coldwater ☑ Warmwater

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

**Catchment Area** _____ km$^2$

# PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

**WATERSHED FEATURES**

**Predominant Surrounding Landuse**
☑ Forest ☐ Commercial
☐ Field/Pasture ☐ Industrial
☐ Agricultural ☐ Other _____
☐ Residential

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

**Local Watershed Erosion**
☐ None ☑ Moderate ☐ Heavy

**RIPARIAN VEGETATION (18 meter buffer)**

**Indicate the dominant type and record the dominant species present**
☐ Trees ☑ Shrubs ☐ Grasses ☐ Herbaceous

**Dominant species present** Blackberry

**INSTREAM FEATURES**

**Estimated Reach Length** 15.2 m

**Estimated Stream Width** 1.22 m

**Sampling Reach Area** 18.6 $m^2$

**Area in $km^2$ ($m^2$x1000)** _____ $km^2$

**Estimated Stream Depth** .15 m

**Surface Velocity (at thalweg)** .82 m/sec

**Canopy Cover**
☐ Partly open ☑ Partly shaded ☐ Shaded

**High Water Mark** .30 m

**Proportion of Reach Represented by Stream Morphology Types**
Riffle 5 % Run 80 %
Pool 15 %

**Channelized** ☐ Yes ☑ No

**Dam Present** ☐ Yes ☑ No

**LARGE WOODY DEBRIS**

**LWD** .93 $m^2$

**Density of LWD** _____ $m^2/km^2$ **(LWD/ reach area)**

**AQUATIC VEGETATION**

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

**Dominant species present** _____

**Portion of the reach with aquatic vegetation** _____%

**WATER QUALITY**

**Temperature** 22.5 $^0$ C

**Specific Conductance** 65.9

**Dissolved Oxygen** 7.50

**pH** 6.41

**Turbidity** _____

**WQ Instrument Used** Ysi

**Water Odors**
☑ Normal/None ☐ Sewage
☐ Petroleum ☐ Chemical
☐ Fishy ☐ Other_____

**Water Surface Oils**
☐ Slick ☐ Sheen ☐ Globs Flecks
☑ None ☐ Other_____

**Turbidity (if not measured)**
☑ Clear ☐ Slightly turbid ☐ Turbid
☐ Opaque ☐ Stained ☐ Other_____

**SEDIMENT/ SUBSTRATE**

**Odors**
☑ Normal ☐ Sewage ☐ Petroleum
☐ Chemical ☐ Anaerobic ☑ None
☐ Other_____

**Oils**
☑ Absent ☐ Slight ☐ Moderate ☐ Profuse

**Deposits**
☐ Sludge ☐ Sawdust ☐ Paper fiber ☑ Sand
☐ Relict shells ☐ Other_____

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

| INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) | | | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | |
|---|---|---|---|---|---|
| **Substrate Type** | **Diameter** | **% Composition in Sampling Reach** | **Substrate Type** | **Characteristic** | **% Composition in Sampling Area** |
| Bedrock | | | Detritus | sticks, wood, coarse plant materials (CPOM) | 50 ft |
| Boulder | > 256 mm (10") | | | | |
| Cobble | 64-256 mm (2.5"-10") | | Muck-Mud | black, very fine organic (FPOM) | |
| Gravel | 2-64 mm (0.1"-2.5") | 50 | | | |
| Sand | 0.06-2mm (gritty) | 30 | Marl | grey, shell fragments | |
| Silt | 0.004-0.06 mm | 20 | | | |
| Clay | < 0.004 mm (slick) | | | | |

