WEST VIRGINIA RIVERS

March 17, 2017

West Virginia Department of Environmental Protection
Permitting Program/Regulatory/401 Certification Program
Division of Water and Waste Management
601 57Th St
Charleston WV 25304

Submitted electronically to DEP.comments@wv.gov

RE: MVP 401 Application (WQC-16-0005)

Dear Mr. Mandirola,

West Virginia Rivers Coalition, on behalf our members and the organizations and individuals signed below, respectfully submit the following comments on the Mountain Valley Pipeline LLC's (MVP) Section 401 Water Quality Certification Application.

Section 401 of the Clean Water Act ("CWA"), 33 U.S.C. § 1341, requires any applicant for a federal license or permit that could result in a discharge to navigable waters to provide a certification from the State in which the discharge originates that the activity will comply with sections 301, 302, 303, 306, and 307 of the Act. By issuing such a certification, a State warrants that the proposed activity will not, among other things, cause or contribute to violations of water quality standards within its borders.

Construction and operation of major natural gas pipelines such as the MVP present numerous threats to water quality that could result in violations of water quality standards and other requirements of the CWA. As the Federal Energy Regulatory Commission (FERC) acknowledged in the draft environmental impact statement (DEIS) for the MVP, "[i]mpacts on waterbodies could occur as a result of construction activities in stream channels and on adjacent banks."[1] Those impacts include "local modifications of aquatic habitat involving sedimentation, increased turbidity, and decreased dissolved oxygen concentrations."[2] Additionally, FERC states that the

> clearing and grading of stream banks could expose soil to erosional forces and would reduce riparian vegetation along the cleared section of the waterbody. The use of heavy equipment for construction could cause compaction of near-surface soils, an effect that could result in increased runoff into surface waters in the immediate vicinity of the proposed construction right-of-way. Increased surface runoff could transport sediment into surface waters, resulting in increased turbidity levels and increased

[1] Draft Environmental Impact Statement for the Mountain Valley Pipeline ("DEIS") at 4-108.

[2] *Id*.

> sedimentation rates in the receiving waterbody. Disturbances to stream channels and stream banks could also increase the likelihood of scour after construction.[3]

Those impacts would harm the aquatic organisms that rely on the affected streams for their survival. As FERC states,

> [i]ncreased sedimentation and turbidity resulting from in-stream and adjacent construction activities would displace and impact fisheries and aquatic resources. Sedimentation could smother fish eggs and other benthic biota and alter stream bottom characteristics, such as converting sand, gravel, or rock substrate to silt or mud. These habitat alterations could reduce juvenile fish survival, spawning habitat, and benthic community diversity and health. Increased turbidity could also temporarily reduce dissolved oxygen levels in the water column and reduce respiratory functions in stream biota. Turbid conditions could also reduce the ability for biota to find food sources or avoid prey.[4]

WVDEP lacks sufficient information for it to rationally conclude that the impacts of MVP's construction and operation, such as those described above, will not cause or contribute to violations of water quality standards or otherwise violate sections 301, 302, 303, 306, and 307 of the CWA. MVP's premature, incomplete, and inconsistent application simply does not provide reasonable grounds for DEP to certify the project. DEP therefore must reject MVP's request for certification.

WVDEP should follow the lead of the Virginia Department of Environmental Quality in its 401 certification process for major natural gas pipelines like the MVP and the similar Atlantic Coast Pipeline. VA DEQ has determined that it will not consider any application for 401 certification to be complete until FERC issues the final environmental impact statement for the project and the U.S. Army Corps of Engineers deems the Clean Water Act Section 404 permit application to be complete. Prior to that time, the project's route, construction methods, and avoidance and mitigation measures are subject to significant modification. Thus, until those documents are final, the applicant can only offer its best guess as to what the project's ultimate impacts will be and the State cannot rationally conclude that those impacts will comply with the Clean Water Act.

Prior to accepting as complete and making a determination on MVP's application for CWA section 401 certification, WVDEP must, at a minimum, resolve the following inadequacies and inconsistencies:

<u>Surveys are not complete and route not finalized</u>: The entire 195.5 miles of the proposed ROW and 141 miles of access roads have not been surveyed. Surveying has not been performed on 13 miles of the project. In addition to the 662 wetlands and 904 streams identified within the LOD, the 401 identifies an additional 11 wetlands and 9 streams could be permanently impacted, the effects of which have not

[3] *Id*.

[4] *Id.* at 4-176

been determined. However, we found contained in Table 8.2, 70 additional stream impacts, approximately 20 of them permanent. Without a complete inventory of impacts, DEP will be unable to perform a detailed assessment on the total impacts of the proposed project. Given that the total impacts have not been determined, DEP should give MVP notice of an incomplete application and resume the review once the entire route has been surveyed and all the impacted areas are included within the total impacts for the project. Additionally, the route has not been finalized. The Federal Energy Regulatory Commission has not approved the final route and in fact has made multiple recommendations for route variations. DEP is wasting state resources by reviewing an incomplete application for water resource impacts that have not been fully determined. 47-CSR-5A-4.1.a.1 specifies that:

"The Secretary may request additional information if he or she determines that such information is necessary to properly evaluate the application."

And 47-CSR-5A-4.3.b specifies that:

"If the project application is altered or modified during the FERC licensing process prior to FERC's final decision, the applicant shall inform the Department of such changes. The Department may review such alterations or modifications and, if the changes are deemed significant by the Secretary, the Department may require a new application for certification

Based on these rules, **DEP must deny MVP's 401 application and not consider any new request for certification until the final route has been approved by FERC, and a complete application has been received**.

The description of Tier 3 stream impacts is inconsistent and the analysis is inadequate: The proposed project is anticipated to impact 57 Tier 3 Outstanding National Resource Waters. MVP's previous 401 application stated "No Tier 3 Streams occur within the Project area." The DEIS states "Neither the MVP nor the EEP would cross Tier III waterbodies in West Virginia." Clearly, identifying 0 Tier 3 impacts where there are approximately 57 Tier 3 impacts is a significant omission and necessitates a full anti-degradation review. Pursuant to WV State code of legislative rules §60-5-6.1, Tier 3 waters "are to be maintained, protected and improved where necessary. Any proposed new or expanded regulated activity that would degrade (result in a lowering of water quality) a [Tier 3 water], other than temporary lowering of water quality, is prohibited." See also id., §60-5-6.3 (applying protections to waters upstream from Tier 3 waters); 47 CSR 2-4.1.c; 40 C.F.R. § 131(a)(3). **DEP must obtain sufficient information for it to conduct the anti-degradation review required by §60-5-6.2 for each of the 53 impacted Tier 3 streams and determine whether increases in, among other things, sedimentation, iron, and temperature will result in a long-term lowering of water quality.**

The description of trout stream impacts is inconsistent: MVP identifies a total of 63 trout streams that will be impacted by the project. Construction activities within trout streams will result in loss of habitat, changes in the thermal conditions of the waterbody, increased turbidity and erosion, and stream bank

instability. The project will result in 100% loss of riparian vegetation within the right-of-way. The application fails to explain how they will avoid impacts to 63 trout streams and instead states that they will submit spawning season waiver requests to DNR. We find this section of the application to be inconsistent with the information in the MVP-DEIS which states that "Mountain Valley would adhere to all federal and state permit conditions regarding the minimization of impacts on fisheries of special concern including adhering to recommended work windows for in-water construction". MVP must clarify this discrepancy. We oppose any waiver requests as they would directly contradict key assertions on which the MVP-DEIS is based. **DEP must request information on specific measures that MVP will take to minimize sedimentation and turbidity in trout streams, including a plan that avoids in-stream construction during the spawning season, before issuing a 401 Certification**.

