APPENDIX C-1
West Virginia Erosion and Sediment Control Plan

Erosion and Sediment Control Plan
Mountain Valley Pipeline Project

Wetzel, Harrison, Doddridge, Lewis, Braxton, Webster, Nicholas, Greenbrier, Fayette, Summers, and Monroe Counties, West Virginia

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For

Mountain Valley PIPELINE LLC

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1.0 Introduction

Tetra Tech, Inc. (Tt) has prepared this Erosion & Sediment Control Plan (E&SCP) as part of the Stormwater Pollution Prevention Plan (SWPPP) for Mountain Valley Pipeline, LLC (MVP). The Plan addresses activities associated with the Mountain Valley Pipeline Project H-600 (Project) installation. The proposed pipeline will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to Transcontinental Gas Pipe Line Company, LLC's (Transco) Zone 5 Compressor Station 165 in Pittsylvania County, Virginia. In addition to the pipeline, the Project will include approximately 171,600 horsepower (hp) of compression at three compressor stations currently planned along the route, as well as measurement, regulation, and other ancillary facilities required for the safe and reliable operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day of natural gas.

A site location map is provided in Attachment 1. This E&SCP, if properly implemented, will provide for effective E&SCs throughout construction.

Project Name:	Mountain Valley Pipeline Project
Project Start:	Lat: 39° 33' 45", Long: -80° 32' 34"
Project End (in WV):	Lat: 37° 24' 10", Long: -80° 41' 21"
Counties:	Wetzel, Harrison, Doddridge, Lewis, Braxton, Webster, Nicholas, Greenbrier, Fayette, Summers, and Monroe

1.1 Project Description

The pipeline will extend from an interconnection with Equitrans' existing H-302 pipeline near the MarkWest Liberty Midstream & Resources, L.L.C. (MarkWest) Mobley processing facility in Wetzel County, West Virginia and traverse south-southeast to the Virginia border near the town of Lindside. The pipeline then heads in a general southeast direction following the terrain until it terminates at Station 165, near Transco Village, in Pittsylvania County, Virginia. The Project route avoids the U.S. Forest Service Ownership Boundary for the Monongahela National Forest. The pipeline then crosses the Jefferson National Forest (MP 195.3 to 196.9) including the Appalachian National Scenic Trail (between MP 195.4 and 195.5) northwest of the town of Goldbond, Giles County, Virginia.

MVP Proposed Pipeline by County

Approximate Milepost	County, State	Length (Miles)
0.0-9.6	Wetzel, WV	9.6
9.6-31.5, 32.6-33.6, 37.4-38	Harrison, WV	23.7
31.5-32.6, 33.7-37.3	Doddridge, WV	4.8

MVP Proposed Pipeline by County

Approximate Milepost	County, State	Length (Miles)
38-65.4	Lewis, WV	27.5
65.5-80.3	Braxton, WV	14.7
80.3-109.8, 110-110.9	Webster, WV	30.0
109.8-110, 110.9-135.4	Nicholas, WV	24.7
135.4-154.2, 154.7-157.2	Greenbrier, WV	21.2
154.2-154.7	Fayette, WV	0.5
157.2-174.3	Summers, WV	16.7
174.3-196.4	Monroe, WV	22.0
Total		**196.4**

Fifty feet will be maintained as permanent right-of-way (ROW). In general, the construction LOD will be 125 feet, which is needed to provide a safe, non-congested working area. The additional temporary right-of-way will be necessary for the safe travel of construction and maintenance vehicles and equipment as well as stockpiling any additional material that may be encountered during trenching. Given the ruggedness of the terrain and steep slopes, the full 125-foot construction right-of-way will be necessary in forested areas for the safe construction of the Project. At a majority of the wetland and stream crossings, the LOD has been reduced to 75 feet in an effort to reduce impacts to these aquatic resources. Additional Temporary Workspaces (ATWS) are also provided within the limits of disturbance (LOD) to provide areas for vehicle parking, material storage, turning radius along access roads, staging areas, and support areas for stream and wetland crossings. Pipeyards identified for this project will not require any grading other than minor blading to level the surface and provide a base for gravel or matting. MVP will employ special construction techniques where the slopes typically exceed 30 to 35 percent, which may also require expanded workspace areas.

Pipeline construction activities will involve tree removal, clearing and grubbing within the ROW, trenching, pipe installation, and site restoration. All required State and Federal Permits, including USFWS and USACE clearances, will be acquired prior to construction.

There will be three compressor stations and three meter (interconnect) stations for receipt or delivery with other pipelines, these permanent above ground facilities are addressed under a separate SWPPP. Additional ancillary aboveground facilities will include pig launcher and receiver sites at the compressor

stations and the beginning and end of the pipeline and meter stations, along with mainline block valve (MLV) sites within the pipeline right-of-way.

Field investigations identified the availability of previously used roads and other existing roads should be sufficient to provide access to most work areas for the pipeline. Temporary and permanent access roads will be necessary for the safe construction and future operation/maintenance of the Pipeline. In most instances, temporary access roads are already in existence and would only be used during the construction phase of the project. Once construction is complete, the use and ownership of the temporary access roads will be returned to the private landowner. The permanent access roads are necessary for safe operation/maintenance of the pipeline. Through landowner agreements, MVP will be responsible for permanent access road maintenance. The attached Erosion and Sediment Control Plans Construction Sheets identify both the permanent and temporary access roads as either being "Maintained" or "Graded and Maintained". A "Maintained" access road will only require crushed stone placement and appropriate smoothing if rutting or roadway degradation occurs – widening or significant grading is not anticipated. The sheet flow along the "Maintained" roadway will be controlled using the existing drainage infrastructure. Additional BMPs would be installed as necessary to prevent any off-site movement of sediments. A "Graded and Maintained" roadway may require widening, grading, and/or crushed stone placement. The sheet flow along these roadways will be controlled with drainage channels, broad based dips, and waterbars. Additional BMPs would be installed as necessary to prevent any off-site movement of sediments. New access roads are proposed in limited areas, including to the permanent above-ground facilities. Streams, wetlands, or other aquatic features along the existing access roads will be crossed according to the appropriate detail on the Plan Sheets. Access roads will utilize culverts where they exist and all other streams will be crossed utilizing timber mats, temporary bridging or culverts as dictated by field conditions during construction. Culverts to be replaced were sized using the Rational Formula for a 24-hr 10-year storm and Manning's Equation. In areas with unexpected drainage, culverts will be appropriately installed and sized according to the Culvert Sizing Chart from the 2006 WVDEP Erosion and Sediment Control Best Management Practice Manual.

This E&SCP has been prepared in accordance with the 2006 West Virginia Department of Environmental Protection (WVDEP) Best Management Protection (BMP) Manual. For more information on the project refer to the E&SCP and Project Location Mapping provided in this report, Attachment 1 and 5.

1.2 Existing Site Conditions and Adjacent Areas

The WV portion of the Project crosses Wetzel, Harrison, Doddridge, Lewis, Braxton, Webster, Nicholas, Greenbrier, Fayette, Summers, and Monroe Counties. Relevant topographic features including streams, streets, pipelines, structures, utility lines, fences, paving and other significant items along the gas line alignment are indicated on the plans and U.S. Geological Survey (USGS) Maps (Attachment 1). The E&S Plan Sheets are provided in Attachment 5 and provide information regarding the typical controls and construction sequence to be followed.

To the extent practicable, the pipeline has been aligned parallel to existing corridors. As currently proposed, the pipeline is aligned parallel to existing utility corridors, trails, and roads for approximately 53 miles to limit additional clearing. Past and present land use of the project area and surrounding area is agricultural, pasture/hay, open space/grassland and forested land. Future land use will be a maintained vegetated natural gas pipeline ROW.

The table below lists the watersheds crossed by this Project. The rainfall zones crossed by this project are 1-Western Plateau, with an annual median rainfall total of 43.7 inches/year and 3-Mountains, with an annual median rainfall total of 52.7 inches/year.

Watersheds Crossed by the MVP Project

Major Region (2-digit HUC)	**Sub-basin (8-digit HUC)**	**Watershed (10-digit HUC)**	**County**
West Virginia			
Ohio Region (05)	Little Muskingum-Middle Island (05030201) (Mid-Ohio North)	Fishing Creek (0503020102)	Wetzel, Harrison
	West Fork (05020002)	Tenmile Creek (0502000205)	Doddridge, Harrison
	Little Muskingum-Middle Island (05030201)	Headwaters Middle Island Creek (0503020104)	Doddridge, Harrison
	West Fork (05020002)	Middle West Fork River (0502000203)	Doddridge, Harrison
	Little Kanawha (05030203)	Leading Creek (0503020302)	Lewis
	West Fork (05020002)	Upper West Fork River (0502000201)	Lewis
	Little Kanawha (05030203)	Sand Fork (0503020301)	Lewis
	Little Kanawha (05030203)	Upper Little Kanawha River (0503020303)	Braxton, Lewis
	Elk (05050007)	Holly River (0505000703)	Braxton, Webster
	Elk (05050007)	Middle Elk River (0505000706)	Braxton, Webster
	Elk (05050007)	Laurel Creek (0505000702)	Webster
	Elk (05050007)	Birch River (0505000704)	Nicholas, Webster
	Gauley (05050005)	Headwaters Gauley River (0505000503)	Nicholas, Webster
	Gauley (05050005)	Outlet Gauley River (0505000508)	Nicholas
	Gauley (05050005)	Hominy Creek (0505000505)	Greenbrier, Nicholas

Watersheds Crossed by the MVP Project

Major Region (2-digit HUC)	Sub-basin (8-digit HUC)	Watershed (10-digit HUC)	County
	Gauley (05050005)	Meadow River (0505000506)	Fayette, Greenbrier, Nicholas, Summers
	Lower New (05050004)	Glade Creek-New River (0505000402)	Greenbrier, Summers
	Greenbrier (05050003)	Wolf Creek-Greenbrier River (0505000309)	Monroe, Summers
	Middle New (05050002)	Indian Creek (0505000207)	Monroe
	Middle New (05050002)	East River-New River (0505000206)	Monroe

MVP has reviewed Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for areas crossed by the Project and recorded the location of 100-year flood zones. A summary of 100-year flood zones is listed in the table below.

