

Baseline Assessment – Stream Attributes

Reach S-H13 (Pipeline Row)
Perennial
Spread I
Pittsylvania County, Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	N/A – Perennial stream (not shadeable, slope <4%)
RBP Physical Characteristics Form	✓
Water Quality Data	✓
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	✓
Wolman Pebble Count	✓
RiverMorph Data Sheet	✓
USM Form (Virginia Only)	✓
Longitudinal Profile and Cross Sections	✓



Photo Type: LB US VIEW

Location, Orientation, Photographer Initials: Downstream at S-H13 looking NE upstream, TC



Photo Type: RB US VIEW

Location, Orientation, Photographer Initials: Downstream at S-H13 looking NE upstream, TC



Photo Type: DS COND DS

Location, Orientation, Photographer Initials: Downstream at S-H13 looking S downstream, TC



Photo Type: LB CL

Location, Orientation, Photographer Initials: On thalweg at S-H13 pipe centerline looking NW at right streambank, TC



Photo Type: RB CL

Location, Orientation, Photographer Initials: On thalweg at S-H13 pipe centerline looking SE at left streambank, TC



Photo Type: DS VIEW

Location, Orientation, Photographer Initials: Upstream at S-H13 looking W downstream, TC



Photo Type: RB DS VIEW

Location, Orientation, Photographer Initials: Upstream at S-H13 looking SW downstream, TC

USACE FILE NO./ Project Name: (v2.1, Sept 2015)				Mountain Valley Pipeline				IMPACT COORDINATES: (in Decimal Degrees)				Lat.	36.925105			Lon.	-79.51735			WEATHER:				100% Cloud Cover				DATE:				October 12, 2021																	
IMPACT STREAM/SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)										S-H13; 1974.14 ac										MITIGATION STREAM CLASS./SITE ID AND SITE DESCRIPTION: (watershed size (acreage), unaltered or impairments)																				Comments:									
STREAM IMPACT LENGTH:				77		FORM OF MITIGATION:		RESTORATION (Levels I-III)				MIT COORDINATES: (in Decimal Degrees)				Lat.				Lon.				PRECIPITATION PAST 48 HRS:				No				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:				Perennial						Stream Classification:										Stream Classification:				0						Stream Classification:				0						Stream Classification:				0					
Percent Stream Channel Slope				0.81						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										Biogeochemical Cycling										Biogeochemical Cycling										Biogeochemical Cycling										Biogeochemical Cycling									
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											
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				10		1. Epifaunal Substrate/Available Cover				0-20				0		1. Epifaunal Substrate/Available Cover				0-20				0		1. Epifaunal Substrate/Available Cover				0-20				0											
2. Embeddedness				0-20				9		2. Embeddedness				0-20				0		2. Embeddedness				0-20				0		2. Embeddedness				0-20				0											
3. Velocity/ Depth Regime				0-20				8		3. Velocity/ Depth Regime				0-20				0		3. Velocity/ Depth Regime				0-20				0		3. Velocity/ Depth Regime				0-20				0											
4. Sediment Deposition				0-20				15		4. Sediment Deposition				0-20				0		4. Sediment Deposition				0-20				0		4. Sediment Deposition				0-20				0											
5. Channel Flow Status				0-20				16		5. Channel Flow Status				0-20				0		5. Channel Flow Status				0-20				0		5. Channel Flow Status				0-20				0											
6. Channel Alteration				0-20				20		6. Channel Alteration				0-20				0		6. Channel Alteration				0-20				0		6. Channel Alteration				0-20				0											
7. Frequency of Riffles (or bends)				0-20				15		7. Frequency of Riffles (or bends)				0-20				0		7. Frequency of Riffles (or bends)				0-20				0		7. Frequency of Riffles (or bends)				0-20				0											
8. Bank Stability (LB & RB)				0-20				8		8. Bank Stability (LB & RB)				0-20				0		8. Bank Stability (LB & RB)				0-20				0		8. Bank Stability (LB & RB)				0-20				0											
9. Vegetative Protection (LB & RB)				0-20				12		9. Vegetative Protection (LB & RB)				0-20				0		9. Vegetative Protection (LB & RB)				0-20				0		9. Vegetative Protection (LB & RB)				0-20				0											
10. Riparian Vegetative Zone Width (LB & RB)				0-20				9		10. Riparian Vegetative Zone Width (LB & RB)				0-20				0		10. Riparian Vegetative Zone Width (LB & RB)				0-20				0		10. Riparian Vegetative Zone Width (LB & RB)				0-20				0											
Total RBP Score				Suboptimal				122		Total RBP Score				Poor				0		Total RBP Score				Poor				0		Total RBP Score				Poor				0											
Sub-Total								0.61		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				0-90				76.4																																									

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME S-H13		LOCATION Pittsylvania County	
STATION # _____ RIVERMILE _____		STREAM CLASS Perennial	
LAT <u>36.925105</u> LONG <u>-79.51735</u>		RIVER BASIN Upper Roanoke	
STORET # _____		AGENCY VA DEQ	
INVESTIGATORS TC			
FORM COMPLETED BY TC		DATE <u>10/12/2021</u> TIME <u>1050 AM</u>	REASON FOR SURVEY Baseline Assessment