The description of freshwater mussel surveys is inconsistent: The 401 application states that MVP identified and surveyed 13 streams containing freshwater mussels, and due to route variations surveyed 2 additional sites on the Little Kanawha River. The DEIS states that MVP will impact 16 streams containing freshwater mussels. All streams containing freshwater mussels must be surveyed. **DEP must request clarification on this discrepancy and no certification can be issued until all impacts to freshwater mussels are determined.**

Watershed-scale impacts are not analyzed: The overall health of a watershed is dependent on its network of tributaries. The inter-connected streams contribute to the quality of water within a watershed and support the physical and biological need of the system. The cumulative effect of tributary water quality on watershed-scale health is especially important in native trout streams and rivers that support endangered and threatened aquatic life. A project of this magnitude that impacts multiple watersheds must be assessed at a regional scale.

A recent example from New York demonstrates the need for close scrutiny of cumulative impacts by states when determining whether a project can be certified pursuant to CWA section 401. In April 2016, the New York State Department of Environmental Conservation denied a section 401 Water Quality Certification for the proposed Constitution Gas Pipeline.[5] The Department's rationale for denial included an examination of the pipeline's cumulative impacts on waterways:

> [c]umulatively, impacts to both small and large streams from the construction and operation of the Project can be profound and include loss of available habitat, changes in thermal conditions, increased erosion, creation of stream instability and turbidity, impairment of best usages, as well as watershed-wide impacts resulting from placement of the pipeline across water bodies in remote and rural areas.[6]

[5] New York State Department of Environmental Conservation Notice of Denial Addressed to Constitution Pipeline Company, LLC (April 22, 2016), attached as Exhibit A.

[6] *Id.* at 12.

MVP's 401 application contains no information on the project's total impacts within each watershed, which prevents DEP from determining the overall impacts of the project and concluding that the project will not jeopardize the state's water resources. MVP must provide an analysis for each watershed including information on the number of stream crossings by watershed and the number of stream crossings on each stream if waterbodies are crossed multiple times. At the landscape level, impacts from the ROW are exacerbated by the cumulative impacts of the proposed access roads. There is a negative correlation between road miles within a watershed and water quality. An analysis of the pre-construction vs. post-construction ratio of roads within a basin must be performed to adequately assess the impacts from the proposed project. **This information is not contained in the DEIS cumulative impact analysis. DEP must require MVP to analyze the cumulative impacts of their proposed project on water quality.**

Compliance with special conditions is inconsistent: MVP's compliance with special conditions set forth in the 401 application is inconsistent with variance requests in the DEIS. In Section 8.2 Special Condition #4 in the 401 application, MVP states "Storage areas and refueling areas shall be a minimum distance of 100 feet from any surface water body." However, the DEIS states that 366 alternative workspace areas used for storage and refueling will be located within 50 feet of streams. The compliance of special conditions in the 401 and the variance from FERC procedures in the DEIS is contradictory. The assurances of compliance with special conditions in the 401 application and the proposed variance from FERC procedures in the DEIS are contradictory. **DEP must wait until the issuance of the final EIS to determine if the construction of the project as approved by FERC will comply with the special conditions set forth in the 401 application**.

Stream crossing information is inconsistent and inadequate: Additional analysis is needed for each stream crossing. The DEIS states that there are 617 impacted streams in WV; however, Table 5.2 and 8.2 list approximately 630 crossing impacts. MVP supplied one drawing of a typical stream crossing for each method of crossing. A typical stream crossing drawing does not give sufficient information to adequately assess the impacts for approximately 630 stream impacts, several of which are crossing the same stream multiple times. Water quality standards apply in all streams, not just a "typical" stream, and DEP's 401 certification must demonstrate how the project will comply with those standards in each and every stream. **DEP must require detailed information for each proposed stream crossing including the location of the access roads and right-of-way in relation to the stream, the location of the temporary crossing bridges, the depth of abutments located within the stream, the location of the coffer dams, the depth of pipe including whether blasting will be required, the substrate material used to stabilize the stream bed, the slopes of the hillsides where the ROW will be cleared immediately adjacent to the crossings, and the sediment and erosion control measures needed to prevent chronic erosion. DEP must evaluate all crossings individually to adequately assess their ability to comply with water quality standards.**

Wetland Crossing information is inconsistent and inadequate: The 401 application identifies 400 wetland impacts or 40.59 acres of wetlands permanently or temporarily impacted from the proposed

project and an additional 11 wetlands that have yet to be surveyed for potential impacts. However, Tables 4.2 and 7.2 identify 400 surveyed and 25 desktop wetland impacts, respectively. There are inconsistencies in the narrative of the 401 application and the Tables describing anticipated wetland impacts. With approximately 425 wetlands totaling 43.6 acres of potential impacts, the 401 application includes one drawing of a typical wetland crossing. Absent detailed and accurate information on each wetland crossing that demonstrates MVP properly avoided, minimized and mitigated impacts to wetland and adjacent areas, the Application does not supply the DEP with adequate information to assure that wetlands will not be subject to discharges that do not comply with applicable water quality standards. **We find this lack of information inconsistent and insufficient to enable DEP to fully assess the impacts to the state's wetland resources. DEP must require detailed and accurate information for each wetland crossing.**

Restoration Plans are inadequate: MVP has identified approximately 630 streams and 425 wetlands potentially impacted as a result of this project. With impacts of this magnitude on waters of the state, we find the 2-page restoration section of the 401 application grossly inadequate to quantify the restoration work needed for a project of this magnitude. The applicant must submit a restoration plan that supplies sufficient information for DEP to be assured that temporary impacts to aquatic resources will be restored so as to not interfere with or jeopardize the designated use of impacted waters. **DEP must require a Restoration Plan that contains specific information for each site where waters of the state are impacted including techniques used to restore the stream channel to its pre-construction state using natural streambed channel design, bank stabilization techniques, riparian area restoration, permanent runoff controls to prevent erosion on steep slopes within the cleared ROWs, and techniques used to ensure the hydrology of the wetlands remain intact following completion of the project including pre-and post-construction soil density analysis.**

Effectiveness of best management practices is unsupported: To support the assertion that the proposed project will comply with the CWA and will not cause violations of water quality standards, MVP relies primarily on its compliance with best management practices (BMPs) outlined in FERC's procedures and MVP stormwater pollution prevention plan. Past experience demonstrates, however, that those measures are insufficient to prevent water quality standards violations.

The proposed project would impact aquatic life due to increased sedimentation not just from the stream crossings themselves, but also from the runoff from the significant land disturbance that would occur in the watersheds upstream from the crossings during construction. Construction of the proposed project would disturb over 4,100 acres of soils that are classified as having the potential for severe water erosion.[7] Moreover, much of the proposed pipeline route follows very steep slopes, with the MVP crossing 18.5 miles of slopes between 15 and 30 percent grade and 72.6 miles of slopes greater than 30 percent.[8] Through the course of construction, "clearing and grading would remove trees, shrubs, brush,

[7] DEIS at 4-59.

[8] *Id.* at 2-49.

roots, and large rocks from the construction work area" and heavy machinery would be used to dig a trench to a depth of 5.5 feet to 9 feet."[9] Such disturbance would undoubtedly lead to increased sedimentation in waterbodies downstream from the disturbed area.

Studies show that erosion and sedimentation controls for pipelines have been known to fail under heavy rain events and sedimentation risk is higher under steeper conditions and near bodies of water.[10] There are numerous examples of significant sedimentation impacts occurring during pipeline construction despite the use of industry-standard erosion and sedimentation controls.[11]

A 42-inch diameter pipeline has never been constructed through the steep, rugged, highly erodible terrain of the region of the Appalachian Mountains that would be traversed by the MVP. However, construction of much smaller pipelines in the region has repeatedly resulted in extreme sedimentation impacts. For example, in 2006, during construction of a 20-inch East Tennessee Gas Pipeline in Tazewell and Smyth Counties, Virginia, slopes failed in two independent events in Indian Creek and North Fork Holston River, resulting in a kill of several hundreds of individuals and multiple species of endangered mussels.[12] The worst sediment problems originated not directly at the stream crossings, but high in the watershed where small streams transported sediment to the larger streams. Evidence of the sediment was detected as far as 2 kilometers downstream of the slips. These impacts occurred despite extreme care taken by FERC, USFWS, the Virginia Department of Conservation and Recreation, and the company to ensure that state-of-the-art erosion control measures were in place.[13]

Similarly, a 2014 Columbia Gas of Virginia project to add a 12-inch pipeline adjacent to an existing 6-inch pipeline along Peter's Mountain near a portion of the Jefferson National Forest in Giles County, Virginia, led to extreme sedimentation impacts.[14] This location involves similar terrain and is very close to the

---

[9] *Id.* at 2-38, 2-39.