## HABITAT ASSESSMENT FIELD DATA SHEET - HG - USE ON ALL STREAMS (FRONT)

| | | |
|---|---|---|
| STREAM NAME S-DD4 | LOCATION Pittsylvania | |
| STATION #_____ RIVERMILE_____ | STREAM CLASS Intermittent | |
| LAT 36.871478 LONG -79.403907 | RIVER BASIN Banister | |
| STORET # | AGENCY VADEQ | |
| INVESTIGATORS CB, BH | | |
| FORM COMPLETED BY<br>CB, BH | DATE 8/18/21<br>TIME 1232 AM PM | REASON FOR SURVEY<br>Baseline 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 <u>not</u> new fall and <u>not</u> transient). | 40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| | **SCORE** 13 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **2. Embeddedness** | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space. | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment. | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment. | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. |
| | **SCORE** 1 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **3. Velocity/Depth Regime** | All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.) | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes). | Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low). | Dominated by 1 velocity/ depth regime (usually slow-deep). |
| | **SCORE** 5 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **4. Sediment Deposition** | Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | **SCORE** 1 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| | **5. Channel Flow Status** | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| | **SCORE** 9 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |

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

**Parameters to be evaluated broader than sampling reach**

| Habitat Parameter | Condition Category | | | |
|---|---|---|---|---|
| | **Optimal** | **Suboptimal** | **Marginal** | **Poor** |
| **6. Channel Alteration** | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| **SCORE** 19 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **7. Frequency of Riffles (or bends)** | Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important. | Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15. | Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. | Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25. |
| **SCORE** 6 | 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1 0 |
| **8. Bank Stability (score each bank)** Note: determine left or right side by facing downstream. | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| SCORE 7 | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 7 | 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 4 | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 5 | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| **10. Riparian Vegetative Zone Width** (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| SCORE 8 | Left Bank 10 9 | 8 7 6 | 5 4 3 | 2 1 0 |
| SCORE 10 | Right Bank 10 9 | 8 7 6 | 5 4 3 | 2 1 0 |

**Total Score** 95

## BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| | | |
|---|---|---|
| STREAM NAME S-DD4 | LOCATION Pittsylvania | |
| STATION #_____ RIVERMILE_____ | STREAM CLASS Intermittent | |
| LAT 36.871478 LONG -79.403907 | RIVER BASIN Banister | |
| STORET # | AGENCY VADEQ | |
| INVESTIGATORS CB, BH | | LOT NUMBER |
| FORM COMPLETED BY<br>CB, Bh | DATE 08/18/21<br>TIME _____ | REASON FOR SURVEY<br>Baseline Assessment |

| | |
|---|---|
| **HABITAT TYPES** | **Indicate the percentage of each habitat type present**<br>☐Cobble_____% ☐Snags_____% ☐Vegetated Banks_____% ☐Sand_____%<br>☐Submerged Macrophytes_____% ☐Other (  )_____% |
| **SAMPLE COLLECTION** | **Gear used** ☐D-frame ☐kick-net ☐Other _____<br>**How were the samples collected?** ☐wading ☐from bank ☐from boat<br>**Indicate the number of jabs/kicks taken in each habitat type.**<br>☐Cobble_____ ☐Snags_____ ☐Vegetated Banks_____ ☐Sand_____<br>☐Submerged Macrophytes_____ ☐Other (  )_____ |
| **GENERAL COMMENTS** | No Benthics due to lack of habitat |

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

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

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

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

## WOLMAN PEBBLE COUNT FORM

| | | | |
|---|---|---|---|
| County: | Pittsylvania | Stream ID: | S-DD4 |
| Stream Name: | UNT to Mill Creek | | |
| HUC Code: | 03010105 | Basin: | Banister |
| Survey Date: | 8/18/2021 | | |
| Surveyors: | CB, Bh | | |
| Type: | Representative | | |