WEATHER CONDITIONS	<p>Now</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> 100 % <input type="checkbox"/> </div> <div> storm (heavy rain) rain (steady rain) showers (intermittent) %cloud cover clear/sunny </div> </div> <p>Past 24 hours</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 100 % </div> </div>	<p>Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Air Temperature <u>23.3</u> °C</p> <p>Other _____</p>
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p> <div style="text-align: center; margin-bottom: 10px;">S-H13</div> <div style="border: 1px solid black; padding: 10px;"> <p>Add Notes and a Site Sketch in this space:</p> <p>The sketch shows a stream flowing from left to right. On the left bank, it says 'Coming IN' with arrows pointing towards the stream. The stream has two 'Eroded Bank' sections. Between them is a 'Dense veg' area. To the right of the second eroded bank is another 'Dense Veg' area. At the bottom, there's a 'Timber Mat Bridge'. Arrows indicate the direction of flow. There are also some handwritten notes like 'SF' and 'X' along the banks.</p> </div>	
STREAM CHARACTERIZATION	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>Stream Subsystem</p> <p><input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p>Stream Origin</p> <p><input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> </div> <div style="width: 48%;"> <p>Stream Type</p> <p><input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater</p> <p>Catchment Area _____ km²</p> </div> </div>	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse <input type="checkbox"/> Forest <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Agricultural <input type="checkbox"/> Other _____ <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources Local Watershed Erosion <input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Dominant species present _____	
INSTREAM FEATURES	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Estimated Reach Length <u>20.16</u> m Estimated Stream Width <u>2.44</u> m Sampling Reach Area <u>49.21</u> m² Area in km² (m²x1000) _____ km² Estimated Stream Depth _____ m Surface Velocity (at thalweg) _____ m/sec </div> <div style="width: 45%;"> Canopy Cover <input checked="" type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types Riffle <u>70</u> % Run _____ % Pool <u>30</u> % </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </div> </div>	
LARGE WOODY DEBRIS	LWD <u>0</u> m ² Density of LWD <u>0</u> m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae Dominant species present _____ Portion of the reach with aquatic vegetation <u>10</u> %	
WATER QUALITY	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Temperature <u>20.2</u> °C Specific Conductance <u>76.4</u> D ms/cm Dissolved Oxygen <u>7.7</u> D mg/L pH <u>7.21</u> D su Turbidity <u>N/A</u> WQ Instrument Used <u>YSI</u> </div> <div style="width: 45%;"> Water Odors <input checked="" type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other _____ Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input checked="" type="checkbox"/> None <input type="checkbox"/> Other _____ Turbidity (if not measured) <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____ </div> </div>	
SEDIMENT/SUBSTRATE	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other _____ Oils <input checked="" type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse </div> <div style="width: 45%;"> Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No </div> </div>	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock		0	Detritus	sticks, wood, coarse plant materials (CPOM)	0
Boulder	> 256 mm (10")	0			
Cobble	64-256 mm (2.5"-10")	15	Muck-Mud	black, very fine organic (FPOM)	0
Gravel	2-64 mm (0.1"-2.5")	20			
Sand	0.06-2mm (gritty)	30	Marl	grey, shell fragments	0
Silt	0.004-0.06 mm	10			
Clay	< 0.004 mm (slick)	30			

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

STREAM NAME S-H13		LOCATION Pittsylvania County	
STATION # _____ RIVERMILE _____		STREAM CLASS Perennial	
LAT 36.925105 LONG -79.51735		RIVER BASIN Upper Roanoke	
STORET # _____		AGENCY VA DEQ	
INVESTIGATORS TC			
FORM COMPLETED BY TC		DATE 10/12/2021 TIME 1050 AM AM PM	REASON FOR SURVEY 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 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
	SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE 15	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 16	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)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration SCORE <u>20</u>	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.					
	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) SCORE <u>15</u>	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.					
	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. SCORE <u>3</u> SCORE <u>5</u>	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.					
	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
	Right Bank	10	9			8	7	6			5	4	3			2	1	0			
9. Vegetative Protection (score each bank) SCORE <u>5</u> SCORE <u>7</u>	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.					
	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
	Right Bank	10	9			8	7	6			5	4	3			2	1	0			
10. Riparian Vegetative Zone Width (score each bank riparian zone) SCORE <u>4</u> SCORE <u>5</u>	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.					
	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
	Right Bank	10	9			8	7	6			5	4	3			2	1	0			

Total Score 122

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME S-H13		LOCATION Pittsylvania County	
STATION # _____ RIVERMILE _____		STREAM CLASS Perennial	
LAT 36.925105 LONG -79.51735		RIVER BASIN Upper Roanoke	
STORET # _____		AGENCY VADEQ	
INVESTIGATORS ES/NF		LOT NUMBER	
FORM COMPLETED BY NF		DATE 09/08/2021 TIME 12:30 pm	REASON FOR SURVEY Baseline Assessment