[10] *See, e.g.,* Johnson, Gagnolet, Ralls, and Stevens, The Nature Conservancy, *Natural Gas Pipelines* at 7 (2011), available at http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/pennsylvania/ng-pipelines.pdf.

[11] *See, e.g.,* J. Tanfani & C.R. McCoy, *Environmentalists and sportsmen raise alarms over pipelines*, Philadelphia Inquirer (December 12, 2011), available at http://www.philly.com/philly/news/special_packages/inquirer/marcellus-shale/20111212_Environmentalists_and_sportsmen_raise_alarms_over_pipelines.html.

[12] *See* April 10, 2015 Comments of the Scientific and Technical Committee of Preserve Craig, Inc. to the USDA Forest Service, attached as Exhibit B.

[13] *Id*.

[14] *See* Dominion Pipeline Monitoring Coalition, *Case Study - Columbia Gas, Giles County, VA*, *available at* http://pipelineupdate.org/case-study-no-1.

proposed route of the MVP. Inspection reports by the US Forest Service describe sediment movement that "looked like a lava flow" and note that the inspector had "never seen that much sediment move off site before."[15] Much of the sediment became embedded in a nearby stream.[16] These impacts occurred despite the existence of comprehensive erosion control plans, implementation of Best Management Practices, and weekly inspections by the company to ensure proper implementation.[17] As demonstrated by the photo below showing massive amounts of sediment that has travel beyond the company's installed silt fence and bypassed a diversion channel, standard erosion and sediment control practices are simply not sufficient to protect against damage associated with pipeline construction on the steep slopes of this area.

Sedimentation at Columbia Gas Site near Jefferson National Forest (Source: Dominion Pipeline Monitoring Coalition)

[15] USFS Inspection Reports of Sept. 5, 2014 and September 15, 2014, *available at* http://pipelineupdate.org/national-forest-pipeline-inspection-reports/.

[16] *Id*.

[17] *Id*.

Additionally, construction of the G-150 and TL-589 gas pipelines in West Virginia led to slope failure at pipeline stream crossing locations during and post construction, resulting in harm to streams despite the application of industry-standard erosion and sediment control practices. West Virginia Department of Environmental Protection Consent Order No. 8078, dated October 1, 2014, addressed a series of 13 locations in West Virginia where lower slope slippage or landslides along pipeline construction right-of-ways introduced sediment into streams in violation of regulations concerning conditions not allowable in waters of the State, specifically sediment deposits.

The same story occurred in Pennsylvania with construction of Tennessee Gas Pipeline's (TGP) 300 Line Project, part of the Susquehenna West Project.[18] In May of 2010, FERC issued an environmental assessment for the 300 Line Project, finding there would be no significant impacts when TGP crossed streams in northeast and north-central Pennsylvania. FERC relied on TGP's plan to follow construction guidelines created by the Corps, USDA, NRCS, and FERC. In addition, FERC imposed its own conditions. However, despite what FERC believed to be adequate measures, TGP's construction violated Pennsylvania Clean Water Law multiple times. The majority of the project's compliance reports contained at least one violation of the project plans, but the plan was never enforced.[19] Whether the plan was inadequate in its substance or inadequately enforced, the end result is the same; the pipeline's stream crossings, which FERC believed would cause no significant environmental impact, resulted in numerous violations and an $800,000 penalty settlement with the Pennsylvania DEP.[20]

These examples all demonstrate that DEP cannot rely on MVP's use of the "industry-standard" BMPs outlined in its application and SWPPP. Indeed, a review of those plans and procedures by Pamela C. Dodds, Ph.D., Licensed Professional Geologist, found them to be severely lacking. That report, attached at Exhibit C, is hereby fully incorporated by reference into these comments.[21] **DEP must not act on MVP's request for certification until it obtains an affirmative demonstration of the effectiveness of the proposed avoidance and mitigation measures, such as has been requested by the U.S. Forest Service for the MVP and the Atlantic Coast Pipeline.[22]**

---

[18] *See* Comments of Allegheny Defense Project and Damascus Citizens for Sustainability on Susquehenna West Pipeline Environmental Assessment, FERC Docket CP15-148-000, filed April 18, 2016 (Accession No. 20160418-5264) pp. 13-17.

[19] *Id.* at 15-16.

[20] *Id.* at 13.

[21] *See also* Review of MVP erosion and sedimentation impacts and controls performed by Kirk Bower, P.E. for the Virginia Chapter of the Sierra Club, attached as Exhibit E.

[22] *See, e.g.,* March 9, 2016 USFS Comments on Final Resource Reports for the Mountain Valley Pipeline, attached as Exhibit D (explaining that past pipeline projects have resulted in significant sedimentation impacts despite use of BMPs, noting that pipeline sedimentation impacts are

Sediment and turbidity analyses were not submitted: MVP would cross 5 source water protection areas for public water utilities. Excess sediment in source water accelerates the formation of haloacetic acid when chlorine is added to treat the raw water. Haloacetic acid has been linked to increased risk of cancer. Haloacetic acid is regulated by EPA under the Safe Drinking Water Act. Excess levels of sediment in source water can cause the utility to exceed the maximum contaminant level. **DEP must require MVP to perform a sediment and turbidity analysis to conclude that the source water protection area crossings will not cause increased sediment levels in water treatment facilities and violate the State's water quality standards for turbidity.**

DEP must also require in-depth turbidity analyses for all waters crossed by the "wet open-cut" method. According to the DEIS, the MVP would cross three major rivers using the wet open-cut method: the Elk River at milepost 87.4, the Gauley River at milepost 118.6, and the Greenbrier River at milepost 170.6.[23] All of those rivers are ecologically, economically, and recreationally important to West Virginia. According to MVP's modeling analysis included in the DEIS, the crossings would significantly increase the sediment loads in those rivers. Specifically, "[s]ediment loads downstream of the crossings were estimated to increase by 49 to 81 percent, 15 to 26 percent, and 19 to 52 percent for the Elk River, Gauley River, and Greenbrier Rivers, respectively, over monthly baseline loads based on a crossing duration of 2 days."[24]

FERC acknowledges, however, that those sedimentation-loading calculations by themselves are not sufficient to assess impacts to aquatic life. In order to determine the impacts to aquatic organisms, it is necessary to calculate the duration, extent, and magnitude of in-stream turbidity levels that would result from additional sediment loads. As FERC explains, "while sediment loads and downstream turbidity and sedimentation are related, they are different measurements with distinct values."[25] The density, downstream extent, and persistence of a turbidity plume at a given crossing depends on stream

---

often long-term, not temporary, and requesting demonstration of the effectiveness of proposed BMPs).

[23] The DEIS notes that Mountain Valley is currently evaluating using the wet open-cut method at the crossing of the Pigg River at milepost 286.3. Obviously, DEP (and the public) cannot know what the impacts to the Pigg River will be, and thus whether the impacts will comply with the CWA, until the method of crossing is determined. Moreover, since issuance of the DEIS, MVP has submitted information stating that it intends to use the coffer dam construction method in crossing the Greenbrier River. This discrepancy further demonstrates why DEP should wait until the final project route and approved construction methods are determined in the EIS and CWA 404 permit applications.

[24] DEIS at 4-176. The DEIS notes that Mountain Valley would "attempt" to minimize those impacts using "turbidity curtains" and timing restrictions but includes no analysis of the effectiveness of the minimization measures that would be used, which is similarly lacking in MVP's 401 application.