FEMA-100 year Flood Zones crossed by the MVP Project

County	Floodplain Waterbody	Flood Zone	Milepost
Wetzel	North Fork Fishing Creek	A	0.7
Wetzel	Price Run	A	5
Harrison	Little Tenmile Creek	AE	15.4
Harrison	Rockcamp Run	A	18.8
Harrison	Indian Run	A	23
Harrison	Salem Fork	A	25.9
Doddridge	Laurel Run	AE	34.8
Lewis	Right Fork Freemans Creek	A	42.5
Lewis	Left Fork Freemans Creek	A	45.8
Lewis	Sand Fork	A	55.1
Lewis	Indian Fork	A	58.5
Lewis	Oil Creek	A	62.2
Braxton	Falls Run	A	72.4
Braxton	Little Kanawha River	A	74.9
Webster	Left Fork Holly River	A	81.6
Webster	Oldlick Creek	A	82.3

Webster	Right Fork Holly River	A	84.1
Webster	Elk River	A	87.3
Webster	Camp Creek	A	93.1
Webster	Amos Run	A	97.6
Webster	Lost Run	AE	98.6
Webster	Laurel Creek	AE	98.9
Webster	Strouds Creek	AE	110.1
Nicholas	Big Beaver Creek	A	114.3
Nicholas	Big Beaver Creek	A	116.2
Nicholas	Gauley River	A	118.9
Nicholas	Hominy Creek	A	126.9
Greenbrier	Meadow Creek	A	140.4
Greenbrier	Meadow River	AE	144
Greenbrier	Little Sewell Creek	A	147
Greenbrier	Buffalo Creek	A	154.8
Greenbrier	Morris Fork	A	155.8
Summers	Hungard Creek	A	169.9
Summers	Greenbrier River	AE	171.4
Summers	Kelly Creek	AE	171.6
Monroe	Indian Creek	A	182.8
Monroe	Hans Creek	A	187.6
Monroe	Dry Creek	A	192

1.3 Critical Areas

Waterbodies

It is anticipated that all stream and wetland impacts within the pipeline limit-of-disturbance will be temporary, occurring during pipeline construction activities. Wetlands within the LOD but not within the pipeline trench area will be covered with timber mats during construction. Once construction in these areas is complete and the crossings are no longer necessary, the mat(s) will be removed and the resource restored and protected with the appropriate BMPs. These temporary resource impacts will not result in an adverse impact to water quality, physical or biological habitat, or aquatic species within the Project area due to the temporary stream crossing construction activities and implementing the Erosion and Sedimentation Control Plan's best management practices. The methods used includes silt fence, compost filter sock (CFS), and/or reinforced filtration devices and permanent vegetative cover. MVP will obtain all necessary local, state, and federal permits. MVP will obtain necessary clearance from county floodplain coordinators for temporary impacts within 100-year FEMA floodplains. In an effort to reduce permanent impacts, the existing culverts will not be replaced and will be spanned if necessary.

Some of the watersheds crossed by the Project are classified as Tier 3, warm water or trout streams, refer to attached table in Attachment 2. In-stream work in designated warm water streams and their adjacent tributaries is restricted during the fish spawning season of April – June. In-stream work in designated trout waters and their adjacent tributaries is restricted during the spawning season September 15-March 31st. Refer to Table 1 in Attachment 2 for a listing of affected streams. MVP may request a waiver from the West Virginia Division of Natural Resources, Wildlife Resources Section to avoid this restriction. In stream work may occur during the respective spawning season in ephemeral waters without a waiver if all reasonable measures are taken to minimize turbidity and sedimentation downstream associated with the proposed project.

Additional protective measures will be employed at crossings of and in proximity to Tier 3 and trout streams (refer to Table 1 in Attachment 2) such as:

- The use of reinforced filtration devices (defined as belted silt retention fence, triple stacked compost filter sock and/or super silt fence) at all downslope perimeters.
- Stream crossings in these areas will be completed within 72 hours once the crossing has begun.
- Permanent seeding and mulching must be accomplished within 4 days of reaching final grade.
- Temporary seeding and mulching must be accomplished within 4 days when areas will not be disturbed for more than 14 days.
- Disturbance will be limited as much as practicable.

MVP will pay special attention to the crossing of North Fork Fishing Creek (mile post 0.5) as requested by West Virginia Division of Natural Resources, Wildlife Resources Section. In order to limit potential impacts to downstream aquatic life, MVP will reduce the construction ROW to 75 feet and will keep temporary workspace areas 50 feet from this stream. Super silt fence or compost filter sock will be installed to limit sedimentation from leaving the worksite. Other Best Management Practices will be the use of timber mats for temporary vehicle crossing and trench plugs on either side of the stream.

Construction across waterbodies will be performed in a manner that minimizes the amount of time that the pipeline trenches will be left open. Construction methods at waterbody crossings will vary with the characteristics of the waterbody encountered. Typical stream crossing details are provided in the details section of the E&SCPs. Proposed methods for waterbody crossings include: dam and pump, flume, cofferdam and open-cut.

Intermediate waterbodies (between 10 and 100 feet wide at water's edge) and minor waterbodies (less than 10 feet wide at water's edge) will be crossed by the open-cut/conventional lay or dry ditch crossing methods, unless otherwise required. Where a dry-ditch crossing method is not specifically required by the FERC Procedures, the waterbody may be crossed using the open-cut crossing method.

The pipeline will be installed to provide a minimum of four feet of cover from the waterbody bottom to the top of the pipeline, except in consolidated rock, where a minimum of two feet of cover will be

required. Trench spoil will be placed on the bank above the high water mark for use as backfill. Major waterbodies (over 100 feet wide at water's edge) have been assessed on a case by case basis to determine the best crossing method and site specific construction and restoration plans. MVP proposes to use cofferdam construction open cut-dry ditch method to cross the Elk River, Gauley River, Meadow River and Greenbrier River.

Some waterbodies crossed by the Project are directly associated with or adjacent to roads or railroads. Where these roads or railroads are to be crossed using a horizontal boring machine, the waterbody will typically be included within the length of the bore. Currently, due to constructability issues, there are no HDDs planned for MVP.

West Virginia State Land

The Project crosses the Burnsville Lake Wildlife Management Area (WMA) in Braxton County, West Virginia at approximate MP 68.8 for approximately 175 feet. The Burnsville Lake WMA is a 12,579-acre wildlife area that is managed by the West Virginia Division of Natural Resources (WVDNR) and is used for hunting, fishing, and camping (WVDNR 2015). Within the Burnsville Lake WMA, the Weston Gauley Bridge Turnpike is a hiking trail listed on the National Park Service's National Recreation Trail Register and the National Register of Historic Places. This trail is located in Braxton County, West Virginia and would cross the pipeline route at MP 72.9 adjacent to Barbecue Run and Left Fork Knawl Creek. The area is remote and heavily forested. MVP plans to bore the Weston Gauley Bridge Turnpike trail therefore impacts to users of the trail are expected to be temporary and minimal.

The Project passes within 0.3 mile of the Elk River WMA and within 0.4 mile of the Big Ditch WMA. Both of these areas are USACE-owned wildlife areas that are managed by the WVDNR. The Elk River WMA is an 18,225-acre site in Braxton County, West Virginia that is managed for hunting, fishing, and camping. The Big Ditch WMA is a 388-acre site in Webster County, West Virginia that is managed for hunting and fishing (WVDNR 2015). Due to the distance from these WMAs, impacts are not expected due to construction or operation of the Project.

The proposed route is located more than 1.3 miles from the Meadow River WMA; however, a laydown yard would impact 0.3 acre of this WMA during operation. No impacts are expected during operation of the Project.

The North Bend Rail Trail (NBRT), part of the American Discovery Trail, is a 72-mile, multi-use recreational trail operated by the West Virginia State Park system. The pipeline will cross the trail at MP 26.0 where the trail crosses under US Route 50. In addition to the pipeline there will be a temporary construction laydown yard and a temporary work area directly adjacent to the trail. There is a potential that the eastern and northeastern edges of the laydown yard could overlap the trail. Temporary impacts on trail users may also include noise and visual disturbance from construction equipment while in the vicinity of the trail crossing. Users of the trail during operation of the pipeline would not be impacted. Mitigation measures during construction may include flagging of work zones, signage for trail users, and temporary trail re-

route. MVP will work with the West Virginia State Park system during final pipeline design to identify site-specific measures if needed to minimize disturbance to users of the North Bend Rail Trail in this vicinity.

Steep Terrain

In mountainous areas where the pipeline will encounter steep side slopes, MVP will employ special construction techniques where the slopes typically exceed 30 to 35 percent. Slopes of 30° or greater are identified on the attached plan sheets. In addition, MVP has developed details for potential mitigating measures which are included on the plan sheets and described in Attachment 3 – Slip Mitigation Plan. However, implementing the specific controls should be reviewed by geotechnical engineer before being installed. The steep terrain construction techniques will require expanded workspace areas. In rugged terrain, temporary sediment barriers, such as silt sock and reinforced silt fences will be installed during clearing to prevent movement of sediment off of the right-of-way. In addition, temporary slope breakers may be installed during grading in accordance with the E&SCP to reduce water runoff or divert water areas away from the disturbed areas. Construction activities on rugged terrain will be similar to the typical construction methods; however, equipment will be tethered via winch lines to other equipment at the top of the slopes to ensure the safety of the construction personnel and surrounding areas.

Karst

MVP has completed a karst hazard assessment and determined that portions of pipeline within Summers County will cross areas with the potential to contain karst features. MVP has made route adjustments to avoid areas containing dense concentrations of features, such as sinkholes, which are indicative of karst development; however, the route may encounter areas of karst geology that are not readily identifiable until construction activity. MVP will have a geotechnical contractor on site daily for construction in karst areas, which is further documented in the Karst Mitigation Plan. The contractor will be able to immediately identify potential problematic features and direct crews to immediately employ mitigation measures as needed. During construction, erosion and sediment controls will be installed along the edge of the construction right-of-way and other work areas upslope of known sinkholes or other karst features with a direct connection to the phreatic zone of the karst (i.e., groundwater).