HABITAT TYPES	Indicate the percentage of each habitat type present <input checked="" type="checkbox"/> Cobble 30 % <input type="checkbox"/> Snags _____ % <input checked="" type="checkbox"/> Vegetated Banks 10 % <input checked="" type="checkbox"/> Sand 60 % <input type="checkbox"/> Submerged Macrophytes _____ % <input type="checkbox"/> Other (_____) _____ %
SAMPLE COLLECTION	Gear used <input type="checkbox"/> D-frame <input checked="" type="checkbox"/> kick-net <input type="checkbox"/> Other _____ How were the samples collected? <input checked="" type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat Indicate the number of jabs/kicks taken in each habitat type. <input checked="" type="checkbox"/> Cobble 4 <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____ <input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other (_____) _____
GENERAL COMMENTS	4 kicks in riffle 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						

Mountain Valley Pipeline
Data are not adjusted for subsampling



Sample ID Collection Date		S-H13 09-08-2021
ORDER	GENUS/SPECIES	COUNT
Ephemeroptera	Acentrella sp.	2
Ephemeroptera	Baetis sp.	15
Ephemeroptera	Labiobaetis sp.	1
Ephemeroptera	Maccaffertium sp.	18
Ephemeroptera	Plauditus sp.	1
Trichoptera	Cheumatopsyche sp.	85
Trichoptera	Hydropsyche sp.	21
Odonata	Calopterygidae	1
Coleoptera	Oulimnius sp.	3
Coleoptera	Psephenus sp.	7
Megaloptera	Corydalus sp.	4
Megaloptera	Nigronia sp.	2
Diptera-Chironomidae	Cricotopus/Orthocladius sp.	1
Diptera-Chironomidae	Polypedilum sp.	11
Diptera-Chironomidae	Rheocricotopus sp.	1
Diptera-Chironomidae	Rheotanytarsus sp.	4
Diptera-Chironomidae	Tanytarsus sp.	3
Diptera-Chironomidae	Thienemannimyia gr. sp.	6
Diptera	Antocha sp.	5
Diptera	Atrichopogon sp.	2
Diptera	Hemerodromia sp.	3
Diptera	Simulium sp.	6
Annelida	tubificoid Naididae w/o cap setae	1
Bivalvia	Sphaeriidae	1
Gastropoda	Ferrissia sp.	3
Gastropoda	Pleuroceridae	1
Other Organisms	Prostoma sp.	1
TOTAL		209

Mountain Valley Pipeline
WV SCI Metrics



Sample ID Collection Date		S-H13 09-08-2021
WVSCI Metric Values		
Total taxa		17
EPT taxa		3
% EPT		68.4
% Chironomidae		12.4
% 2 Dominant		63.2
HBI		4.95
WVSCI Metric Scores		
Total taxa		81.0
EPT taxa		23.1
% EPT		74.5
% Chironomidae		88.4
% 2 Dominant		57.6
HBI		71.2
WVSCI Metric Scores		
Total taxa		81.0
EPT taxa		23.1
% EPT		74.5
% Chironomidae		88.4
% 2 Dominant		57.6
HBI		71.2
WVSCI Total Score		65.9

WVSCI Thresholds

Unimpaired = > 68.00
Gray Zone = 60.61 to 68.00
Impaired = <60.61

WOLMAN PEBBLE COUNT FORM

County: Pittslyvania

Stream ID: S-H13

Stream Name: Harpen Creek

HUC Code: 03010101

Basin: Upper Roanoke

Survey Date: 10/12/2021

Surveyors: KB/TC
Type: Representative

PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	▲ ▼	27	27.27	27.27
	Very Fine	.062-.125	S A N D	▲ ▼	0	0.00	27.27
	Fine	.125-.25		▲ ▼	0	0.00	27.27
	Medium	.25-.5		▲ ▼	2	2.02	29.29
	Coarse	.50-1.0			0	0.00	29.29
.04-.08	Very Coarse	1.0-2		▲ ▼	14	14.14	43.43
.08 -.16	Very Fine	2 -4	G R A V E L	▲ ▼	0	0.00	43.43
.16 - .22	Fine	4 -5.7		▲ ▼	0	0.00	43.43
.22 - .31	Fine	5.7 - 8		▲ ▼	0	0.00	43.43
.31 - .44	Medium	8 -11.3		▲ ▼	2	2.02	45.45
.44 - .63	Medium	11.3 - 16		▲ ▼	2	2.02	47.47
.63 - .89	Coarse	16 -22.6		▲ ▼	0	0.00	47.47
.89 - 1.26	Coarse	22.6 - 32		▲ ▼	4	4.04	51.52
1.26 - 1.77	Vry Coarse	32 - 45		▲ ▼	7	7.07	58.59
1.77 -2.5	Vry Coarse	45 - 64		▲ ▼	16	16.16	74.75
2.5 - 3.5	Small	64 - 90	C O B B L E	▲ ▼	9	9.09	83.84
3.5 - 5.0	Small	90 - 128		▲ ▼	8	8.08	91.92
5.0 - 7.1	Large	128 - 180		▲ ▼	4	4.04	95.96
7.1 - 10.1	Large	180 - 256		▲ ▼	1	1.01	96.97
10.1 - 14.3	Small	256 - 362	B O U L D E R	▲ ▼	1	1.01	97.98
14.3 - 20	Small	362 - 512		▲ ▼	2	2.02	100.00
20 - 40	Medium	512 - 1024		▲ ▼	0	0.00	100.00
40 - 80	Large	1024 -2048		▲ ▼	0	0.00	100.00
80 - 160	Vry Large	2048 -4096		▲ ▼	0	0.00	100.00
	Bedrock		BDRK	▲ ▼	0	0.00	100.00
				Totals:	99		
	Total Tally:						