[25] DEIS at 4-110.

velocity, turbidity, bank composition, sediment particle size, and duration of the disturbance.[26] According to the DEIS, "Mountain Valley's analysis does not quantify the duration, extent, or magnitude of estimated turbidity levels. Therefore, based on these estimates, *conclusions cannot be drawn regarding the effects of sedimentation and turbidity on fisheries and aquatic resources due to the wet open-cut crossings.*"[27] Without that critical information, DEP cannot conclude that those crossings will comply with the Clean Water Act. **DEP thus must obtain the turbidity modeling analysis prior to acting on MVP's 401 certification application.**

Long-term impacts associated with land cover change not analyzed: MVP's application fails to adequately analyze the increase in sedimentation and runoff that would result from the conversion of upland forest to herbaceous cover within vulnerable segments of the pipeline right-of-way. Fragmented forests have been directly linked to lower water quality and condition (Lee et al. 2009, Shandas and Alberti 2009) and infrastructure development including pipelines and access roads are known to increase fine sedimentation due to reduced vegetation and associated habitat fragmentation (Entrekin et al. 2011, Drohan et al. 2012, Wood et al. 2016). DEP cannot reasonably conclude that the project would comply with the Clean Water Act without fully accounting for those impacts.

Consulting firm Downstream Strategies prepared an analysis of the sedimentation impacts associated with construction of the MVP and with post-construction land use change utilizing the Generalized Watershed Loading Functions – Enhanced (GWLF-E) and Wikiwatershed computer modeling tools.[28] The authors used these models to predict the change in annual sedimentation post-construction that would result from conversion of land cover from forest to the herbaceous cover that would need to be maintained in the permanent pipeline right-of-way. Although the study found that streams in watersheds with low slopes and stable soils would not experience significant, long-term increases in sedimentation, the opposite was true for "high risk" areas, *i.e.*, those with steep slopes and highly erodible soils.[29] In the high risk

[26] *Id.* at 4-108, 4-176.

[27] *Id.* at 4-176 (emphasis added).

[28] Mountain Valley Pipeline Sediment Modeling Methodology, Prepared for Appalachian Mountain Advocates by Jason Clingerman and Evan Hansen of Downstream Strategies, LLC, (hereinafter "Downstream Strategies Report"), attached as Exhibit E, at 1.

[29] As explained above, a significant portion of the proposed route of the MVP is characterized by the steep slopes and highly erodible soils that would contribute to such long-term impacts.

modeling scenario, sedimentation increased by 15 percent due to the permanent land use change associated with keeping the right-of-way clear.[30]

Furthermore, that 15 percent figure likely underestimates the long-term increase in sedimentation in steep slope areas. Downstream Strategies' methodology assumes that the right-of-way would be converted to a land cover with equal sediment attenuating properties as "hay/pasture."[31] However, once steep slopes, particularly those with shallow soils, are disturbed, they are unlikely to regain plant cover equivalent to hay/pasture. Despite efforts to revegetate steep, mountainous slopes after construction, slopes between 33% and 50% have a poor chance of revegetating, and slopes over 50% have an improbable chance of revegetating.[32] The MVP would traverse 72.6 miles of slopes greater than 30 percent.[33] **DEP must not act on MVP's application until it fully analyzes that increased sedimentation and its impacts on the streams proposed to be crossed, including Tier 3 waters and waters for which TMDLs have been developed.**

In summary, Mountain Valley Pipeline's 401 Application fails to address significant impacts to the state's water resources that will occur as a result of the project. We found the information in the application inconsistent and deficient. DEP must request clarification of inconsistencies and additional information to properly assess the impacts of the project and determine whether the project will be able to comply with the state's water quality standards. DEP must be able to evaluate whether the project impacts have been minimized and avoided so that the waters are able to attain their designated uses.

DEP must request additional information from the applicant to be assured that adverse impacts to water quality and aquatic resources are avoided, minimized or mitigated. The application as submitted does not contain adequate information to assure that sufficient impact avoidance and minimization measures were considered. DEP must reject the application as incomplete and may not act of MVP's request for certification until it has adequate information to evaluate the cumulative impacts of a project of this magnitude and its effect on the state's water resources.

Sincerely,

Angie Rosser & Autumn Crowe
West Virginia Rivers Coalition

---

[30] Downstream Strategies Report at 3.

[31] *Id.* at 2

[32] Bowers Report, Ex. E, at 3.

[33] DEIS at 2-49.

April Keating
Sierra Club, WV Chapter

Elly Benson
Sierra Club, National

Nancy Novak & Helen Gibbins
League of Women Voters of WV

Pete Anderson
Appalachian Voices

Chad Oba
Friends of Buckingham

Natalie Thompson
Ohio Valley Environmental Coalition

Katlyn Clark
Waterkeepers Chesapeake

Wayne Woods
Doddridge County Watershed Association

Brent Walls
Upper Potomac Riverkeeper
Potomac Riverkeeper Network

Rick Webb
Dominion Pipeline Monitoring Coalition

Melinda Hughes
Nature Abounds

Cindy Ellis & Cindy Rank
WV Highlands Conservancy

Brent Martin
The Wilderness Society

Carolyn Reilly
Bold Alliance

Laurie Ardison
Protect Our Water, Heritage, Rights

Joe Chasnoff
Discover Monroe

Herman & Paula Mann, Maury Johnson
Friends of the Narrows of Hans Creek

Judy Azulay
Indian Creek Watershed Association

Dr. Stephen Miller
Save Monroe

Roseanna Sacco
Preserve Monroe

Chris Chanlett
Summers County Residents Against the Pipeline

Ben Luckett
Appalachian Mountain Advocates

John Walkup, III
Greenbrier River Watershed Association

Beth Little
Eight Rivers Council

Allen Johnson
Christians for the Mountains

Justin Raines
Glenville State College Student Environmental Organization

Kevin Campbell
Mountain Lake Preservation Alliance

Exhibit A

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits & Pollution Prevention
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 I F: (518) 402-9168 I deppermitting@dec.ny.gov
www.dec.ny.gov

April 22, 2016

Lynda Schubring, PMP
Environmental Project Manager
Constitution Pipeline Company, LLC
2800 Post Oak Boulevard
P.O. Box 1396
Houston, Texas 77251-1396

Re: Joint Application: DEC Permit # 0-9999-00181/00024 Water Quality Certification/Notice of Denial

Dear Ms. Schubring,

On April 27, 2015, Constitution Pipeline Company, LLC (Constitution) submitted to the New York State Department of Environmental Conservation (NYSDEC or Department) a Joint Application (Application)[1] to obtain a Clean Water Act[2] Section 401 Water Quality Certification (WQC) for the proposed Project and New York State Environmental Conservation Law (ECL) Article 15, Title 5 (Protection of Waters) and Article 24, Title 23 Freshwater Wetlands permits. Based on a thorough evaluation of the Application as well as supplemental submissions, the Department hereby provides notice to Constitution that in accordance with Title 6 New York Codes Rules and Regulation (NYCRR) Part 621, the Application fails in a meaningful way to address the significant water resource impacts that could occur from this Project and has failed to provide sufficient information to demonstrate compliance with New York State water quality standards. Constitution's failure to adequately address these concerns limited the Department's ability to assess the impacts and conclude that the Project will comply water quality standards. Accordingly, Constitution's request for a WQC is denied.[3] As required by 6 NYCRR §621.10, a statement of the NYSDEC's rationale for denial is provided below.

BACKGROUND

The Federal Energy Regulatory Commission (FERC) issued a certificate approving construction and operation of the pipeline on December 2, 2014, conditioning

[1] New York State and U.S. Army Corps of Engineers Joint Application, Constitution Pipeline, August, 2013. Constitution initially submitted its WQC application on August 28, 2013. With the Department's concurrence Constitution subsequently withdrew and re-submitted the WQC application on May 9, 2014 and April 27, 2015, each time extending the period for the Department to review the application by up to one year.