To minimize the potential for impacts to a karst feature (e.g., sinkhole, cave opening, etc.,) or a water resource (e.g., well, spring, stream, pond) from pipeline construction in karst areas, industry-standard ESC practices will be supplemented with enhanced BMPs to accomplish the following objectives:

- Minimize the volume of stormwater and other construction-related surface water run-off;
- Minimize the permanent alteration of land surface characteristics and surface runoff patterns (existing drainage patterns and features should be taken into consideration to minimize changes to the rate that water enters the subsurface through a karst feature);
- Promote broad and shallow surface water flow dispersion with suitable spreading or diversion techniques;
- Prevent uncontrolled release of surface water and sediment to a waterbody or karst feature;
- Prevent artificial routing of storm water to karst features;
- Prevent blockage or filling of karst features;

- Do not construct artificial storm water structures within karst features;
- Prevent disposal of materials into a karst feature that will degrade the quality of water entering the subsurface through karst feature;
- Install double lines of sediment control fencing upslope of a water body or karst feature;
- Stock pile excavated material at least 100 feet from a water body so that the material cannot slough back into these areas;
- Monitor ESC and stormwater management structures periodically during construction, and particularly after precipitation events (stormwater and ESC structures include sediment control fencing, temporary detention basins, diversion berms, or containerization - clean, repair, and replace structures as necessary);
- Do not discharge hydrostatic test water in karst areas;
- Establish staging areas for the crew, equipment, hazardous materials, chemicals, fuels, lubricating oils, etc., at least 100 feet from a water body or karst feature;
- Install ESC and stormwater management structures surrounding staging areas to prevent run-on to, and then run-off and sediment migration from these sites;
- Store construction waste materials, debris, and excess materials at least 100 feet from a water body or karst features;
- Refuel and maintain construction equipment at least 100 feet from a water body or karst feature;
- Limit the removal of riparian vegetation to only when it is necessary;
- Re-vegetate all disturbed areas as soon as possible after construction using only native plants to reduce soil erosion. Annual species, such as rye or wheat, may initially be planted along with native species in areas subject to immediate soil loss, such as a steep slope, to provide rapid erosion control. Final re-vegetation should use native species only;
- Replace woody riparian vegetation unavoidably lost using native riparian plants to help prevent the spread of invasive plants;
- Where possible and practical, leave a minimum of 100-foot wide natural vegetated buffer area around a water body or karst feature. Plant a vegetative buffer of at least 100 feet around a waterbody or karst feature if the vegetation was previously cleared;
- Apply fertilizers, herbicides, pesticides, or other chemicals no closer than 100 feet of a waterbody or karst feature;
- Evaluate the establishment of vegetation after project completion and inspect all sediment control structures at one month intervals for at least 3 months. Retain sediment control structures until site stabilization is achieved;
- Remove and dispose of all debris and excess construction materials properly upon project completion;
- Remove temporary sediment/erosion control structures upon final site stabilization;
- Clay dams or breakers should be included in pipeline installation design and constructed at appropriate intervals along the trench excavation to impede subsurface flow along the trench.

If karst features are uncovered, they will be evaluated by Karst Specialists to determine the need for mitigation measures, such as stabilization. A typical mitigation method for a sinkhole would be to excavate the feature to expose its throat, and then plug the throat using graded rock or sand fill to allow drainage and minimize alteration of flow patterns. The restoration of the pipeline and temporary work space LOD to a meadow condition or better. As a result of restoring these areas to a meadow in good condition and maintaining pre-construction drainage patterns, there will be no increase in stormwater runoff rate or volume to karst features.

1.4 Soils

Project soils information was obtained from the Natural Resources Conservation Service (NRCS) Mapping Web Site, which utilizes data from the NRCS Soil Survey. The soils are listed in Attachment 4 which lists the soils potentially encountered within the project limits along with the limitations of each soil type.

2.0 Construction Sequence

Refer to the E&SC Plan drawings for the location of the proposed work and the associated BMPs. A generalized construction sequence is provided below. The construction sequence is intended to provide a general course of action in order to conform to the applicable regulatory agency requirements for temporary and permanent soil E&SCs. Necessary parts for proper and complete execution of work pertaining to this plan, whether specifically mentioned or not, are to be performed by the contractor. It is not intended that the drawings and this report show every detailed piece of material or equipment. The contractor will comply with all requirements listed in this section. The contractor may be required to alter controls based on effectiveness of controls or differing conditions encountered in the field. A copy of the SWPPP must be available at the Project site at all times.

1. At least 3 days prior to starting any earth disturbance activities, all contractors involved will notify Miss Utility of WV by calling 811 or 1-800-245-4848.
2. Install temporary erosion and sediment (E&S) controls prior to earth disturbance. Refer to best management practices (BMP) install and removal notes sheet. The appropriate BMPs should be placed around sensitive areas prior to earth disturbance. Stone construction entrances are to be provided at all locations where access roads and pipelines will be accessing or crossing a public roadway.
3. Install temporary E&S controls for stream crossings at locations shown on the E&S plans sheets. No earth disturbance activities within 50 feet of stream channels will be performed until materials needed to complete the crossing are at the location.
4. General clearing and grubbing of the trees and brush along the ROW for pipeline trenching may commence to the width specified in the ROW agreements or construction alignment sheets, whichever is less. Smaller debris such as shrubs and limbs are to be chipped and utilized on-site as part of the soil stabilization. Unless otherwise directed by the landowner, logs will be either

hauled off-site or given to the landowner upon their request; stumps and/or logs will be ground, chipped, windrowed, or hauled off-site.

5. Install temporary waterbars immediately after initial disturbance of the soil in accordance with the waterbar spacing and sizing requirements shown on the plan and detail sheets. Waterbars will be constructed of soil, and used to reduce runoff velocity and divert water off the pipeline ROW. Waterbars will be installed with compost filter sock at the discharge end.
6. Excavate pipeline trench and begin grading of proposed meter and rectifier anode bed sites. The proposed construction ROW and extra workspaces are to be used as a work area for trench excavation, equipment movement and the temporary storage of soil stockpiles, as needed. Equipment, soil stockpiles and other materials are to remain upslope of BMPs during construction activities. Refer to BMP installation and removal sequence for the BMPs to be used for the protection during trench excavation and around temporary soil stockpiles. Segregation of topsoil and subsoil will be formed where trench excavation takes place in an agricultural, wetland, or residential area.
7. Pipeline sections will be transported to the work area and strung along the working side of the ROW parallel to the trench line. Welding can occur in or out of the trench. The pipeline will be bent to conform to the trench contour and placed on temporary supports alongside the trench. Welds will be visually and radio-graphically inspected and repaired as necessary. The pipe section will be lowered into the trench and placed on padding per MVP construction standards. Any wetness encountered during construction work will be dewatered by using pumps, hoses, and pumped filter (dewatering) bags, and will be discharged to a well vegetated, upland area. No standing water is permitted in the pipe trench, except in wetland areas.
8. Stream pipeline crossing construction methods will be installed at locations shown on the E&S plan sheets and as specific on detail sheet. Stream bank stabilization will be installed immediately following completion of pipeline installation as shown on the attached detail sheet.
9. Install trench breakers at locations shown on the drawings or as directed by MVP or as specified on the detail sheet.
10. The trench will subsequently be backfilled with suitable excavated material. The backfill material will be slightly crowned in upland areas to allow for settlement that may occur. Crowning the soil slightly over the pipeline will help prevent future storm water-related problems from settling of the backfilled area. No crowning of soils will take place in wetlands, streams or floodplains. In areas where topsoil has been segregated, the subsoil will be replaced first, and then the topsoil will be spread over the area from which it was removed. Disturbed areas will be restored to their approximate original topographic contours.
11. Stabilize exposed and unworked soils by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water, and wind. Areas at final grade should be seeded and mulched or otherwise stabilized within 7 days and areas that will not be worked again for 21 days or more must be seeded and mulched or otherwise stabilized within 7 days.
12. In the unlikely event that there are excess excavated materials remaining after the trench has been backfilled, the material is to be disposed of within the existing ROW in an upland area

outside of the 100-year floodplain. Material will be spread in a thin layer and tied into existing contours to create positive drainage for stormwater runoff.

13. Construct permanent waterbars after completion of grading in accordance with the waterbar spacing and sizing requirements shown on plan and detail sheets. Permanent waterbars are not permitted in agriculture or pasture lands.
14. Revegetated disturbed area per tables in Section 11.0 or per landowner request. For 3:1 or steeper slopes the disturbed area will have erosion control fabric (blanketing, hydroseeding, Flexterra, or approved equal) installed as shown on the detail sheet. Blanketing is not permitted in agriculture or pasture lands.
15. Re-establish appropriate drainage in existing road channels prior to seeding and mulching.
16. Inspection of all erosion and sedimentation controls within disturbed areas will be, at a minimum, performed once every seven calendar days and within 24 hours after any storm event greater than 0.5 inches per 24 hours period. Repairs or maintenance shall be performed immediately to BMPs. A final inspection shall be requested once there is uniform, perennial 70 percent vegetative stabilization; 80 percent in the Jefferson National Forest. The 70 or 80 percent requirement refers to the total area vegetated. Disturbed areas not attaining a uniform, perennial 70 or 80 percent vegetative coverage shall be re-seeded as needed until uniform, perennial 70 or 80 percent vegetative coverage is established.
17. All pollutants, including waste materials and demolition debris that occur on site during construction shall be handled and legally disposed of in accordance with state and federal regulations. Woody debris may be chopped and spread on-site.

For stream crossings, refer to the following steps and Section 3.3.1:

1. Install temporary equipment bridge, bypass hose, flume, pump, or cofferdam as described in Stream Crossing details around the work area.
2. Dewater work area utilizing pump water filter bags. Where possible, excavation will be from the top of the stream bank. Stockpile stream bed material separately from other soils to be used during stream restoration activities.
3. Install trench plugs, pipe, and backfill. Stockpiled stream bed material will be the last material restored in the stream channel.
4. Stabilize channel excavation and stream banks prior to redirecting stream flow.
5. Remove bypass hose, flume, pump, and temporary dam as needed.

Additional protective measures will be employed at crossings of Tier 3 and trout streams (refer to Table 1 in Attachment 2) such as:

- The use of reinforced filtration devices (defined as belted silt retention fence, triple stacked compost filter sock or super silt fence) at all downslope perimeters.
- Stream crossings in these areas will be completed within 72 hours once the crossing has begun.
- Permanent seeding and mulching must be accomplished within 4 days of reaching final grade.
- Temporary seeding and mulching must be accomplished within 4 days when areas will not be disturbed for more than 14 days.

- Disturbance will be limited as much as practicable.

If working within a wetland area, follow the generalized construction sequence below:

1 Install either RFDs or compost filter socks along the perimeters of the site as shown on the construction drawings.

2. Mats, pads, or similar devices will be used during the crossings of wetlands. Original grades through wetlands must be restored after trenching and backfilling. Any excess fill materials must be removed from the wetland and not spread within wetlands.
3. Soil excavated from wetland areas will be carefully removed with the roots intact. This soil should be placed in a separate stockpile to be reused during the wetland surface restitution.
4. Dewater work area utilizing pump water filter bags.
5. Install pipe.
6. Install trench plugs in wetland areas to prevent the trench from draining the wetland or changing its hydrology.
7. Backfill pipe trench. Backfill the top 12-inches of the excavated trench with the stockpiled wetland soil to match original surface grades.
8. Compact backfill and grade the surface of the trench area to allow for positive drainage to soil E&SCs and to prepare disturbed areas for permanent trench restoration.
9. Maintain all E&SCs devices until site work is complete and a uniform 70-percent perennial vegetative cover is established; 80-percent is required in the Jefferson National Forest.
10. Remove all soil and E&SC measures upon establishment of a uniform 70-percent vegetative cover over the disturbed area; 80-percent is required in the Jefferson National Forest. Re-grade and revegetate areas disturbed during the removal of the soil E&SCs.