RIVERMORPH PARTICLE SUMMARY

River Name: Harpen Creek
 Reach Name: S-H13
 Sample Name: Representative
 Survey Date: 10/12/2021

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	28	28.00	28.00
0.062 - 0.125	0	0.00	28.00
0.125 - 0.25	0	0.00	28.00
0.25 - 0.50	2	2.00	30.00
0.50 - 1.0	0	0.00	30.00
1.0 - 2.0	14	14.00	44.00
2.0 - 4.0	0	0.00	44.00
4.0 - 5.7	0	0.00	44.00
5.7 - 8.0	0	0.00	44.00
8.0 - 11.3	2	2.00	46.00
11.3 - 16.0	2	2.00	48.00
16.0 - 22.6	0	0.00	48.00
22.6 - 32.0	4	4.00	52.00
32 - 45	7	7.00	59.00
45 - 64	16	16.00	75.00
64 - 90	9	9.00	84.00
90 - 128	8	8.00	92.00
128 - 180	4	4.00	96.00
180 - 256	1	1.00	97.00
256 - 362	1	1.00	98.00
362 - 512	2	2.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.04		
D35 (mm)	1.36		
D50 (mm)	27.3		
D84 (mm)	90		
D95 (mm)	167		
D100 (mm)	511.99		
Silt/Clay (%)	28		
Sand (%)	16		
Gravel (%)	31		
Cobble (%)	22		
Boulder (%)	3		
Bedrock (%)	0		

Total Particles = 100.

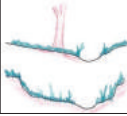
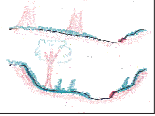
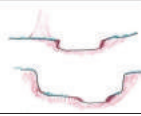
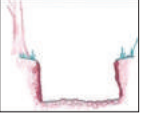
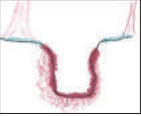
Stream Assessment Form (Form 1)

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
22865.07	Mountain Valley Pipeline (Mountain Valley Pipeline, LLC)	Pittsylvania	R3	03010101	10/12/2021	S-H13	77	1
Name(s) of Evaluator(s)		Stream Name and Information					SAR Length	
TC		S-H13					77	

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

Channel Condition	Conditional Category					CI
	Optimal	Suboptimal	Marginal	Poor	Severe	
						
	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 to 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.	
Scores	3	2.4	2	1.6	1	2.00

NOTES>>

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

Riparian Buffers	Conditional Category						NOTES>>
	Optimal	Suboptimal		Marginal		Poor	
	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.
Scores	1.5	High 1.2	Low 1.1	High 0.85	Low 0.75	High 0.6	Low 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.

Right Bank	% Riparian Area>	75%	25%				100%
	Score >	0.75	0.5				
CI= (Sum % RA * Scores*0.01)/2							
Left Bank	% Riparian Area>	50%	25%	25%			100%
	Score >	0.75	0.6	0.5			
Rt Bank CI > 0.69							
Lt Bank CI > 0.65							
CI							
0.67							

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

Instream Habitat/ Available Cover	Conditional Category				NOTES>>
	Optimal	Suboptimal	Marginal	Poor	
	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.	
Scores	1.5	1.2	0.9	0.5	Stream Gradient High / Low
1.5					

Stream Impact Assessment Form Page 2

Project #	Project Name (Applicant)	Locality	Cowardin Class.	HUC	Date	SAR #	Impact length	Impact Factor
22865.07	Mountain Valley Pipeline (Mountain Valley Pipeline, LLC)	Pittsylvania	R3	03010101	10/12/2021	S-H13	77	1

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

Channel Alteration	Conditional Category						NOTES>>	CI
	Negligible	Minor		Moderate		Severe		
	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.		
Scores	1.5	1.3	1.1	0.9	0.7	0.5		1.50