[2] *See* 33 U.S.C.A. Section 1341.

[3] The other permits sought by Constitution in the Joint Application remain pending before the Department and are not the subject of this letter.

its approval on Constitution first obtaining all other necessary approvals. Accordingly, Constitution's Application for a WQC pending with the Department must be approved before construction may commence. Constitution's Application was reviewed by NYSDEC in accordance with ECL Article 70 (Uniform Procedures Act or UPA) and its implementing regulations at 6 NYCRR Part 621, which provide a review process for applications received by NYSDEC.

Despite FERC conditioning its approval on Constitution's need to obtain a WQC, the Department has received reports that tree felling has already occurred in New York on the Project's right of way. This tree cutting, both clear cutting and selective cutting, has occurred notwithstanding the fact that Constitution has right-of-way agreements with the property owners where this cutting has occurred. The tree felling was conducted near streams and directly on the banks of some streams, and in one instance has resulted in trees and brush being deposited directly in a stream, partially damming it. As described below, this type of activity, if not properly controlled, can severely impact the best usages of the water resource.

Concurrent with its review, the Department received a Clean Air Act Title V application[4] for the Wright Compressor Station (Wright Compressor Station) from Iroquois Gas Transmission System, Inc. Additionally, Constitution is obligated to obtain coverage from NYSDEC under the SPDES Stormwater General Permit for Construction Activities (GP-0-15-002) and prepare a Stormwater Pollution Prevention Plan (SWPPP) prior to Project construction.

Proposed Project Description and Environmental Impacts

Constitution proposes construction of approximately 124.14 miles of new interstate natural gas transmission originating in northeastern Pennsylvania, proceeding into New York State through Broome, Chenango, Delaware, and Schoharie Counties, terminating at the existing Wright Compressor Station in Schoharie County. In New York State, the Project, rather than co-locating a significant portion of the pipeline on an existing New York State Department of Transportation (NYSDOT) Interstate I-88 access area[5], proposes to include new right-of-way (ROW) construction of approximately 99

[4] Minor Source Air Permit Modification, Wright Compressor Station, Town of Wright, Schoharie County, NY, Iroquois Gas Transmission System, July 26, 2013.

[5] On September 25, 2013, NYSDEC provided FERC with comments on Constitution's Environmental Report dated June 13, 2013, supplemented in July, 2013 that concurred with the United States Army Corps of Engineers' (ACOE) comments and supported ACOE's request to FERC for additional details and documentation to support the reasons why all or some of the Project route could not be routed with the New York State Department of Transportation (NYSDOT) Interstate I-88 control of access area. On April 7, 2014, the Department provided FERC with preliminary comments on the DEIS which extensively analyzed the environmental benefits of utilizing Interstate I-88 (also referred to as Alternative "M") regarding stream, wetland, and interior forest habitats.

In June 2014, Constitution provided information about Alternative M which Department Staff found did not contain sufficient analysis to determine whether Alternative M would generate fewer impacts than Constitution's preferred route. However, using Constitution's information, as well as publicly available information, Department Staff

miles of new 30-inch diameter pipeline, temporary and permanent access roads and additional ancillary facilities.

Although the Department repeatedly asked Constitution to analyze alternative routes that could have avoided or minimized impacts to an extensive group of water resources, as well as to address other potential impacts to these resources, Constitution failed to substantively address these concerns. Constitution's failure to adequately address these concerns limited the Department's ability to assess the impacts and conclude that the Project will comply with water quality standards. Project construction would impact a total of 251 streams, 87 of which support trout or trout spawning. Cumulatively, construction would include disturbance to 3,161 linear feet of streams resulting in a total of 5.09 acres of stream disturbance impacts. Furthermore, proposed Project construction would cumulatively impact 85.5 acres of freshwater wetlands and result in impacts to regulated wetland adjacent areas totaling 4,768 feet for crossings, 9.70 acres for construction and 4.08 for acres for Project operation. Due to the large amount of new ROW construction, the Project would also directly impact almost 500 acres of valuable interior forest. Cumulatively, within such areas, as well as the ROW generally, impacts to both small and large streams from the construction and operation of the Project can be profound and could include loss of available water body habitat, changes in thermal conditions, increased erosion, and creation of stream instability and turbidity.

The individual quality and integrity of streams form the primary trophic levels that support many aquatic organisms and enable the provision of stream ecosystems at large. Under the Project's proposal, many of the streams to be crossed present unique and sensitive ecological conditions that may be significantly impacted by construction and jeopardize best usages. For a number of reasons, streams that support trout and other cold water aquatic species are typically the most sensitive. The physical features of these streams include dense riparian vegetation often composed of old-growth trees which are free of invasive species and that shade and cool streams while also maintaining the integrity of adjacent banks or hillslopes. Undisturbed spring seeps provide clean, cold water and stable yet sensitive channel forms maintain the integrity of the stream itself and further preserve water quality. Biologically, these streams are vital in providing complex habitat for foraging, spawning and nursery protection by wild reproducing trout.

Impacts to these streams are exacerbated as the cumulative negative effects of multiple crossings are added. Demonstrating this, the trout stream Clapper Hollow Creek and its tributaries would be crossed 11 times by the project. Likewise, Ouleout Creek and its tributaries will be crossed 28 times. Many of these streams are part of tributary networks that are dependent upon the contributing quality of connected streams to supply and support the physical and biological needs of a system. This is especially true in supporting the viability of wild trout populations.

---

conducted a review that found that Alternative M could reduce overall impacts to water bodies and wetlands when compared to Constitution's preferred route.

Initially, 100 per cent loss of stream and riparian habitat will occur within the ROW as it is cleared and the pipeline trenched across streams. The trenching of streams will destroy all in-stream habitat in the shorter term and in some cases could destroy and degrade specific habitat areas for years following active construction. For example, highly sensitive groundwater discharge areas within streams could be disturbed, resulting in loss or degradation to critical spawning and nursery habitat. In addition, physical barriers will temporarily prevent the movement of aquatic species during active construction and changes to the stream channel will persist beyond the active construction period, creating physical and behavioral barriers to aquatic organism passage.

Changes to thermal conditions will also likely occur due to clearing of riparian vegetation. Because of the need to maintain an accessible ROW, subsequent revegetation will take considerable time to replace what was lost, notably long-lived, slow growing forest trees. Loss of riparian vegetation that shades streams from the warming effects of the sun will likely increase water temperatures, further limiting habitat suitability for cold-water aquatic species such as brook trout. The loss of shade provided by mature riparian vegetation may be exacerbated in the long term by climate change and thus be more significant since small changes in the thermal loading of cold water trout streams could result in the long term loss of trout populations.

NYSDEC Staff's extensive experience and technical reviews have shown that destabilization of steep hillslopes and stream banks will likely occur and may result in erosion and failure of banks, causing turbid inputs to waterbodies. Specifically, Project construction would include approximately 24 miles of steep slope or side slope construction. Cumulatively, this would amount to roughly 24 per cent of the new cleared right-of-way. Exposed hillslopes can become less stable and, when appropriate stormwater controls are not properly implemented, erosion can result in increased sediment inputs to streams and wetlands. If these events occur they can affect the water quality and habitat quality of these streams.

Trenching of streams can also destabilize the stream bed and such conditions can temporarily cause an exceedance of water quality standards, notably turbidity. Turbidity and sediment transport caused as a result of construction can negatively impact immediate and downstream habitat, can smother or kill sensitive aquatic life stages and reduce feeding potential of all aquatic organisms. More specifically, visual predators such as brook trout find food using visual cues. Thus, reductions in clear water conditions may reduce feeding success that can ultimately result in impacts on aquatic species' propagation and survival and corresponding reductions in the attainment of the waters' best usages.