| PEBBLE COUNT | | | | | | | |
|---|---|---|---|---|---|---|---|
| Inches | PARTICLE | Millimeters | | Particle Count | **Total #** | **Item %** | **% Cum** |
| | Silt/Clay | < .062 | S/C | | 13 | 13.00 | 13.00 |
| | Very Fine | .062-.125 | | | 22 | 22.00 | 35.00 |
| | Fine | .125-.25 | | | 22 | 22.00 | 57.00 |
| | Medium | .25-.5 | S A N D | | 21 | 21.00 | 78.00 |
| | Coarse | .50-1.0 | | | | 0.00 | 78.00 |
| .04-.08 | Very Coarse | 1.0-2 | | | 4 | 4.00 | 82.00 |
| .08 -.16 | Very Fine | 2 -4 | | | 3 | 3.00 | 85.00 |
| .16 - .22 | Fine | 4 -5.7 | | | 3 | 3.00 | 88.00 |
| .22 - .31 | Fine | 5.7 - 8 | | | 1 | 1.00 | 89.00 |
| .31 - .44 | Medium | 8 -11.3 | | | 3 | 3.00 | 92.00 |
| .44 - .63 | Medium | 11.3 - 16 | G R A V E L | | 3 | 3.00 | 95.00 |
| .63 - .89 | Coarse | 16 -22.6 | | | 2 | 2.00 | 97.00 |
| .89 - 1.26 | Coarse | 22.6 - 32 | | | 1 | 1.00 | 98.00 |
| 1.26 - 1.77 | Vry Coarse | 32 - 45 | | | 2 | 2.00 | 100.00 |
| 1.77 -2.5 | Vry Coarse | 45 - 64 | | | | 0.00 | 100.00 |
| 2.5 - 3.5 | Small | 64 - 90 | | | | 0.00 | 100.00 |
| 3.5 - 5.0 | Small | 90 - 128 | | | | 0.00 | 100.00 |
| 5.0 - 7.1 | Large | 128 - 180 | C O B B L E | | | 0.00 | 100.00 |
| 7.1 - 10.1 | Large | 180 - 256 | | | | 0.00 | 100.00 |
| 10.1 - 14.3 | Small | 256 - 362 | | | | 0.00 | 100.00 |
| 14.3 - 20 | Small | 362 - 512 | | | | 0.00 | 100.00 |
| 20 - 40 | Medium | 512 - 1024 | B O U L D E R | | | 0.00 | 100.00 |
| 40 - 80 | Large | 1024 -2048 | | | | 0.00 | 100.00 |
| 80 - 160 | Vry Large | 2048 -4096 | | | | 0.00 | 100.00 |
| | Bedrock | | BDRK | | | 0.00 | 100.00 |
| | | | | Totals: | 100 | | |
| | Total Tally: | | | | | | |

RIVERMORPH PARTICLE SUMMARY

---

River Name: UNT to Mill Creek
Reach Name: S-DD4A
Sample Name: Representative
Survey Date: 08/18/2021

---

| Size (mm) | TOT # | ITEM % | CUM % |
|---|---|---|---|
| 0 - 0.062 | 13 | 13.00 | 13.00 |
| 0.062 - 0.125 | 22 | 22.00 | 35.00 |
| 0.125 - 0.25 | 21 | 21.00 | 56.00 |
| 0.25 - 0.50 | 21 | 21.00 | 77.00 |
| 0.50 - 1.0 | 0 | 0.00 | 77.00 |
| 1.0 - 2.0 | 4 | 4.00 | 81.00 |
| 2.0 - 4.0 | 3 | 3.00 | 84.00 |
| 4.0 - 5.7 | 3 | 3.00 | 87.00 |
| 5.7 - 8.0 | 1 | 1.00 | 88.00 |
| 8.0 - 11.3 | 4 | 4.00 | 92.00 |
| 11.3 - 16.0 | 3 | 3.00 | 95.00 |
| 16.0 - 22.6 | 2 | 2.00 | 97.00 |
| 22.6 - 32.0 | 1 | 1.00 | 98.00 |
| 32 - 45 | 2 | 2.00 | 100.00 |
| 45 - 64 | 0 | 0.00 | 100.00 |
| 64 - 90 | 0 | 0.00 | 100.00 |
| 90 - 128 | 0 | 0.00 | 100.00 |
| 128 - 180 | 0 | 0.00 | 100.00 |
| 180 - 256 | 0 | 0.00 | 100.00 |
| 256 - 362 | 0 | 0.00 | 100.00 |
| 362 - 512 | 0 | 0.00 | 100.00 |
| 512 - 1024 | 0 | 0.00 | 100.00 |
| 1024 - 2048 | 0 | 0.00 | 100.00 |
| Bedrock | 0 | 0.00 | 100.00 |

| | |
|---|---|
| D16 (mm) | 0.07 |
| D35 (mm) | 0.13 |
| D50 (mm) | 0.21 |
| D84 (mm) | 4 |
| D95 (mm) | 16 |
| D100 (mm) | 45 |
| Silt/Clay (%) | 13 |
| Sand (%) | 68 |
| Gravel (%) | 19 |
| Cobble (%) | 0 |
| Boulder (%) | 0 |
| Bedrock (%) | 0 |

Total Particles = 100.