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) >> **0.83**

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

COMPENSATION REQUIREMENT (CR) >> **64**

CR = RCI X L_r X IF

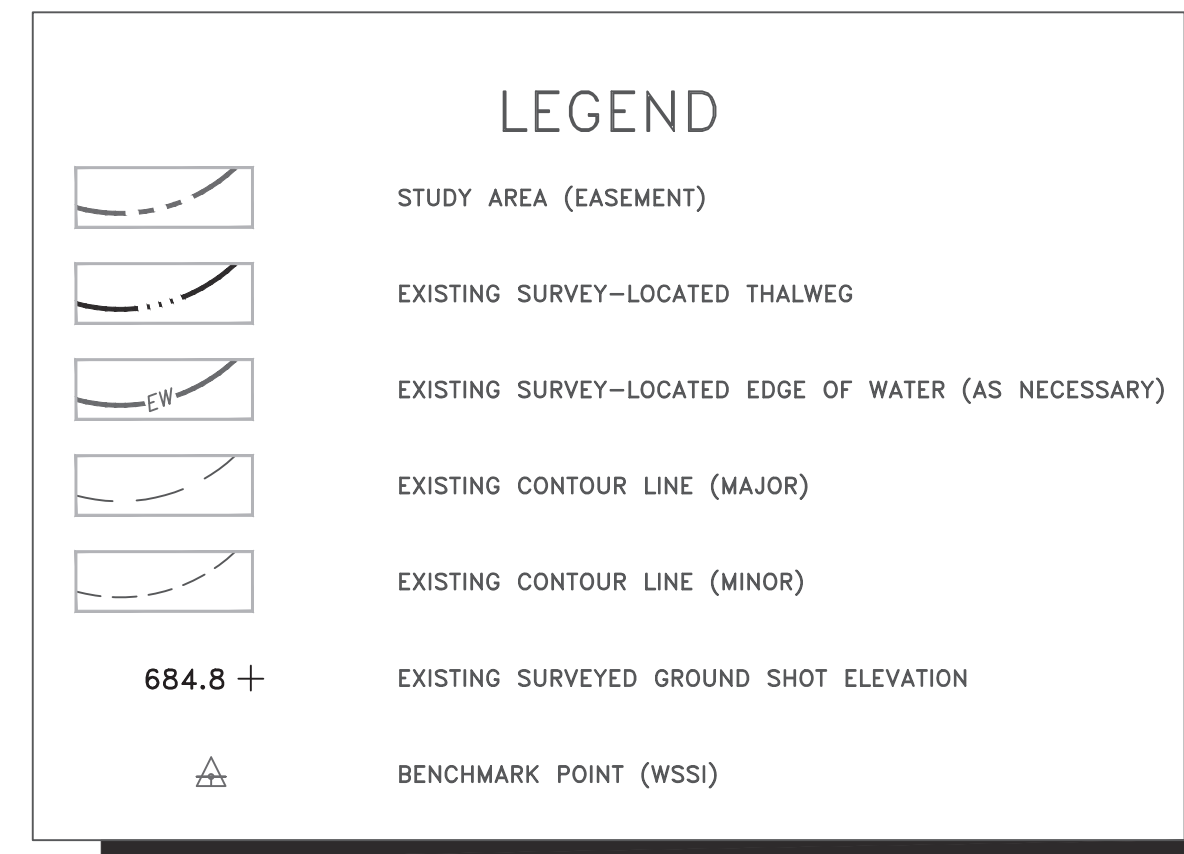
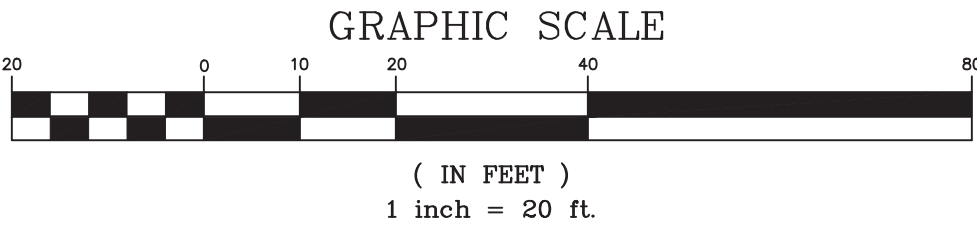
INSERT PHOTOS:

(WSSI Photo Location L:\22000s\22800\22865.06\Admin\05-ENV\Field Data\)