As a result of chronic erosion from disturbed stream banks and hill slopes, consistent degradation of water quality may occur. Changes in rain runoff along ROW may change flooding intensity and alter stream channel morphology. Disturbed stream channels are at much greater risk of future instability, even if the actual work is conducted under dry conditions; long ranging stream erosion may occur up and

downstream of disturbed stream crossings well beyond the time of active construction. This longer term instability and erosion can result in the degradation of spawning beds and a decrease in egg development. The loss of spawning potential in some cold headwater streams may significantly reduce the long-term viability of these streams to support trout. Constitution proposes to cross 50 known trout spawning streams which will likely result in cumulative impacts on the trout populations in these streams. More specifically, and by way of an example of cumulative impacts to a water body, Constitution proposes to cross Ouleout Creek and its tributaries a total of 28 times with 15 of these crossings occurring in trout spawning areas.

Finally, at the landscape level, impacts to streams from the ROW construction are analogous to the cumulative impacts from roads. There is an established negative correlation between road miles per watershed area and stream quality. Thus, increases in the crossings of streams by linear features such as roads and the pipeline ROW can have cumulative impacts beyond the individual crossings. In the case of the 1 mile corridor surrounding the proposed Constitution pipeline, the pre-construction crossing/area ratio for the New York section is 2.28 crossings/square mile. However, the post-construction ratio will increase 44 per cent to 3.29 crossings/square mile. In specific basins this ratio will be higher and may cause a permanent degradation in stream habitat quality and likewise affect associated natural resources, including aquatic species' propagation and survival.

NYSDEC Application Reviews

On August 21, 2013, Constitution submitted the Application to obtain a CWA §401 WQC and NYSECL Article 15 and Article 24 permits to the Department. Due to insufficient information, NYSDEC issued a Notice of Incomplete Application on September 12, 2013, indicating that the Application was not complete for commencing review. On May 9, 2014, Constitution simultaneously withdrew and resubmitted its WQC request to the NYSDEC. Constitution supplemented the Application a number of times in 2014. A Notice of Complete Application for public review was published by NYSDEC in the Environmental Notice Bulletin (ENB) and local newspapers on December 24, 2014.

This notice commenced a public comment period ending on January 30, 2015 which was subsequently extended to February 27, 2015. To afford the Applicant time to respond to NYSDEC's requests for information based on thousands of public comments, and to extend the time period by which NYSDEC was required to issue the WQC and associated permits, Constitution submitted its second request to withdraw and resubmit the WQC on April 27, 2015. This resubmission initiated an additional UPA comment period until May 21, 2015. A total of 15,035 individual comments were received during the two comment periods. Most of these comments related to issues surrounding the Project applications; a relative handful were related to issues specific to the Compressor Station application.

Since August 21, 2013, Constitution supplemented its Application numerous times in response to additional information requests by the Department; Table 1 below provides an easy reference of the requests and submittals associated with the Application over the past several years.

Table 1

Prepared by	Date	Summary
DEC	June 21, 2012	Summary of Pre-Application Meeting
DEC	May 30, 2013	Sample Matrix for Linear Projects
Constitution	August 28, 2013	401 WQC and related NYS Joint Permit application/documentation received by DEC
DEC	September 12, 2013	Notice of Incomplete Application
Constitution	November 27, 2013	Joint Permit Application - Supplemental Information
Constitution	May 9, 2014	401 WQC Application Withdrawal and Re-submittal
DEC	July 3, 2014	DEC Recommendations for Revised Joint Application
Constitution	August 13, 2014	Joint Permit Application - Supplemental Information # 2
Constitution	November 17, 2014	Additional Information Submittal
Constitution	November 17, 2014	Responses to Wetland Mitigation Plan Deficiencies
Constitution	November 24, 2014	Updated and Revised Information
Constitution	December 1, 2014	Response to Request for Additional Clarification of Wetland Impacts
DEC	December 24, 2014	Notice of Complete Application
DEC	December 31, 2014	NY Stream Crossing Feasibility Analysis Information Request
Constitution	January 22, 2015	Summary of Changes Trenchless Locations
Constitution	February 2, 2015	Revised Wetland Mitigation Plan
Constitution	February 6, 2015	Phase I Stream Analysis/Open Cut
DEC	February 19, 2015	DEC Proposed Wetland Re-route
Constitution	March 27, 2015	Joint Permit Application - Supplemental Information
Constitution	April 24, 2015	Response to DEC Preferred List of Trenchless Stream Crossings
Constitution	April 27, 2015	401 WQC Application Withdrawal and Re-submittal
DEC	April 27, 2015	Notice of Complete Application - WQC Withdrawal and Re-submittal

Constitution	May 13, 2015	Wetland Mitigation Area - Application for Pesticide Permit
Constitution	May 20, 2015	Supplemental Information - Trenchless Crossings
DEC	June 1, 2015	Notice of Incomplete Application - Pesticide Permit
Constitution	June 19, 2015	Canadarago Lake Mitigation Area Update
Constitution	June 30, 2015	Updated Trenchless Crossing Matrix
Constitution	July 8, 2015	Joint Permit Application - Supplemental Information - Wetland Re-route
Constitution	July 14, 2015	Additional Information Submittal - Wetland Impacts and Mitigation
Constitution	August 5, 2015	Response to Notice of Incomplete Application - Pesticide Permit
Constitution	September 15, 2015	Joint Permit Application - Supplemental Information
DEC	October 2, 2015	Acknowledgement of NOI - SPDES MS GP - Contractor Yard 5B
Constitution	January 6, 2016	Wetland Mitigation Area - Application for Pesticide Permit - Betty Brook
DEC	February 26, 2016	Acknowledgement of NOT - SPDES MS GP - Contractor Yard 5B

STATEMENT OF REASONS FOR DENIAL

The Department, in accordance with CWA §401, is required to certify that a facility meets State water quality standards prior to a federal agency issuing a federal license or permit in conjunction with its proposed operation. An applicant for a water quality certification must provide the Department sufficient information to demonstrate compliance with the water quality regulations found at 6 *NYCRR Section 608.9 (Water* Quality Certifications). Pursuant to this regulation, the Applicant must demonstrate compliance with §§301, 302, 303, 306 and 307 of the Federal Water Pollution Control Act, as implemented, by applicable water quality standards and thermal discharge criteria set forth in 6 NYCRR Parts 701,702,703, 704 and 750, and State statutes, regulations and criteria otherwise applicable to such activities.[6] Denial of a WQC may occur when an application fails to contain sufficient information to determine whether the application demonstrates compliance with the above stated State water quality standards and other applicable State statutes and regulations due to insufficient information. The Department is guided by statute to take into account the cumulative impact upon all resources in making a determination in connection with any license, order, permit or certification, which in this case includes being able to evaluate the cumulative water quality impacts of ROW construction and operation on the numerous water bodies mentioned in this letter.[7]

[6] 6 NYCRR §608.9 (2) and (6).

[7] ECL 3-0301(1)(b).

As noted above, Constitution supplemented its Application in response to information requests issued to it by the Department but has not supplied sufficient information for the Department to be reasonably assured that the State's water quality standards would be met during construction and operation of the proposed pipeline. As a result the Department cannot be assured that the aforementioned adverse impacts to water quality and associated resources will be avoided or adequately minimized and mitigated so as not to materially interfere with or jeopardize the best usages of affected water bodies. The following are the Department's reasons for denial of Constitution's Application based on applicable sections of the New York State environmental laws, regulations or standards related to water quality.

Stream Crossings

Project construction would disturb a total of 251 streams under New York State's jurisdiction, 87 of which support trout or trout spawning. Cumulatively, construction would disturb a total of 3,161 linear feet of streams and result in a combined total of 5.09 acres of temporary stream disturbance impacts. From inception of its review of the Application, NYSDEC directed Constitution to demonstrate compliance with State water quality standards and required site-specific information for each of the 251 streams impacted by the Project. NYSDEC informed Constitution that *all 251* stream crossings must be evaluated for environmental impacts and that trenchless technology was the preferred method for stream crossing. This information was conveyed to Constitution and FERC on numerous occasions since November 2012; however, Constitution has not supplied the Department with the necessary information for decision making.