3.0 Erosion and Sediment Control Measures

General stabilization and structural controls will be used in sediment and erosion control practices to 1) divert stormwater flows away from exposed areas, 2) convey runoff, 3) prevent sediments from moving off-site, and 4) reduce the erosive forces of runoff waters.

1. Mark Clearing Limits

Clearing limits will be staked and visibly flagged prior to construction. Adjacent sensitive areas and no-access roads will utilize signage and/or orange construction fence.

2. Establish construction access

The majority of access to the site will be via existing access roads. Access roads will include the installation of a stabilized rock construction entrance to remove sediment prior to exiting the site. Stabilized construction entrances will follow the WVDEP standard detail provided in the BMP manual. In instances where there are private residential driveways along the access roads, the stabilized construction entrance

has been moved past the residential driveways. This was done to prevent the residences from driving over the rock construction entrances.

3. Install sediment controls

The E&SC Plan utilizes several best management practices throughout the project area to prevent sediment from leaving the site. As depicted on the plans, controls will be placed along the boundary of sensitive areas, at stream and wetland crossings, downslope of all stockpiles, and where the potential exists for off-site sediment transport. The BMPs to be used throughout this project include:

- Rock Construction Entrance
- Temporary ROW Diversion Berm and Sediment Trap Outlet
- Silt Fence, Super Silt Fence and Belted Silt Retention Fence
- Compost Filter Sock
- Waterbars
- Trench Plugs
- Pumped Water Filter Bag
- Erosion Control Blanket/Flexterra/or equivalent
- Vegetative Stabilization

Instream BMPs

If a stream crossing or encroachment is required, work will be in accordance with state and federal permits. Refer to E&SC detail sheets for stream crossing details. Procedures that will be followed at stream crossing locations include the following:

- Minimize clearing and grubbing of vegetation up to streams, as possible, until the time of pipeline installation.
- Only that area which is required for pipeline installation shall be disturbed within the proposed LOD at stream crossings;
- Locating staging areas 50 feet away from the stream, where possible;
- Storing chemicals, storing equipment, washing equipment, or refueling equipment must be done in areas that are greater than 100 feet away from stream;
- Spoil placement and BMPs will be monitored at all times during stream crossing procedures; once work within a stream area is started, it will be conducted continuously to completion, emphasis will be placed on minimizing time of disturbance
- Construction activities will be scheduled so that the trench is excavated immediately prior to pipe laying activities. The duration of construction within each waterbody will be limited to 24 hours for minor waterbodies (10 feet wide or less) and 48 hours for intermediate waterbodies (greater than 10 feet wide but less than or equal to 100 feet in width).
- Spoils from stream crossings must be placed at least 10 feet from the water's edge; and
- Construction equipment will not be allowed in the stream channel when excavation can be done from either side or a temporary crossing while working at the stream crossing.

Dry Crossing Techniques

These techniques will be used to perform pipeline work in a relatively dry working condition or around the open excavation. These techniques include dam and pump around and flumed crossings, however the process is limited by stream size, flow, and water depth. Larger streams with greater flow or width that require dry working conditions will utilize cofferdam construction.

E&S control measures will be installed prior to any earth disturbance and addressed if necessary immediately after disturbance of the waterbody.

- Flume Pipe Method. Please see detail sheets for a detail of the flume method. This procedure involves construction two bulkheads, either sandbags or plastic dams, to direct the stream flow through a flume pipe placed over the trench prior to excavation. The flume shall be aligned as to prevent bank erosion and bed scour. The flume will not be removed during trenching, pipe laying, or backfilling.

- Pump Around Method. Please see the detail sheets for a detail of the dam and pump method. This procedure involves construction two bulkheads, either sandbags or plastic dams. The upstream dam will cause the water to pond where it can be pumped around the work area and be discharged behind the downstream bulkhead. Pumps of sufficient size to transmit the flow downstream will be used. Backup pumps must be on-site. Pump intakes must be screened. Pump discharges must not cause scour.

- Cofferdam – Please see the detail sheets for a detail of the cofferdam construction method. This procedure involves constructing a cofferdam around a portion of the stream crossing utilizing a combination of, but not necessarily all, sand bags, jersey barriers and stone. Following the installation of the cofferdam the water within the work area is pumped through a discharge filter bag and the construction will proceed with installation of the pipe in the dry open ditch. Following installation of the section of pipe the stream bed is restored, water is re-introduced to the work area and the cofferdam is removed. Then construction moves to the opposite-uncompleted side of the stream and the process is repeated to complete the crossing.

- Portadam™ - Please see the detail sheets for a detail of the Portadam™ (or equivalent) construction method. This procedure is similar to the Cofferdam procedure and involves installing a Portadam™ (or equivalent) structure. Following the installation of the structure, the water within the work area is pumped through a discharge filter bag. The construction will proceed with installation of the pipe in the dry open ditch. Following installation of the section of pipe the stream bed is restored, water is re-introduced to the work area and the cofferdam is removed. Then construction moves to the opposite-uncompleted side of the stream and the process is repeated to complete the crossing

Stream Bank Stabilization

Permanent stabilization shall occur immediately upon installation, backfilling, and grading at each stream crossing.

Temporary Stream Crossings

Temporary stream crossings, consisting of bridges of timber mats or clean rock fill and flume(s), will be installed to cross minor or intermediate streams. Timber mats shall be used to cross smaller streams where the span of the mat will stretch from bank to bank. Clean rock fill and flumed crossings will be utilized where it is not feasible to utilize timber mats. As an alternative, portable bridges may be used instead for small crossings. Equipment will not be allowed to ford flowing streams during construction activities. Temporary road crossings of streams must maintain adequate flow downstream.

4. Stabilize Soils

After pipeline installation, previously excavated material will be used to backfill the pipeline trench and restore the grade to pre-excavation conditions. The first 12 inches above the top of the pipe will be clean fill free of rocks from the excavation; where the previously excavated material contains large rocks or other materials that could damage the pipe or coating, clean fill will be used to protect the pipe. If additional fill is required, it will be either flowable fill or topsoil.

To prevent mixing of the soil horizons or incorporation of additional rock into the topsoil, topsoil segregation (topsoil set in a separate pile) will be performed in non-saturated wetlands, croplands, pastures, hayfields, and in areas requested by the landowner. Implementing proper topsoil segregation will help ensure post-construction revegetation success, thereby minimizing loss of crop productivity and the potential for long-term erosion problems. Up to 12 inches of topsoil will be removed from the ground surface, segregated, as appropriate, from all subsoil and replaced in the proper order during backfilling and final grading. Where topsoil is less than 12 inches deep, the actual depth of the topsoil will be removed and segregated. Segregated topsoil will be placed in the trench following subsoil backfilling. Topsoil segregation may not be practical in saturated wetlands with standing water.

The plans specify the utilization of temporary and permanent seed mixes, mulching and lime in accordance with the WVDEP BMP Manual (refer to Section 11.0).

Any additional subsoil material from pipeline trenching activities will be spread thinly (2-3 inches) along the ROW and within the disturbance limits in upland areas and revegetated. Additional material may not be placed within wetlands and streams. After installation of the pipeline, the site will be restored to approximate original contour and revegetated to a meadow condition with no proposed impervious surfaces. Waste/borrow sites are not anticipated to be utilized. Waste material not suitable for on-site stockpile or backfill, or excess soil that cannot be used on-site will be disposed of at a WVDEP approved waste disposal facility with an approved E&SCP.

Permanent above ground facilities for compressor stations and interconnect sites will be addressed under a separate SWPPP.

5. Protect Slopes

MVP will employ special construction techniques where the slopes typically exceed 30 to 35 percent. Slopes that of 30 degrees or greater are identified on the attached plan sheets. In addition, MVP has developed details for potential mitigating measures which are included on the plan sheets and described in Attachment 3 – Slip Mitigation Plan.

The E&SC Plan depict placement of erosion control blanket/soil stabilization matting (or approved equivalent such as hydromulching) on all slopes greater than 20-percent. Plan details provide for installation of slope matting according to manufacturer specifications.

Waterbars (ROW Diversions) are depicted on the plans and are placed along the pipeline following spacing specification in the WVDEP BMP Manual. The waterbar discharge will be controlled by outlet protection such filter socks.

6. Convey Stormwater in a Non-Erosive Manner

The pre-construction drainage patterns surrounding the project will be maintained. All disturbed areas within the pipeline LOD will be restored to a meadow in good condition. As a result of restoring the pipeline LOD and associated workspaces to a meadow in good condition and maintaining pre-construction drainage patterns, there will be no increase in stormwater runoff rate or volume.

Permanent above ground facilities for compressor stations and interconnect sites will be addressed under a separate SWPPP.

7. Control Other Pollutants

The operator will remove from the site, recycle, or dispose of all building materials and wastes in accordance with the WVDEP BMP Manual. The contractor will not illegally bury, dump, or discharge building material or wastes at the site. Sediment removed from BMPs will either be spread in a protected area to dry and then recycled as fill material or disposed of off-site. In cases where disposal is necessary, waste materials are to be disposed of at an approved WVDEP waste disposal facility in accordance with state and federal regulations.

8. Control Dewatering

Localized trench dewatering will be in accordance with the WVDEP BMP manual and recommendations. Dewatering will occur with a dewatering filter bag and will outfall to a well-vegetated area or through a filter sock outlet protection. Trench plugs will be used to prevent the excavation from draining or changing the hydrology of water resources. Discharges from upland dewatering should not occur within wetlands or on streambanks.

9. Maintain BMPs

Temporary and permanent E&S control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with West Virginia DEP, Division of Water and Waste Management, Erosion and Sediment Control Best Management Practice Manual, 2006.

E&SCs on the site will be inspected at least once every seven calendar days and within 24 hours after any storm event equal to or greater than 0.5 inches of rain per 24-hour period.

Repairs or maintenance shall be performed immediately to BMPs.

All public and private roads adjacent to a construction entrance must be inspected and cleaned of debris originated from the construction site as necessary.

Specific maintenance will include:
Rock Construction Entrance – thickness of the stabilized construction entrance will be constantly maintained to the specific dimensions by adding rock as needed. The entrance will be cleaned and redressed when voids become choked with mud and sediment.

Compost filter sock/silt fence - accumulated sediment will be removed as required, and in all cases where uniform accumulations are ½ the above ground height of the filter sock/fence. Any accumulated earth behind the filter sock/fence will be disposed of by the Contractor in such a manner that the removed earth will not be excessively eroded and transported into a waterbody or wetland.

The filter sock/fence installation should be inspected weekly and within 24 hours after any storm event greater than or equal to 0.5 inches of rain per 24-hr period. Loosened support stakes will be removed and new stakes driven. Filter socks/fence will be maintained and repaired as per manufacturer specifications.