# Stream Assessment Form (Form 1)

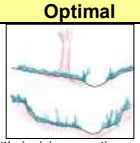
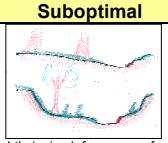
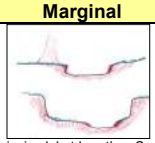
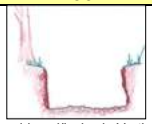
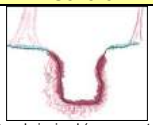
**Unified Stream Methodology for use in Virginia**

**For use in wadeable channels classified as intermittent or perennial**

| Project # | Project Name (Applicant) | Locality | Cowardin Class. | HUC | Date | SAR # | Impact Length | Impact Factor |
|---|---|---|---|---|---|---|---|---|
| 22865.06 | Mountain Valley Pipeline (Mountain Valley Pipeline, LLC) | Pittsylvania | R4 | 03010105 | 8/18/21 | S-DD4 | 147 | 1 |

| Name(s) of Evaluator(s) | Stream Name and Information | SAR Length |
|---|---|---|
| CB BH | UNT to Mill Creek | 147 |

**1. Channel Condition:** Assess the cross-section of the stream and prevailing condition (erosion, aggradation)

| | Conditional Category | | | | | |
|---|---|---|---|---|---|---|
| | Optimal | Suboptimal | Marginal | Poor | Severe | |
| Channel Condition |  Very little incision or active erosion; 80-100% stable banks. Vegetative surface protection or natural rock, prominent (80-100%). AND/OR Stable point bars / bankfull benches are present. Access to their original floodplain or fully developed wide bankfull benches. Mid-channel bars and transverse bars few. Transient sediment deposition covers less than 10% of bottom. |  Slightly incised, few areas of active erosion or unprotected banks. Majority of banks are stable (60-80%). Vegetative protection or natural rock prominent (60-80%) AND/OR Depositional features contribute to stability. The bankfull and low flow channels are well defined. Stream likely has access to bankfull benches,or newly developed floodplains along portions of the reach. Transient sediment covers 10-40% of the stream bottom. |  Often incised, but less than Severe or Poor. Banks more stable than Severe or Poor due to lower bank slopes. Erosion may be present on 40-60% of both banks. Vegetative protection on 40-60% of banks. Streambanks may be vertical or undercut. AND/OR 40-60% Sediment may be temporary / transient, contribute instability. Deposition that contribute to stability, may be forming/present. AND/OR V-shaped channels have vegetative protection on > 40% of the banks and depositional features which contribute to stability. |  Overwidened/incised. Vertically / laterally unstable. Likely to widen further. Majority of both banks are near vertical. Erosion present on 60-80% of banks. Vegetative protection present on 20-40% of banks, and is insufficient to prevent erosion. AND/OR 60-80% of the stream is covered by sediment. Sediment is temporary / transient in nature, and contributing to instability. AND/OR V-shaped channels have vegetative protection is present on > 40% of the banks and stable sediment deposition is absent. |  Deeply incised (or excavated), vertical/lateral instability. Severe incision, flow contained within the banks. Streambed below average rooting depth, majority of banks vertical/undercut. Vegetative protection present on less than 20% of banks, is not preventing erosion. Obvious bank sloughing present. Erosion/raw banks on 80-100%. AND/OR Aggrading channel. Greater than 80% of stream bed is covered by deposition, contributing to instability. Multiple thread channels and/or subterranean flow. | CI |
| Scores | 3 | 2.4 | 2 | 1.6 | 1 | 1.60 |
| NOTES>> | | | | | | |