Deficient Trenchless Stream Crossings Information and Lack of Specific Stream Crossings Details

Staff's review of the Application includes an analysis of adverse stream crossing impacts, specifically the suitability of open trenching versus trenchless techniques or subsurface boring methods. Open trenching is a highly impactful construction technique involving significant disturbance of the existing stream bed and potential long-term stream flow disruption, destruction of riparian vegetation and establishment of a permanently cleared corridor. Comparatively, trenchless methods present significantly fewer environmental impacts to the regulated resource. Because alternative trenchless techniques exist for this Project, the Department requested additional information from Constitution to evaluate their feasibility and to determine if the Application provides enough information to demonstrate compliance with water quality standards.

Since NYSDEC's most protective method for stream crossings is some form of a trenchless technology, NYSDEC directed Constitution to determine whether a trenchless technology was constructible for each stream crossing.[8] On a number of occasions NYSDEC identified the need to provide information so that it could evaluate trenchless stream installation methods (see Table 2, below); however, Constitution has not provided sufficient information to enable the Department to determine if the

[8] NYSDEC Comments to FERC, November 7, 2012.

Application demonstrates compliance with 6 NYCRR Part 703, including, but not limited to, standards for turbidity and thermal impacts (6 NYCRR §703.2), and 6 NYCRR Part 701 (best usages).

	Table 2	
Prepared by	Date	Summary
NYSDEC	June 21, 2012	In a summary of the initial pre-application meeting with Constitution, which took place on June 7, 2012, NYSDEC stated in a letter to Constitution that for protected streams and wetlands, trenchless technology is the preferred method for crossing and should be considered for *all* such crossings (emphasis added).
NYSDEC	November 7, 2012	In comments to FERC, NYSDEC stated that for streams and wetlands the preferred method for crossing is trenchless technology. The draft EIS should evaluate cases where other methods are proposed and Constitution should explain why trenchless crossing technology will not work or is not practical for that specific crossing.
FERC	April 9, 2013	FERC's Environmental Information Request (EIR) directed Constitution to address all of the comments filed in the public record by other agencies regarding the draft Resource Reports including all comments from the NYSDEC.
NYSDEC	May 28, 2013	Meeting with Constitution and NYSDEC staff at the DEC Region 4 office to review stream crossings. NYSDEC reiterates that acceptable trenchless technology was the preferred installation method and that stream crossings should be reviewed for feasibility of using those technologies.
NYSDEC	July 17, 2013	NYSDEC comments to FERC reiterates that trenchless technology is preferred method for stream crossings. The DEIS should evaluate cases where other methods are proposed and the Project Sponsor should explain why trenchless technology will not work or is not practical for that specific crossing.
NYSDEC and Constitution staff	July - August 2013	Field visits of proposed stream crossings prior to permit applications to the Department. At each crossing, NYSDEC emphasized to

		Constitution staff that trenchless technology is preferred/most protective.
Constitution	November 2013	Trenchless Feasibility Study provided by Constitution that described its choices of stream crossing techniques. Upon review, document and justifications found insufficient and all streams less than 30' wide were arbitrarily eliminated from any consideration for trenchless crossing methods.
NYSDEC and Constitution staff	December 31, 2014	Meeting conducted with Constitution staff in which NYSDEC indicated that the Trenchless Feasibility Study was inadequate, *e.g.* provided insufficient justification and removed all streams less than 30 feet in width from analysis.
NYSDEC	December 31, 2014	To aid in an appropriate review of stream crossing techniques and compliance with water quality standards, an informational request table including required technical information was developed by NYSDEC and provided to Constitution.
US Army Corps of Engineers	January 13, 2015	U.S. Army Corps of Engineers letter reiterates a request for a feasibility analysis of trenchless crossings.
Constitution and NYSDEC	January 23, 2015	Meeting between Constitution and NYSDEC staff wherein Constitution stated it was unable to complete the table (described above on December 31, 2014). NYSDEC staff indicated that the justification for stream crossing methods was insufficient and that appropriate site specific information must be provided.
Constitution and NYSDEC	January 28, 2015	Conference call: NYSDEC reiterated its request for a site specific analysis of trenchless stream crossings for all streams including those under 30 feet wide.
Constitution	February 5, 2015	Constitution provided an updated example of a trenchless feasibility study but that example continued to exclude streams up to 30 feet wide from analysis and did not provide detailed information of the majority of streams.

Constitution submitted a Trenchless Feasibility Study (Study) to FERC in November of 2013 which the Department has analyzed for the purpose of reviewing Constitution's WQC application. This Study did not include the information that FERC directed Constitution to supply to NYSDEC (and others) in its April 9, 2013 EIR, which incorporated NYSDEC's information requests, including NYSDEC's request to

Constitution dated November 7, 2012. Moreover, the Study did not include information that NYSDEC specifically requested in meetings and site visits with Constitution throughout 2013 and did not provide a reasoned analysis to enable the Department to determine if the Project demonstrates compliance with water quality standards.

Of the 251 streams to be impacted by the Project, Constitution's Study evaluated only 87 streams, in addition to the Schoharie Creek, as part of the Phase I desktop analysis[9] which Constitution used to determine if surface installation methods warranted consideration for a trenchless design. Of the 87 streams reviewed, Constitution automatically eliminated 41 streams from consideration for trenchless crossing because those streams were 30 feet wide or less. Constitution further eliminated 10 more streams from the Study because although they were in the proposed ROW, they would not be crossed by the Project. Accordingly, a total of 24 streams were subsequently analyzed in the Study's Phase II analysis which evaluated construction limiting factors including available workspace, construction schedules and finances. Using its review criteria, Constitution's Study finally concluded that only 11 stream crossings of the 251 displayed preliminary evidence in support of a potentially successful trenchless design and were chosen for the Phase III geotechnical field analysis. Department staff consistently told Constitution that its November 2013 Trenchless Feasibility Study was incomplete and inadequate (See Table 2).

Constitution's continued unwillingness to provide a complete and thorough, Trenchless Feasibility Study required Department staff to engage in a dialogue with Constitution on potential trenchless crossings for a limited number of streams. On April 24, 2015, Constitution's consultant produced a revised draft list of 29 trenchless stream crossings and an example of plans that would be provided for each crossing on the proposed list. Subsequently, in May 2015, Constitution provided detailed project plans for 25 potential trenchless crossings, but only two of those plans were based on full geotechnical borings that are necessary to evaluate the potential success of a trenchless design. Detailed project plans including full geotechnical borings for the remaining stream crossings have not been provided to the Department. From May through August 2015, NYSDEC engaged in a dialogue with Constitution on potential trenchless methods for 19 streams, although NYSDEC did not form a conclusion on a crossing method for the remaining streams, including the vast majority of trout and trout spawning streams. Furthermore, as noted above, Constitution's unwillingness to adequately explore the Alternative M route alternative, with the prospect of potentially fewer overall impacts to water bodies and wetlands when compared to Constitution's preferred route, means that the Department is unable to determine whether an alternative route is actually more protective of water quality standards. The Department therefore does not have adequate information to assure that sufficient impact avoidance, minimization or mitigation measures were considered as to each of the more than 200 streams proposed for trenched crossings.

[9] Constitution described the Phase I analysis as "a general evaluation of Project locations meeting the basic criteria for trenchless construction methods such as crossing distances, feature classifications and potential associated impacts."