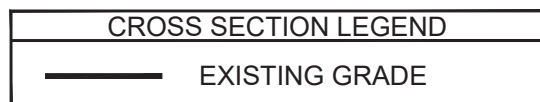
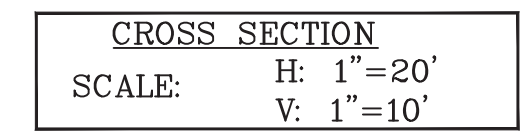
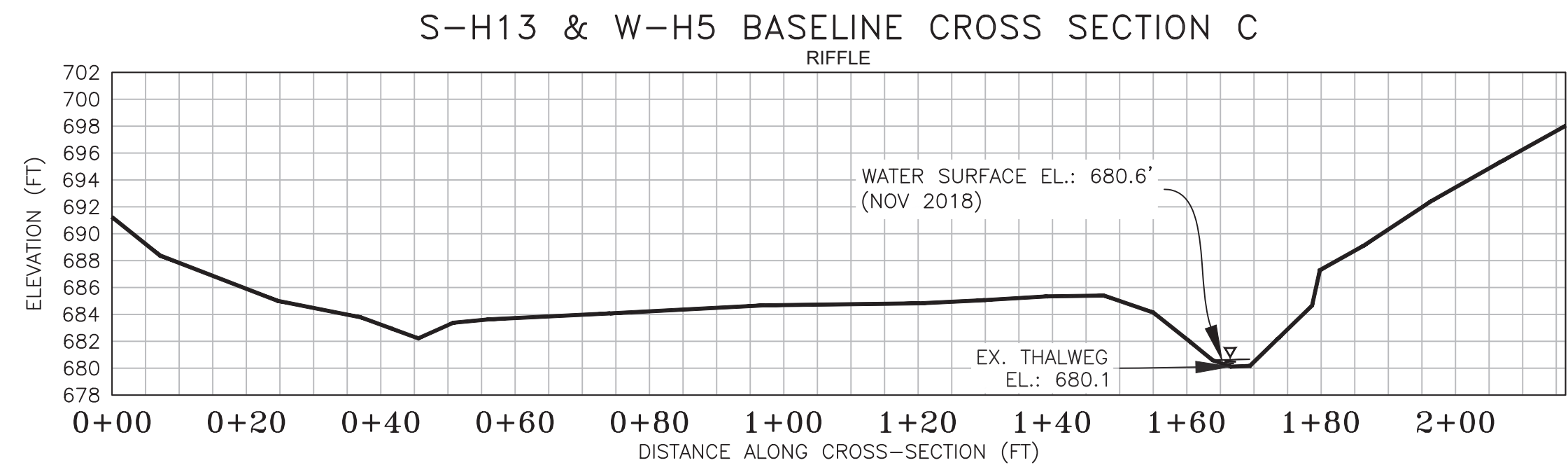
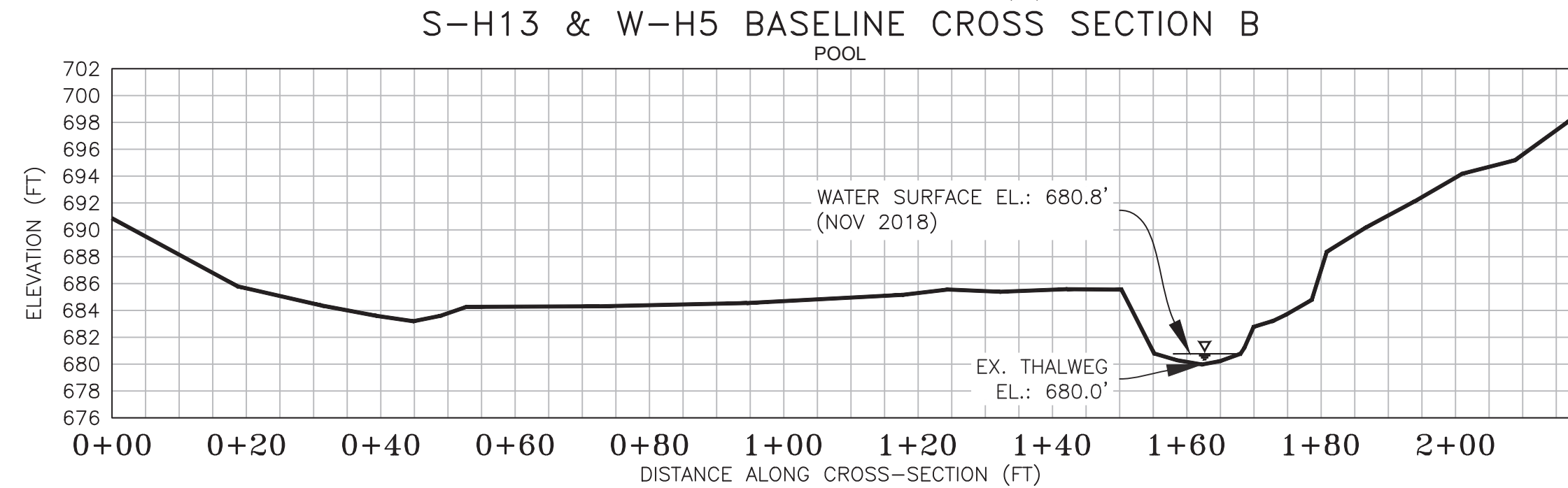
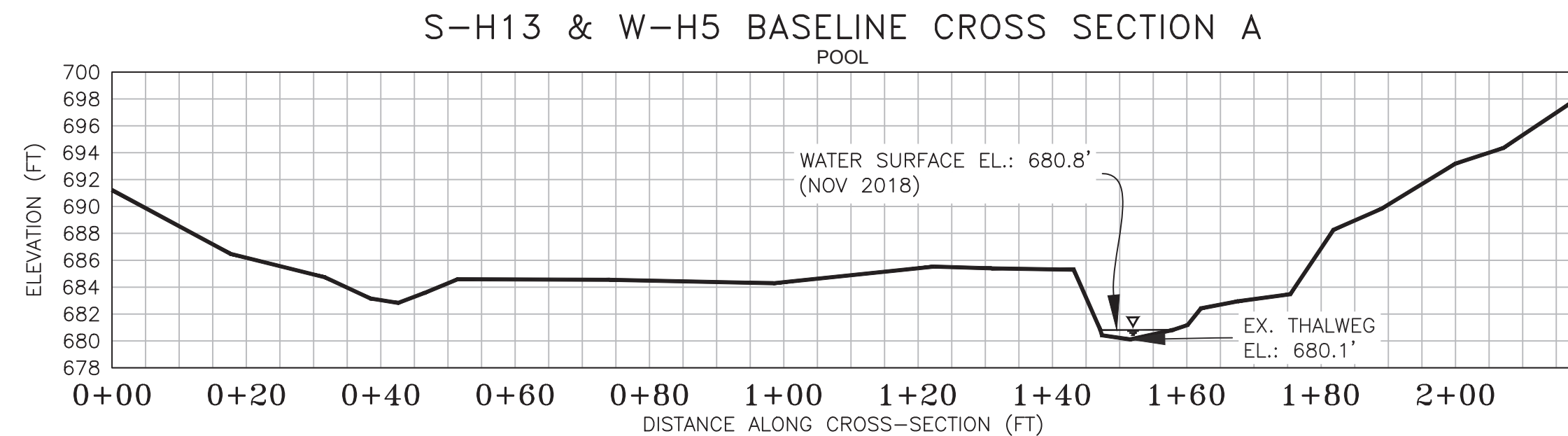