Cross drain culverts with outlet protection – cross drain culverts with outlet protection should be inspected weekly and within 24 hours after any storm event greater than or equal to 0.5 inches of rain per 24-hr period. They should be maintained to ensure that the culvert inlet is free of debris so as to allow for proper flow. Damaged culverts and/or outlet protection should be repaired or replaced immediately.

Erosion Control Blanket – the erosion control blanket will be checked for torn or loose stapled areas.

Vegetative Stabilization – vegetative stabilization will be periodically inspected for proper growth. Any areas not responding will be promptly reseeded. Areas which show signs of erosion prior to stabilization will be re-graded, re-seeded and re-mulched as soon as possible.

Waterbars– waterbars should be inspected weekly and after all rainfall events. They should be maintained to ensure that the specified design dimensions and protective lining are available at all times. Damaged waterbars should be repaired or replaced immediately.

10. Manage the Project

A copy of the E&SC Plans and appropriate inspection/maintenance logs are to be kept on site at all times during active construction. A copy of the Groundwater Protection Plan will be kept onsite during construction.

The project will be generally maintained in accordance with the following:

- Coordination with Utilities – Notify Miss Utility of WV by calling 811 or 1-800-245-4848 at least 3 days prior to construction.
- Inspection and Monitoring – E&SC BMPs will be inspected at least once every seven calendar days and within 24 hours after any storm event greater than or equal to 0.5 inches per 24 hour period. Temporary and permanent E&S BMPs will be maintained and repaired as needed.
- Reporting – The E&S plan holder will notify the WVDEP of any spill/discharge of pollutants within 24 hours.
- Equipment Maintenance – Maintenance of equipment will be performed using generally accepted practices, including plastic mats, drip pans, etc.

11. Stabilization

11.1 Seedbed preparation

The seedbed must be loose at the time of seeding. The seedbed must be loosened by disking on the contour, or by bulldozer tracking up and down the slope. Backblading is acceptable on gentle slopes or road bed.

11.2 Permanent and Temporary Seeding

Temporary vegetative cover must be established where runoff will go directly into a stream. Stabilization measures will be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than seven days after the construction activity in that portion of the site has permanently ceased.

Where the initiation of stabilization measures by the seventh day after construction activity temporarily or permanently ceases is precluded by natural causes, stabilization measures will be initiated as soon as conditions allow.

Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g., the total time period that construction activity is temporarily halted is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the seventh day after construction activities have temporarily ceased.

Planting of permanent vegetative cover will be performed on all disturbed areas. Lime and fertilizer rates will be applied to all permanent seeding at the time of seedbed preparation.

Inspection shall be requested once there is uniform, perennial 70 percent vegetative coverage established. Temporary BMPs will be removed upon achieving vegetative stabilization. The 70 percent requirement refers to the total area vegetated and not a percent of the site. Disturbed areas not attaining a uniform, perennial 70 percent vegetative coverage shall be re-seeded as needed until uniform, perennial 70 percent vegetative coverage is established.

Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agriculture areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

Restoration will be considered successful if the disturbed surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the landowner or land managing agency), revegetation is successful, proper drainage has been restored, and the appropriate federal and state agencies approve.

Wetlands along the proposed pipeline are expected to exhibit varying degrees of saturation and water elevation, requiring a variety of plant species to be re-established. In unsaturated wetlands, most vegetation will be replaced by seeding. Saturated wetlands will typically be allowed to re-vegetate naturally. Wetland revegetation will be considered successful when the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. Revegetation efforts will continue until wetland revegetation is successful.

Recommended Permanent and Temporary Seed Mixtures and Fertilizer/Mulch for Revegetation of Upland Areas

Item	Uplands	
Permanent Seed and Mulch Application Rates		
Seed[1]	Kentucky 31 tall fescue	65 pounds per acre
Seed[1]	Empire Birdsfoot Trefoil (1/2 Empire, 1/2 Viking)	5 pounds per acre of inoculated seed
Seed[1]	Redfescue	20 pounds per acre
Lime	Agricultural Grade (Pellet Form)	2 Tons per acre without a soil test
Fertilizer	10-20-20	1/2 ton per acre
Mulch	Cereal Straw	3 tons per acre
Temporary Seed and Mulch Application Rates		
Seed[1]	Annual Ryegrass	40 pounds per acre
Mulch	Cereal Straw	3 tons per acre

Notes

1 – all seed is pure live seed

2 – unless otherwise requested by landowner in ROW

Revegetation of Wetland Areas

Item	Wetlands[2]	
Seed[1]	Annual Ryegrass	48 pounds per acre

Notes

1 – all seed is pure live seed

2 – do not apply mulch, fertilizer, or lime in wetland areas

Alternate Permanent Seed Mixtures

Item	Alternate No. 1	
Permanent Seed and Mulch Application Rates		
Seed[1]	Alfalfa	18 pounds per acre
Seed[1]	Clover	5 pounds per acre

Item	Alternate No. 2	
Permanent Seed Application Rates		
Seed[1]	Orchard Grass	30 pounds per acre
Seed[1]	Clover	5 pounds per acre

Item	Alternate No. 3 - Wildlife Seed Mix
Permanent Seed Application Rates	

Seed[1]	ERNMX - 260 PA Piedmont Province UPL Mix: 26% Indiangrass 20% Virginia Wildrye 7% Purpletop 4% Deertongue	 26% Little Bluestem 10% Big Bluestem 5% Switchgrass 2% Purple Lovegrass	20 pounds per acre

Notes

1 – all seed is pure live seed

2 – contractor to use alternate seed mixtures if specified per landowner request

11.3 Jefferson National Forest Permanent and Temporary Seeding

MVP will follow the USFS's recommendations for restoration and rehabilitation of the permanent ROW, as defined in the Plan of Development, to reduce impacts to visual resources, in a manner that preserves MVP's ability to access, monitor, patrol, and inspect the ROW in accordance with PHMSA requirements (49 CFR Part 192). MVP consulted with the USFS regarding appropriate seed mixtures for use within the Jefferson National Forest (JNF). The USFS indicated that the initial goal of seeding on the JNF is to establish vegetative cover to minimize surface erosion and sedimentation, while the secondary goal is to establish an assortment of native species congruent with local ecological communities and benefits for wildlife and pollinators. Species recommended by the USFS are identified on the Typical Details developed specifically for the Jefferson National Forest for use in upland, riparian, and steep slope areas are comparable to those species contained in the seed mixes prepared by Ernst Conservation Seeds, Inc. As such, MVP will apply the herbaceous seed mixes identified on the details in appropriate areas within the JNF.

As requested by the USFS, all leguminous seeds shall be either pre-inoculated, or mixed with inoculant specified for use on that particular seed according to manufacturer's directions. Inoculants shall be manually applied at double the manufacturer's rate and inoculant shall be mixed with legume seed prior to mixing with other seeds. For hydroseeding, a minimum of five times the dry seeding rate of inoculant will be used.

Seeding will occur promptly after construction is complete; however, if ground conditions delay restoration until the following spring, the ground will be mulched and seeding will take place during the next growing season. Additionally, if seeding must occur outside the normal seeding season a temporary erosion control seed mix will be applied, and either a permanent erosion control seed mix or native seed mix will be applied during the next normal seeding season. Seed will be uniformly applied using a broadcast seeder, drill, or hydroseeder. When dryseeding, the seeding depth should be ¼ to ½ inch.

Temporary BMPs will be removed upon achieving vegetative stabilization. In the Jefferson National Forest property vegetation is considered stabilized once there is 80 percent coverage. The 80 percent requirement refers to the total area vegetated and not a percent of the site. Disturbed areas not attaining a uniform, perennial 80 percent vegetative coverage shall be re-seeded as needed until uniform, perennial 80 percent vegetative coverage is established.

4.0 Construction Schedule/Phasing

Clearing is expected to commence in October 2017 and pipeline construction is anticipated to begin March 2018 with a target full in-service date for the Project of November 2018. The order in which each facility will be constructed may vary, depending upon numerous factors, including the receipt of necessary authorizations, the capabilities of each contractor, available work force, and optimized logistics.

4.1 Construction Schedule

Construction Schedule for Major Components of the Project

Component	Commence Activity	Complete Activity
Establish construction access, install site control BMPs, clear ROW and workspace	October 2017	March 2018
Pipeline Construction	March 2018	October 2018
Compressor Stations	October 2017	November 2018
Final Restoration	On-going per spread	November 2018
Hydrostatic Testing	October 2018	November 2018

MVP will utilize 8 construction spreads to construct the pipeline in WV. The table below provides spread by beginning and ending MP, length and construction year.

Proposed Spreads for Pipeline Construction

Spread	Begin MP	Ending MP	Mainline Length (Miles)	Construction Year	Spread Length (Miles)
1	0	25.9	25.9	2018	25.9
2	25.9	48.05	22.15	2018	22.15
3	48.05	77.6	29.55	2018	29.55
4	77.6	104.7	26.65	2018	26.65
5	104.7	127.9	23.65	2018	23.65
6	127.9	154.2	26.3	2018	26.3
7	154.2	181.8	27.6	2018	27.6

8	181.8	End of WV section	22.95	2018	22.95

ATTACHMENT 1

USGS Location Maps

USGS Location Maps not associated with the

U.S Army Corps of Engineers or Jefferson

National Forest have been redacted

Mountain Valley Pipeline Project

NAD 1983 UTM 17N

1:24,000

0 0.5 1 Miles

Mountain Valley PIPELINE

Appendix B
USGS 7.5 Minute
Topographic Maps

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August 2017

Legend

- Mainline Block Valve
- Mile
- Tenth-mile
- October 2016 Proposed Route
- Weston and Gauley Bridge Turnpike Trail
- Army Corps of Engineers Reservoir

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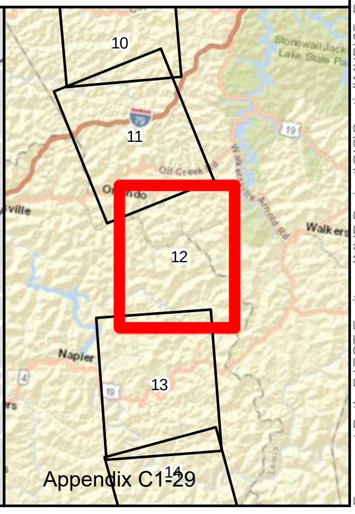

Appendix C1-29

Data Sources: ESRI Streaming Data, 2014, ESRI, 2014, Ventyx, 2014.