**2. RIPARIAN BUFFERS:** Assess both bank's 100 foot riparian areas along the entire SAR. (rough measurements of length & width may be acceptable)

| | Conditional Category | | | | | | | NOTES>> |
|---|---|---|---|---|---|---|---|---|
| | Optimal | Suboptimal | | Marginal | | Poor | | |
| Riparian Buffers | Tree stratum (dbh > 3 inches) present, with > 60% tree canopy cover. Wetlands located within the riparian areas. | **High Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. | **Low Suboptimal:** Riparian areas with tree stratum (dbh > 3 inches) present, with 30% to 60% tree canopy cover and a maintained understory. Recent cutover (dense vegetation). | **High Marginal:** Non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh > 3 inches) present, with <30% tree canopy cover. | **Low Marginal:** Non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, hay production, ponds, open water. If present, tree stratum (dbh >3 inches) present, with <30% tree canopy cover with maintained understory. | **High Poor:** Lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition. | **Low Poor:** Impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, trails, or other comparable conditions. | |
| | | High | Low | High | Low | High | Low | |
| Scores | 1.5 | 1.2 | 1.1 | 0.85 | 0.75 | 0.6 | 0.5 | |

1. Delineate riparian areas along each stream bank into Condition Categories and Condition Scores using the descriptors.
2. Determine square footage for each by measuring or estimating length and width. Calculators are provided for you below.
3. Enter the % Riparian Area and Score for each riparian category in the blocks below.

Ensure the sums of % Riparian Blocks equal 100

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Right Bank | % Riparian Area> | 50% | 50% | | | | | 100% | |
| | Score > | 1.1 | 0.85 | | | | | | |
| | | | | | | | | CI= (Sum % RA * Scores*0.01)/2 | |
| Left Bank | % Riparian Area> | 50% | 50% | | | | | 100% | Rt Bank CI > 0.98 CI |
| | Score > | 1.1 | 0.85 | | | | | | Lt Bank CI > 0.98 0.98 |

**3. INSTREAM HABITAT:** Varied substrate sizes, water velocity and depths; woody and leafy debris; stable substrate; low embededness; shade; undercut banks; root mats; SAV; riffle/pool complexes, stable features.

| | Conditional Category | | | | NOTES>> | |
|---|---|---|---|---|---|---|
| | Optimal | Suboptimal | Marginal | Poor | | |
| Instream Habitat/ Available Cover | Habitat elements are typically present in greater than 50% of the reach. | Stable habitat elements are typically present in 30-50% of the reach and are adequate for maintenance of populations. | Stable habitat elements are typically present in 10-30% of the reach and are adequate for maintenance of populations. | Habitat elements listed above are lacking or are unstable. Habitat elements are typically present in less than 10% of the reach. | Stream Gradient | CI |
| Scores | 1.5 | 1.2 | 0.9 | 0.5 | High / Low | 0.90 |

# Stream Impact Assessment Form Page 2

| Project # | Project Name (Applicant) | Locality | Cowardin Class. | HUC | Date | SAR # | Impact Length | Impact Factor |
|---|---|---|---|---|---|---|---|---|
| 22865.06 | Mountain Valley Pipeline (Mountain Valley Pipeline, LLC) | Pittsylvania | R4 | 03010105 | 8/18/21 | S-DD4 | 147 | 1 |

**4. CHANNEL ALTERATION:** Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel, channelization, embankments, spoil piles, constrictions, livestock

| | Conditional Category | | | | | | NOTES>> | |
|---|---|---|---|---|---|---|---|---|
| | Negligible | Minor | | Moderate | | Severe | | |
| Channel Alteration | Channelization, dredging, alteration, or hardening absent. Stream has an unaltered pattern or has naturalized. | Less than 20% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines. | 20-40% of the stream reach is disrupted by any of the channel alterations listed in the parameter guidelines. | 40 - 60% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered. | 60 - 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If stream has been channelized, normal stable stream meander pattern has not recovered. | Greater than 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines AND/OR 80% of banks shored with gabion, riprap, or cement. | | CI |
| Scores | 1.5 | 1.3 | 1.1 | 0.9 | 0.7 | 0.5 | | 1.30 |