DESCRIBE PROPOSED IMPACT:

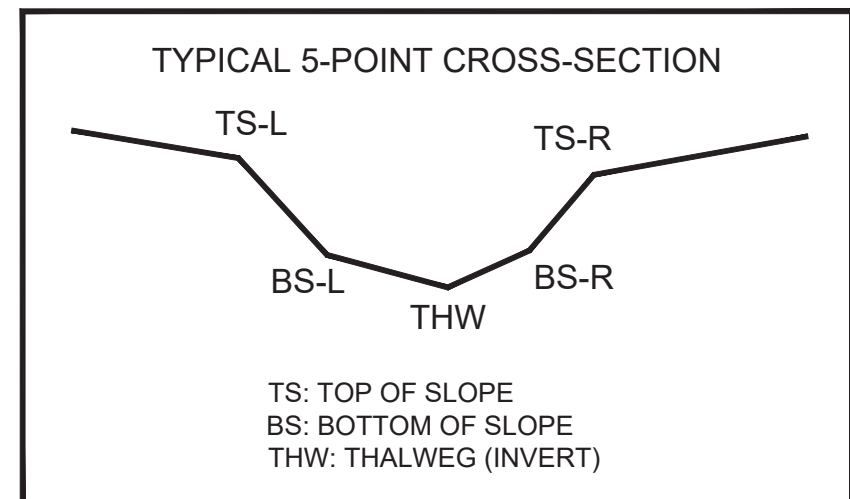
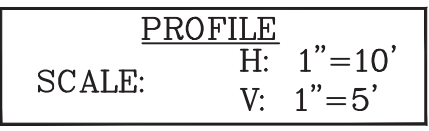
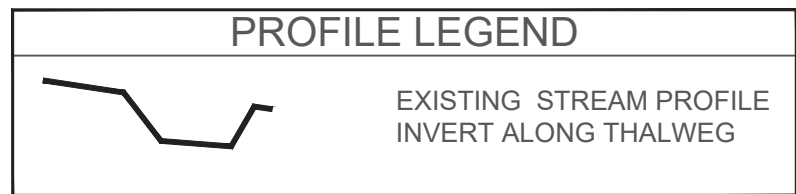
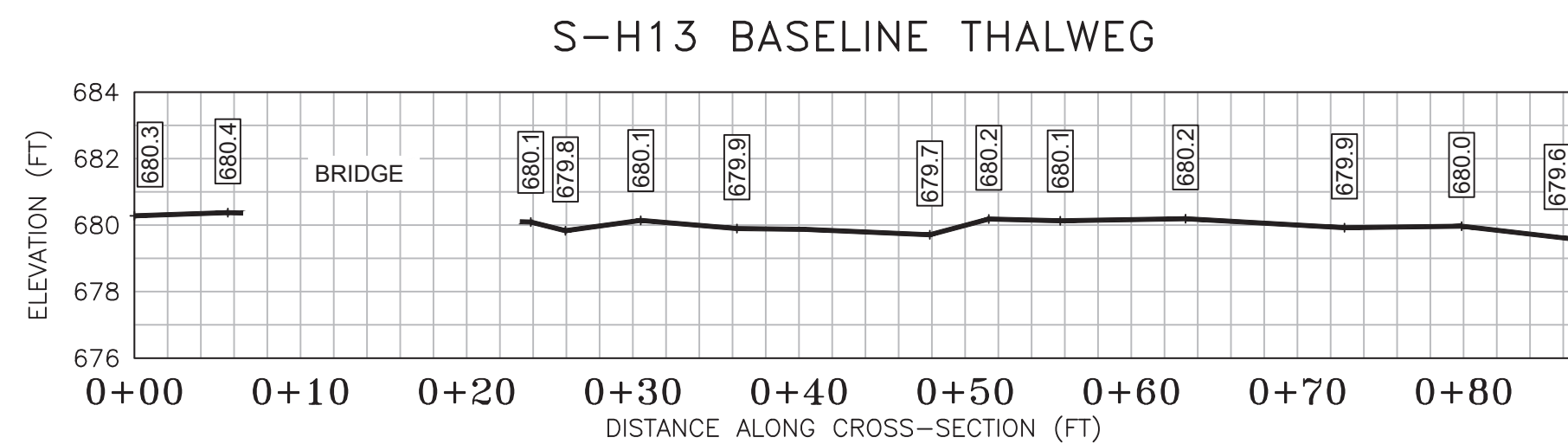
PROVIDED UNDER SEPARATE COVER



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 November 2, 2018.
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).