May 10, 2023

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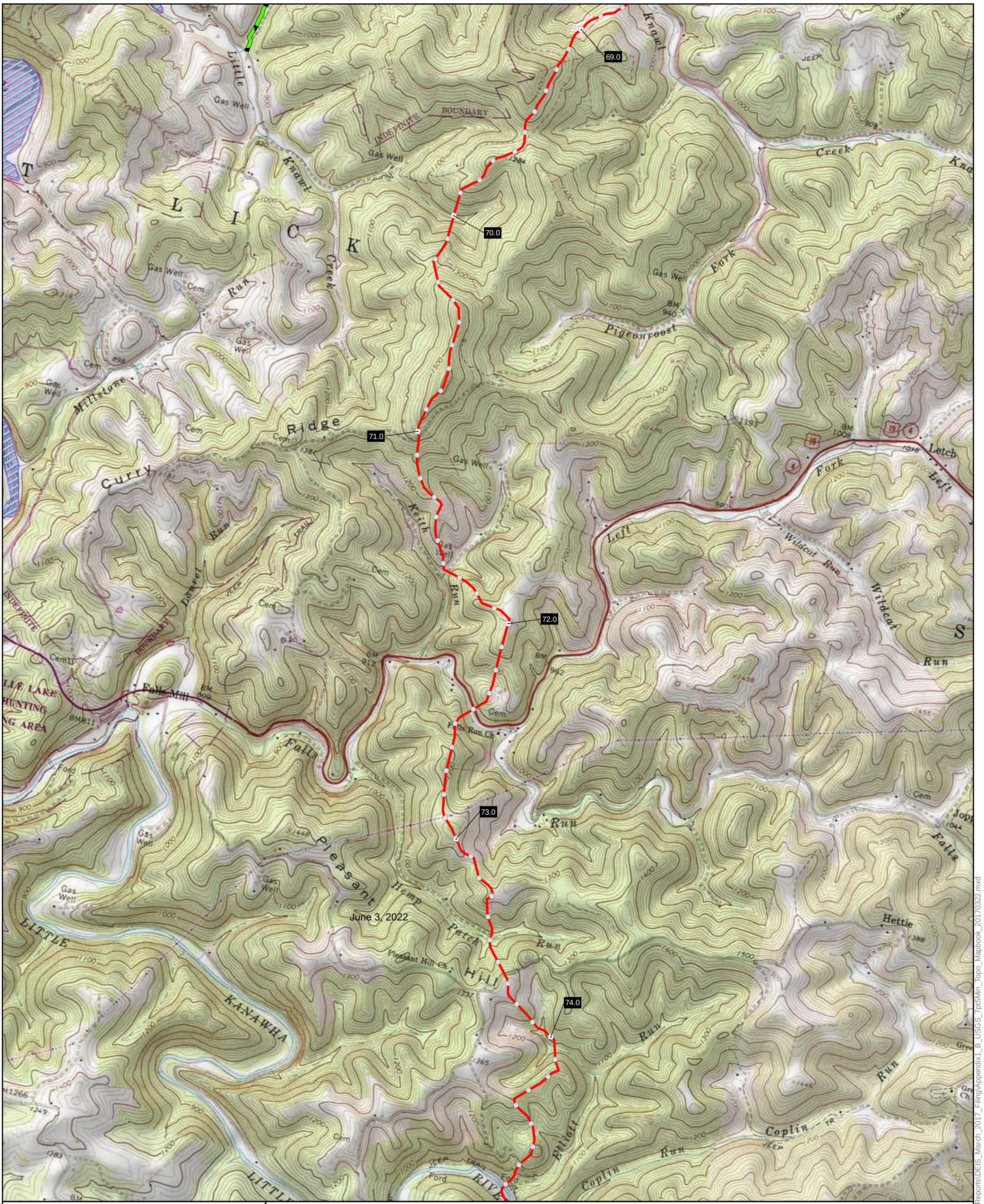

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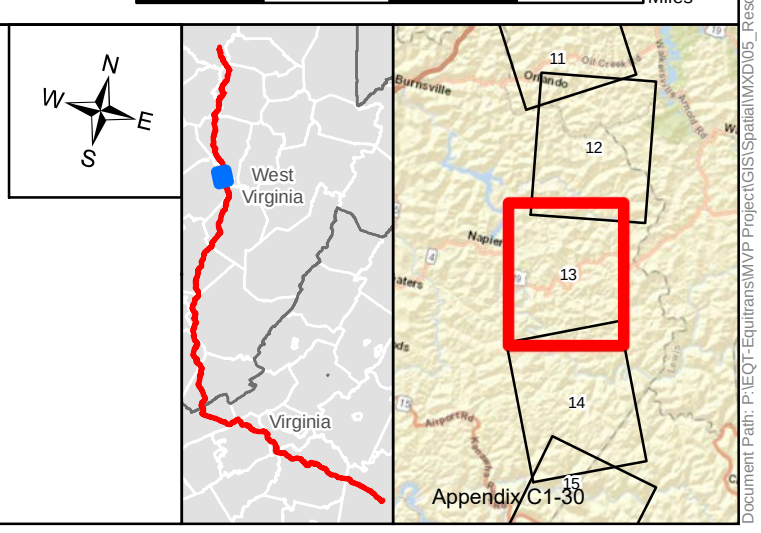

Data Sources: ESRI Streaming Data, 2014, ESRI, 2014, Ventyx, 2014.

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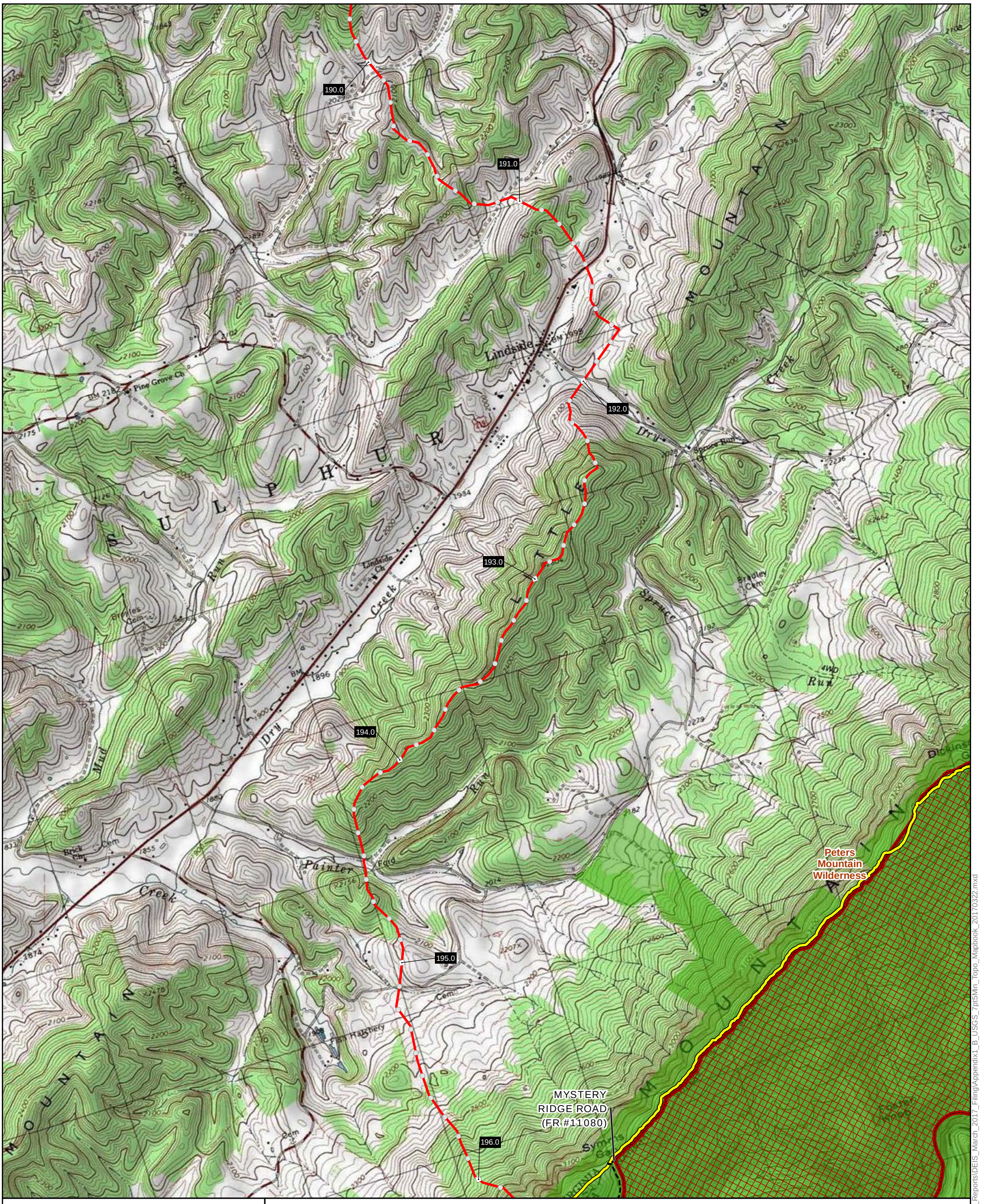

Mountain Valley Pipeline Project

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Mountain Valley PIPELINE

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USGS 7.5 Minute
Topographic Maps

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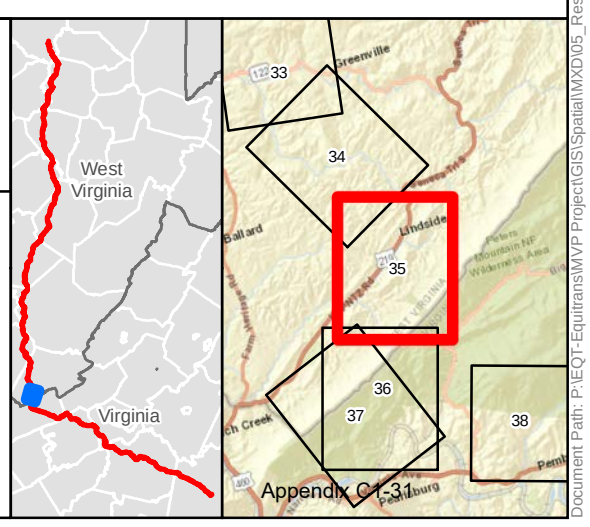
August 2017

Data Sources: ESRI Streaming Data, 2014, ESRI, 2014, Ventyx, 2014.

Legend

- Mile
- Tenth-mile
- October 2016 Proposed Route
- U.S. Forest Service Road
- Appalachian National Scenic Trail
- Peters Mountain Wilderness, Addition A
- U.S. Forest Service (National Forest) Lands



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MYSTERY RIDGE ROAD (FR #11080)

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197.0

198.0

199.0

200.0

Peters Mountain Wilderness

Mountain Valley Pipeline Project

NAD 1983 UTM 17N

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Mountain Valley PIPELINE

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August 2017

Data Sources: ESRI Streaming Data, 2014, ESRI, 2014, Ventyx, 2014.