**REACH CONDITION INDEX and STREAM CONDITION UNITS FOR THIS REACH**

***NOTE:*** **The CIs and RCI should be rounded to 2 decimal places. The CR should be rounded to a whole number.**

| | |
|---|---|
| **THE REACH CONDITION INDEX (RCI) >>** | **0.96** |

RCI= (Sum of all CI's)/5, except if stream is ephemeral RCI = (Riparian CI/2)

| | |
|---|---|
| **COMPENSATION REQUIREMENT (CR) >>** | **141** |

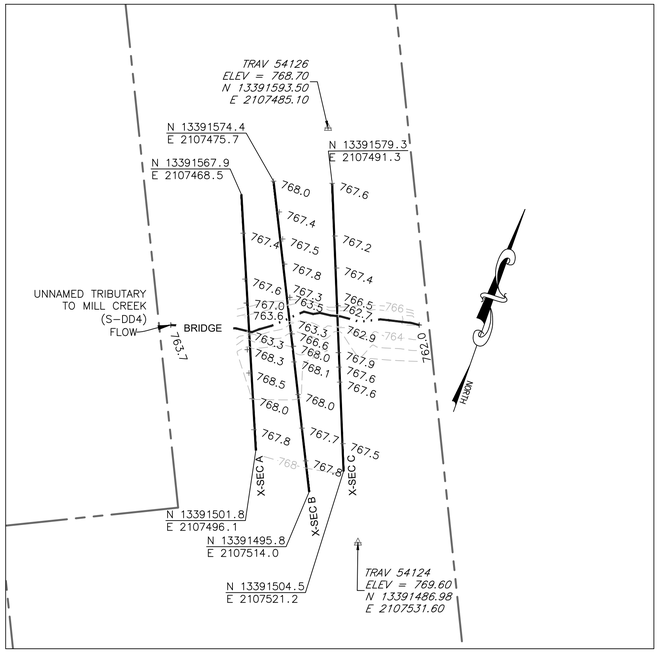
CR = RCI X $L_I$ X IF

**INSERT PHOTOS:**

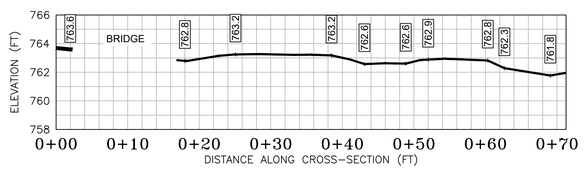
CAPTION. Assessment is limited to areas within the temporary ROW.

**DESCRIBE PROPOSED IMPACT:**

**PROVIDED UNDER SEPARATE COVER**




## S-DD4 BASELINE THALWEG

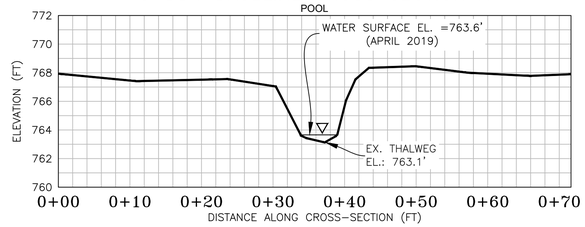



PROFILE LEGEND

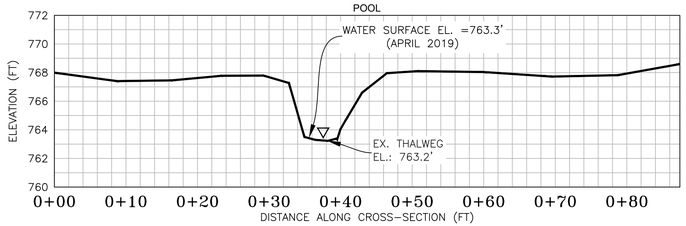
EXISTING STREAM PROFILE
INVERT ALONG THALWEG

PROFILE
SCALE: H: 1"=10'
V: 1"=5'

## S-DD4 BASELINE CROSS SECTION A




## S-DD4 BASELINE CROSS SECTION B




## S-DD4 BASELINE CROSS SECTION C




CROSS SECTION
SCALE: H: 1"=10'
V: 1"=5'

CROSS SECTION LEGEND

EXISTING GRADE

NOTE: ALL SECTION VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.