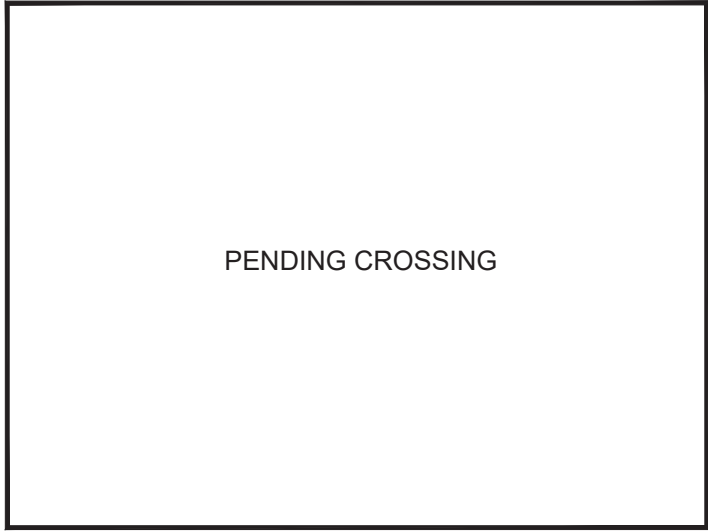
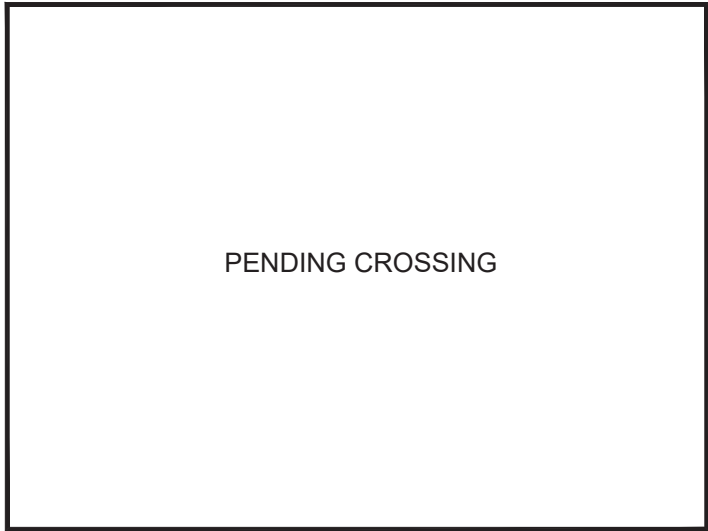
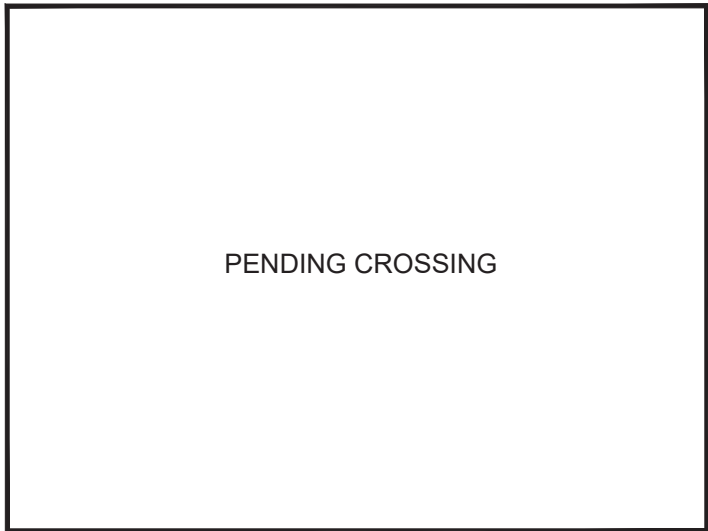
NOTE: ALL SECTION VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.



CL STAKEOUT POINTS: S-H13 CROSS SECTION B (PIPE CL)					
	PRE-CROSSING			POST-CROSSING	
PT. LOC.	NORTHING	EASTING	ELEV	VERT. DIFF.	HORZ. DIFF.
TS-L	13410713.60	20736644.81	688.37	----	----
BS-L	13410706.13	2073654.58	681.20	----	----
THW	13410702.67	2073659.85	679.97	----	----
BS-R	13410698.29	2073665.49	680.79	----	----
TS-R	13410695.79	2073669.64	685.55	----	----



POST-CROSSING PHOTOS



Profile and Cross-Sections Baseline Survey

Prepared For: MVP

Crossing S-H13 & W-H5 - Harpen Creek (MP 290.2)

Pittsylvania County, Virginia

Copyright © 2021 Wetland Studies and Solutions, Inc.

REVISIONS			
No.	Date	Description	App. By
DATE: October 2021		SCALE: AS NOTED	

Horizontal Datum: NAD 1983 UTM ZONE 17N

Vertical Datum: NAVD 88

Boundary and Topo Source:

MVP
WSSI 2' C.I. Tere

Design	Draft	App
--------	-------	-----

FIC	SIH	DE
-----	-----	----

Sheet #

1 of 1

Computer File Name:
L:\Survey\220000\22800\22865.03\Spread 1 Week Dwg