Legend

- Mainline Block Valve
- Mile
- Tenth-mile
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- U.S. Forest Service Road
- Appalachian National Scenic Trail
- Peters Mountain Wilderness, Addition A
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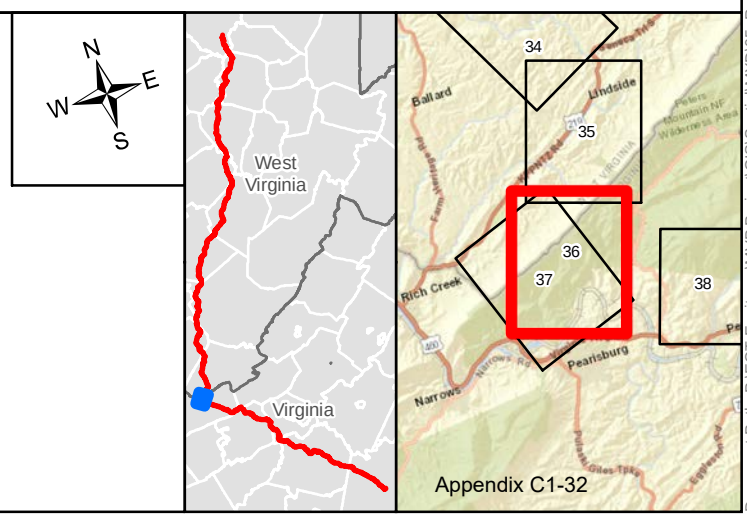
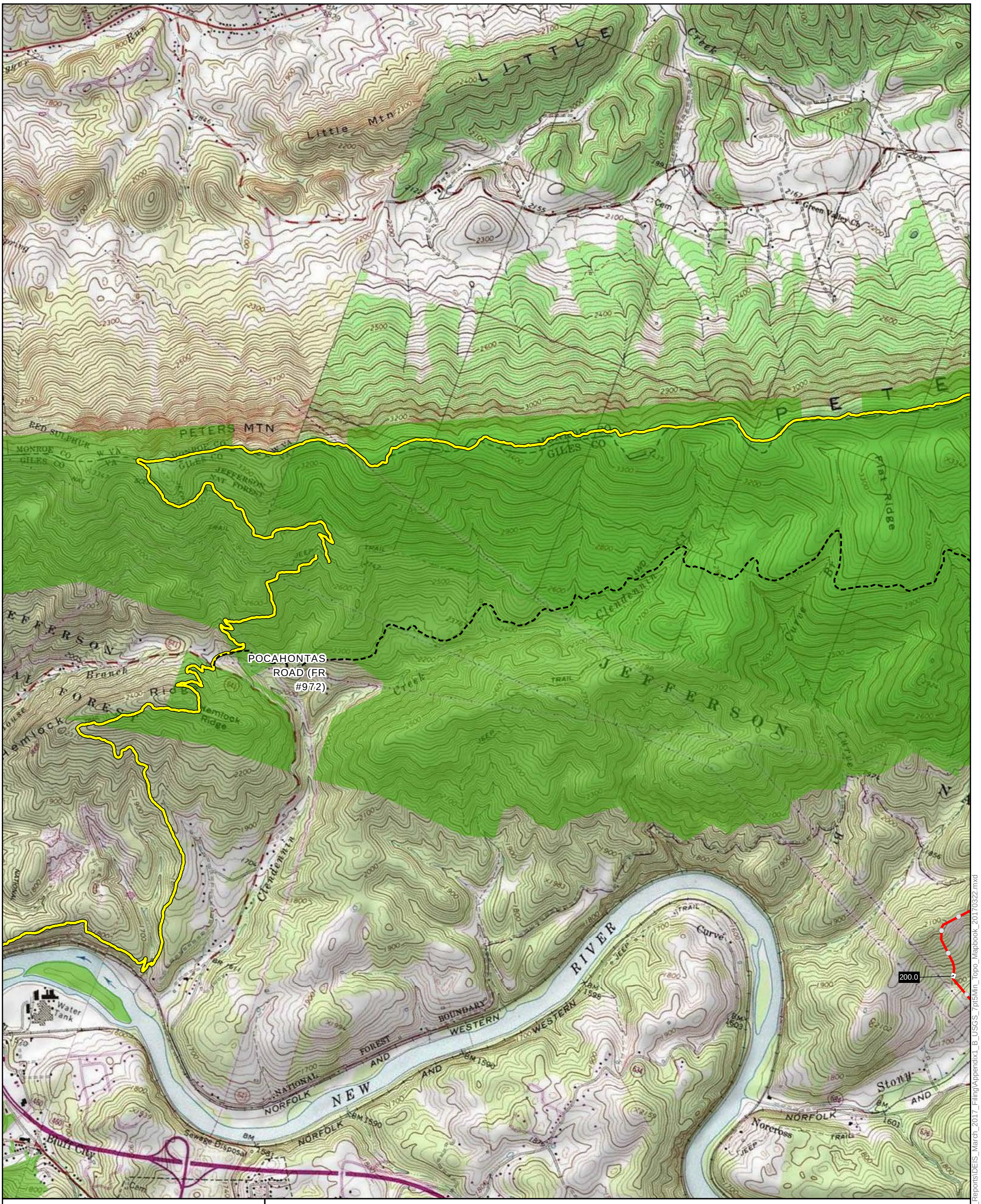
May 10, 2023



Appendix C1-32



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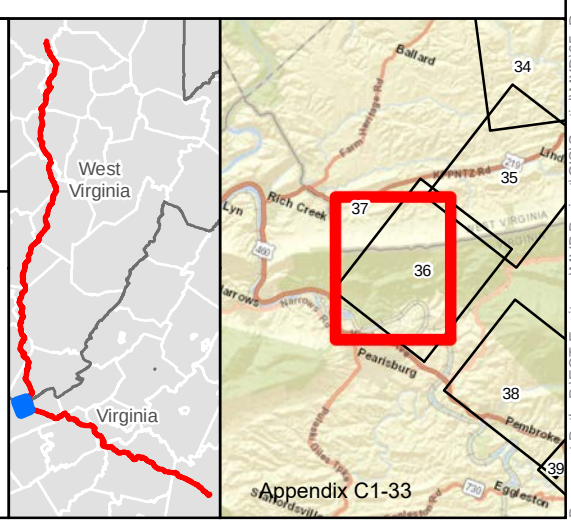
- Appalachian National Scenic Trail
- U.S. Forest Service (National Forest) Lands



Data Sources: ESRI Streaming Data, 2014, ESRI, 2014, Ventyx, 2014.

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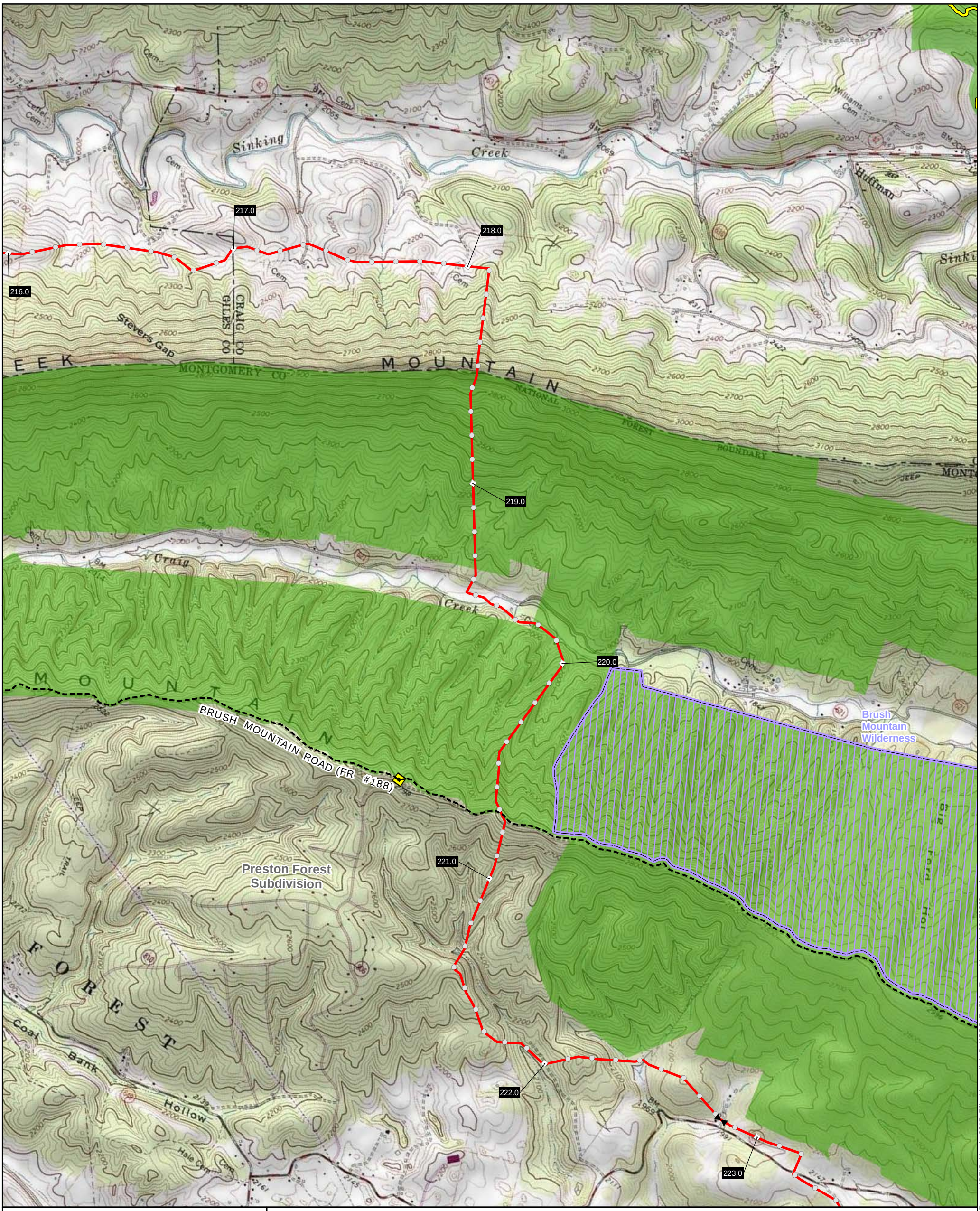

Mountain Valley Pipeline Project

NAD 1983 UTM 17N

1:24,000

0 0.5 1 Miles

Mountain Valley PIPELINE

Appendix B
USGS 7.5 Minute
Topographic Maps

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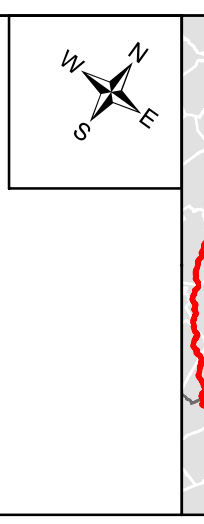
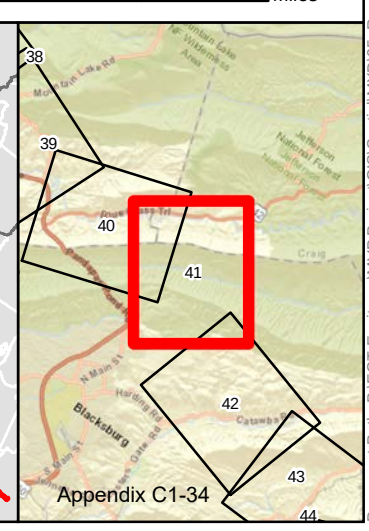
August 2017

Data Sources: ESRI Streaming Data, 2014, ESRI, 2014, Ventyx, 2014.