PRE-CROSSING PHOTOS

PHOTO TAKEN LOOKING DOWNSTREAM
TO THE EAST-NORTHEAST

PHOTO TAKEN LOOKING UPSTREAM
TO THE WEST

POST-CROSSING PHOTOS

PENDING PHOTOS

PHOTO TAKEN LOOKING

PENDING PHOTOS

PHOTO TAKEN LOOKING

## LEGEND

- STUDY AREA (EASEMENT)
- EXISTING SURVEY-LOCATED THALWEG
- EW — EXISTING SURVEY-LOCATED EDGE OF WATER (AS NECESSARY)
- EXISTING CONTOUR LINE (MAJOR)
- EXISTING CONTOUR LINE (MINOR)
- 766.8 + EXISTING SURVEYED GROUND SHOT ELEVATION
- BENCHMARK POINT (WSSI)

SURVEY NOTES:

1. This map has been oriented to NAD 1983 UTM ZONE 17N, and vertically to The North American Vertical Datum of 1988 (NAVD 88), using a Real Time Network (RTN) GPS. Field locations were completed on April 18, 2019.

2. Monumentation, including traverse stations and fly points, shown on this drawing should be used to orient any future boundary, topographic, or location survey.

3. Easement lines shown on plan view were provided by Mountain Valley Pipeline (MVP).

4. WSSI Contour Interval = 2.0'. Contours within the channel were interpolated using stream channel breaklines (i.e. top of slopes, toe of slopes, thalweg) and cross-sectional points. Contours outside the channel were interpolated using cross-sectional spot shots.

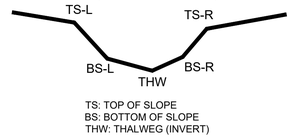
5. All section views shown are left to right facing downstream.

6. Cross-section B shot at location of pipe centerline (based on best professional judgement).

**CL STAKEOUT POINTS: S-DD4 CROSS SECTION B (PIPE CL)**

| | PRE-CROSSING | | | POST-CROSSING | |
|---|---|---|---|---|---|
| PT. LOC. | NORTHING | EASTING | ELEV | VERT. DIFF. | HORZ. DIFF. |
| TS-L | 13391545.31 | 2107490.80 | 767.30 | ---- | ---- |
| BS-L | 13391543.13 | 2107491.27 | 763.50 | ---- | ---- |
| THW | 13391540.20 | 2107492.71 | 763.20 | ---- | ---- |
| BS-R | 13391539.03 | 2107493.29 | 763.30 | ---- | ---- |
| TS-R | 13391532.75 | 2107496.30 | 768.00 | ---- | ---- |

TYPICAL 5-POINT CROSS-SECTION
(FACING DOWNSTREAM)




TS: TOP OF SLOPE
BS: BOTTOM OF SLOPE
THW: THALWEG (INVERT)

Wetland Studies and Solutions, Inc.
a DAVEY company
5300 Wellington Branch Drive • Suite 100
Gainesville, Virginia 20155
Phone: 703-679-5600 • Fax: 703-679-5601
www.wetlands.com

Profile and Cross-Sections Baseline Survey

Prepared For: MVP

Crossing S-DD4- UNT to Mill Creek (MP 298.3)

Pittsylvania County, Virginia

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REVISIONS

| No. | Date | Description | Rev. By | App. By |
|---|---|---|---|---|
| | | | | |

SCALE: AS NOTED

DATE: September 2021

Horizontal Datum: NAD 1983 UTM ZONE 17N

Vertical Datum: NAVD 88

Boundary and Topo Source:
MVP
WSSI 2' C.I. Topo

| Design | Draft | Approved |
|---|---|---|
| EJC | JSF | NAS |

Sheet #
1 of 1

Computer File Name:
L:\Survey\22000\22065.03\Spread 1 Work Dwgs
22065_03 S-1 MP 292-303 Sheets_2.dwg