Legend

- Seasonal Gate
- Mainline Block Valve
- Mile
- Tenth-mile
- October 2016 Proposed Route
- U.S. Forest Service Road
- Appalachian National Scenic Trail
- Brush Mountain Wilderness
- U.S. Forest Service (National Forest) Lands





May 10, 2023

ATTACHMENT 2

Special Protected Streams Crossed by

Project

No West Virginia Special Protected are

crossed on U.S Army Corps of

Engineers or National Forest Lands

ATTACHMENT 3

Landslide Mitigation Plan

See Plan of Development Appendix F

ATTACHMENT 4

Soils Report

Soils Report Tables not associated with the

U.S Army Corps of Engineers or Jefferson

National Forest have been redacted

Milepost	County	Symbol	Soil Name	Farmland Type	Slope	Ground Cover	Hydric	Drainage	Particle Size	Depth to Bedrock
49.4-49.5	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
49.5-49.7	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
49.7-49.9	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
49.9-50.2	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
50.2-50.5	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
50.5-51.1	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
51.1-51.2	Lewis	GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	Farmland of statewide importance	20	-	No	Well drained	fine-loamy	76
51.2-51.3	Lewis	Su	Sensabaugh silt loam	All areas are prime farmland	2	-	No	Well drained	fine-loamy	-
51.3-52.3	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
52.3-52.4	Lewis	GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	Farmland of statewide importance	20	-	No	Well drained	fine-loamy	76
52.4-52.5	Lewis	VaD	Vandalia silt loam, 15 to 25 percent slopes	Farmland of statewide importance	20	Tame pastureland	No	Well drained	fine	-
52.5-55.2	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
55.2-55.3	Lewis	Cn	Chagrin silt loam, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	1	Hayland	No	Well drained	fine-loamy	-
55.3-58.7	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
58.7-58.8	Lewis	VaE	Vandalia silt loam, 25 to 35 percent slopes	Not prime farmland	30	Tame pastureland	No	Well drained	fine	-
58.8-60.2	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
60.2-60.3	Lewis	Uf	Udorthents, smoothed	Not prime farmland	-	-	No	-	not used	-
60.3-60.4	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
60.4-60.5	Lewis	VaD	Vandalia silt loam, 15 to 25 percent slopes	Farmland of statewide importance	20	Tame pastureland	No	Well drained	fine	-
60.5-60.6	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
60.6-60.7	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
60.7-61.2	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
61.1-61.2	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
61.2-61.4	Lewis	VaE	Vandalia silt loam, 25 to 35 percent slopes	Not prime farmland	30	Tame pastureland	No	Well drained	fine	-
61.4-61.6	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
61.6-61.7	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
61.7-61.9	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
61.9-62.2	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
62.2-62.3	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
62.3-62.4	Lewis	Su	Sensabaugh silt loam	All areas are prime farmland	2	-	No	Well drained	fine-loamy	-
62.4-63.9	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
63.9-64.2	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
64.2-64.8	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
64.8-64.9	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
64.9-65.3	Lewis	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Not prime farmland	30	-	No	Well drained	fine-loamy	76
65.3-65.6	Lewis	GwF3	Gilpin-Upshur silt loams, 35 to 70 percent slopes, severely eroded	Not prime farmland	53	-	No	Well drained	fine-loamy	76
65.6-65.7	Lewis	VaD	Vandalia silt loam, 15 to 25 percent slopes	Farmland of statewide importance	20	-	No	Well drained	fine	-
65.7-66.6	Braxton	GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	Farmland of statewide importance	20	-	No	Well drained	fine-loamy	More than 84
66.6-66.7	Braxton	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	More than 84
66.7-67.4	Braxton	GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	Farmland of statewide importance	20	-	No	Well drained	fine-loamy	More than 84

Milepost	County	Symbol	Soil Name	Farmland Type	Slope	Ground Cover	Hydric	Drainage	Particle Size	Depth to Bedrock
67.4-67.5	Braxton	GuF	Gilpin-Upshur silt loams, 35 to 70 percent slopes	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
67.5-76.6	Braxton	VaE	Vandalia silt loam, 25 to 35 percent slopes	Farmland of local importance	30	Tame pastureland	No	Well drained	fine	-
67.6-67.7	Braxton	GuF	Gilpin-Upshur silt loams, 35 to 70 percent slopes	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
67.7-68.3	Braxton	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	More than 84
68.4-68.8	Braxton	GuF	Gilpin-Upshur silt loams, 35 to 70 percent slopes	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
68.8-68.9	Braxton	SoA	Sensabaugh silt loam, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	2	-	Yes	Poorly drained	fine-loamy	-
68.9-69.0	Braxton	GuF	Gilpin-Upshur silt loams, 35 to 70 percent slopes	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
69.0-69.2	Braxton	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	More than 84
69.1-69.8	Braxton	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	More than 84
69.8-70.1	Braxton	GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	Farmland of statewide importance	20	-	No	Well drained	fine-loamy	More than 84
70.1-70.2	Braxton	VxE	Vandalia silt loam, 15 to 35 percent slopes, very stony	Farmland of local importance	25	Tame pastureland	No	Well drained	fine	-
70.2-70.3	Braxton	GuF	Gilpin-Upshur silt loams, 35 to 70 percent slopes	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
70.3-70.5	Braxton	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	More than 84
70.5-70.8	Braxton	GxF	Gilpin-Upshur silt loams, 35 to 70 percent slopes, extremely bouldery	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
70.9-71.1	Braxton	GxF	Gilpin-Upshur silt loams, 35 to 70 percent slopes, extremely bouldery	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
71.1-71.2	Braxton	GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	More than 84
71.2-71.3	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
71.3-71.8	Braxton	GlD	Gilpin-Lily complex, 15 to 25 percent slopes	Farmland of statewide importance	18.5	-	No	Well drained	fine-loamy	69
71.8-71.9	Braxton	BuE	Buchanan channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Moderately well drained	fine-loamy	-
71.9-72.1	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
72.1-72.3	Braxton	GlC	Gilpin-Lily complex, 8 to 15 percent slopes	Farmland of statewide importance	10.6	-	No	Well drained	fine-loamy	69
72.3-72.4	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
72.4-72.6	Braxton	BuE	Buchanan channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Moderately well drained	fine-loamy	-
72.6-72.8	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
72.8-73.5	Braxton	GlD	Gilpin-Lily complex, 15 to 25 percent slopes	Farmland of statewide importance	18.5	-	No	Well drained	fine-loamy	69
73.5-73.6	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
73.6-73.8	Braxton	BuE	Buchanan channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Moderately well drained	fine-loamy	-
73.8-73.9	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
73.9-74.0	Braxton	GlE	Gilpin-Lily complex, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	69
74.0-74.1	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
74.1-74.3	Braxton	BuE	Buchanan channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Moderately well drained	fine-loamy	-
74.3-74.6	Braxton	GlE	Gilpin-Lily complex, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	69
74.6-74.8	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
74.8-74.9	Braxton	GlD	Gilpin-Lily complex, 15 to 25 percent slopes	Farmland of statewide importance	18.5	-	No	Well drained	fine-loamy	69
74.9-75.0	Braxton	BuE	Buchanan channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Moderately well drained	fine-loamy	-
75.0-75.1	Braxton	Ch	Chavies fine sandy loam, rarely flooded	All areas are prime farmland	1	-	No	Well drained	coarse-loamy	-
75.1-75.2	Braxton	BuE	Buchanan channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Moderately well drained	fine-loamy	-
75.-75.3	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84
75.3-76.1	Braxton	GlE	Gilpin-Lily complex, 25 to 35 percent slopes	Farmland of local importance	30	-	No	Well drained	fine-loamy	69
76.1-76.2	Braxton	GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	Not prime farmland	53	-	No	Well drained	fine-loamy	More than 84

Pipeline Route Soil Map Units and Descriptions in West Virginia by Milepost

Milepost	County	Symbol	Soil Name	Farmland Type	Slope	Ground Cover	Hydric	Drainage	Particle Size	Depth to Bedrock
193.8-194.0	Monroe	WeD	Weikert channery silt loam, 15 to 25 percent slopes	Not prime farmland	20	-	No	Well drained	loamy-skeletal	41
194.0-194.1	Monroe	ElD	Elliber very channery silt loam, 15 to 25 percent slopes	Farmland of local importance	20	-	No	Well drained	loamy-skeletal	More than 84
194.1-194.2	Monroe	FFD	Frederick and Dunmore soils, 15 to 25 percent slopes, very rocky	Farmland of local importance	20	-	No	Well drained	fine	More than 84
194.2-195.5	Monroe	BtE	Blackthorn very channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Well drained	loamy-skeletal	-
194.5-195.6	Monroe	MuC	Murrill channery loam, 8 to 15 percent slopes	Farmland of statewide importance	12	-	No	Well drained	fine-loamy	-
194.6-194.8	Monroe	BtE	Blackthorn very channery loam, 15 to 35 percent slopes, extremely stony	Not prime farmland	25	-	No	Well drained	loamy-skeletal	-
194.8-195.1	Monroe	LbD	Laidig channery loam, 15 to 25 percent slopes, very stony	Not prime farmland	20	-	No	Well drained	fine-loamy	-
195.1-195.4	Monroe	DeG	Dekalb channery loam, 55 to 70 percent slopes, very stony	Not prime farmland	60	-	No	Well drained	loamy-skeletal	77
MVP-AWTS-106	Braxton	SoA	Sensabaugh silt loam, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	2	-	Yes	Poorly drained	fine-loamy	More than 84
MVP-AWTS-106	Braxton	SrB	Sensabaugh silt loam, 3 to 8 percent slopes, rarely flooded	All areas are prime farmland	2	-	Yes	Poorly drained	fine	More than 84
MVP-AWTS-439	Braxton	SoA	Sensabaugh silt loam, 0 to 3 percent slopes, occasionally flooded	All areas are prime farmland	2	-	Yes	Poorly drained	fine-loamy	More than 84

ATTACHMENT 5

E&S Plan Sheets

See Plan of Development Appendix C-3