Due to the lack of detailed project plans, including geotechnical borings, the Department has determined to deny Constitution's WQC Application because the supporting materials supplied by Constitution do not provide sufficient information for each stream crossing to demonstrate compliance with applicable narrative water quality standards for turbidity and preservation of best usages of affected water bodies. Specifically, the Application lacks sufficient information to demonstrate that the Project will result in no increase that will cause a substantial visible contrast to natural conditions.[10]

Furthermore, the Application remains deficient in that it does not contain sufficient information to demonstrate compliance with 6 NYCRR Part 701 setting forth conditions applying to best usages of all water classifications. Specifically, "the discharge of sewage, industrial waste or other wastes shall not cause impairment of the best usages of the receiving water as specified by the water classifications at the location of the discharge and at other locations that may be affected by such discharge."[11]

Cumulatively, impacts to both small and large streams from the construction and operation of the Project can be profound and include loss of available habitat, changes in thermal conditions, increased erosion, creation of stream instability and turbidity, impairment of best usages, as well as watershed-wide impacts resulting from placement of the pipeline across water bodies in remote and rural areas (See Project Description and Environmental Impacts Section, above). Because the Department's review concludes that Constitution did not provide sufficient detailed information including site specific project plans regarding stream crossings (*e.g.* geotechnical borings) the Department has determined to deny Constitution's WQC Application for failure to provide reasonable assurance that each stream crossing will be conducted in compliance with 6 NYCRR §608.9.

In addition, the Application lacks required site-specific information for each of the 251 stream crossings including, but not limited to the specific location of access roads, definite location of temporary stream crossing bridges, details of temporary bridges including depth of abutments in stream banks, details of proposed blasting and the location of temporary coffer dams for stream crossings. Absent this information and the information described above, the Department cannot determine whether additional water quality impact avoidance, minimization or mitigation measures must be taken to ensure compliance with water quality standards in water bodies associated with this infrastructure.

Insufficient Site-Specific Information on Depth of Pipe

NYSDEC received numerous public comments regarding the necessary depth for pipeline burial in stream beds that would prevent inadvertent exposure of the pipe. Historically, Department staff has observed numerous and extensive vertical

[10] 6 NYCRR §703.2.

[11] 6 NYCRR §701.1.

movements of streams in New York State that have led to pipe exposure and subsequent remedial projects to rebury the pipe and armor the stream channel. These subsequent corrective actions caused severe negative impacts on water quality and seriously impacted the stability and ecology of the stream that could have been avoided with a deeper pipe. Department staff requested that Constitution provide a comprehensive and site-specific analysis of depth for pipeline burial, but Constitution provided only a limited analysis of burial depth for 21 of the 251 New York streams.[12] Without a site-specific analysis of the potential for vertical movement of each steam crossing to justify a burial depth, NYSDEC is unable to determine whether the depth of pipe is protective of State water quality standards and applicable State statutes and standards.

In addition to impacts to water quality described above and without proper site-specific evaluations, future high flow events could expose the pipeline, resulting in risks to the health, safety, and welfare of the people of New York State. Pipe exposure would require more extensive stabilization measures and in stream disturbances resulting in addition degradation to environmental quality. We note that flooding conditions from extreme precipitation events are projected to increase on the operational span of the pipeline due to climate change.

Deficient Blasting Information

Constitution's Blasting Plan, dated August, 2014, outlines the procedures and safety measures to which Constitution would adhere in the event that blasting is required for Project installation. The Blasting Plan does not provide site-specific information where blasting will occur but instead provides a list of potential blasting locations based on the presence of shallow bedrock. In New York alone, Constitution identifies 42.77 total miles where shallow bedrock occurs, or approximately 44 per cent of the route, involving 84 wetlands crossings and 27 waterbody crossings. Constitution indicates that a final determination on the need for blasting will be made at the time of construction in waterbodies and wetlands. Due to the lack of specific blasting information needed for review with respect to associated water bodies, NYSDEC is unable to determine whether this Plan is protective of State water quality standards and in compliance with applicable State statutes and standards.

Wetlands Crossings

Wetlands provide valuable water quality protection by retaining and cleansing surface runoff to water bodies. Constitution's Application does not demonstrate that wetland crossings will be performed in a manner that will avoid or minimize discharges to navigable waters that would violate water quality standards, including turbidity. Absent detailed information for each wetland crossing that demonstrates Constitution properly avoided, minimized and mitigated impacts to wetland and adjacent areas, the Application does not supply the Department with adequate information to assure that

[12] See, Trout Stream Restoration Report, dated August 2014.

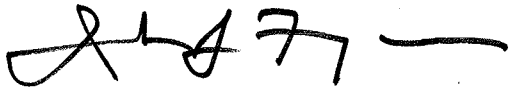
streams and water bodies will not be subject to discharges that do not comply with applicable water quality standards.

NYSDEC Denial

Constitution was required to submit an Application providing sufficient information to demonstrate compliance with the regulations found at 6 NYCRR §608.9, Water Quality Certifications. Pursuant to this regulation, an Applicant must demonstrate compliance with §§301, 302, 303, 306 and 307 of the Federal Water Pollution Control Act, as implemented, by applicable water quality standards and thermal discharge criteria set forth in 6 NYCRR Parts 701,702,703, 704 and 750, and State statutes, regulations and criteria otherwise applicable to such activities.[13] The Department must also take into account the cumulative impact to water quality of the full complement of affected water resources in making any determination in connection with any license, order, permit or certification.[14] For the reasons articulated above, the Department hereby denies Constitution's WQC Application because it does not supply adequate information to determine whether the Application demonstrates compliance with the above stated State water quality standards and other applicable State statutes and regulations.

This notice of denial serves as the Department's final determination. Should Constitution wish to address the above deficiencies, a new WQC application must be submitted pursuant to 6 NYCRR §608.9 and 6 NYCRR Part 621. Uniform Procedures Regulations, 6 NYCRR §621.10 provide that that an applicant has a right to a public hearing on the denial of a permit, including a §401 WQC. A request for hearing must be made in writing to me within 30 days of the date of this letter.

Sincerely,



John Ferguson
Chief Permit Administrator

Cc:
T. Berkman
W. Little
P. Desnoyers
S. Tomasik
D. Merz
F. Bifera
Y. Hennessey
K. Bowman

[13] 6 NYCRR §608.9 (2) and (6).
[14] ECL 3-0301 (1)(b).

APRIL 10, 2015
Via Electronic Mail: comments-southern-georgewashington-jefferson@fs.fed.us

Re: Mountain Valley Pipeline Special-Use Permit Comments

USDA Forest Service
George Washington and Jefferson National Forest
ATTN: Mountain Valley Pipeline Survey Comments
5162 Valleypointe Parkway
Roanoke, VA 24019

Dear H. Thomas Speaks, Jr.:

As the Science and Technical Committee of Preserve Craig, Inc. we urge the US Forest Service (USFS) to **deny the application by MVP for a Special-Use Permit to conduct surveys on Jefferson National Forest Lands in Craig County, Virginia**, pursuant to Alternative Routes 110, 110J and 110R for the Mountain Valley Pipeline (MVP) Project. The USFS has already judiciously denied such permission for a portion of Alternate 110 as incompatible with present land designation (i.e. Wilderness Area). We contend that the proposals of Alternative Routes 110J, 110R and the remaining parts of 110 show a similar lack of professional diligence on the part of MVP, as detailed in the attached assessment.

We understand the USFS typically allows surveys even when the proposal is highly questionable. In this case, however, **established facts about Alternates 110, 110J, and 110R clearly demonstrate that the route is so egregious and environmentally disastrous** that the USFS should reject the Special Use Permit application on the grounds of known environmental concerns. Specifically, current facts demonstrate that these alternatives 1) threaten the security of domestic water supplies, 2) violate longstanding management practices and policies, 3) violate multiple water quality BMPs, 4) threaten federally listed species, 5) damage viewsheds, and 6) negatively impact longstanding relations between the USFS and the citizens of Craig County.

At the same time, the exceptionally poor survey design will provide no useful information to support sound decision-making: the proposed surveys will be extensive rather than intensive (i.e. cover a wide area in a cursory way), and will be extremely limited spatially (300-ft survey corridor) and temporally (4-5 months for 300+ miles). While MVP will attempt to make definitive statements from such insubstantial data, the limited nature of their findings cannot address concerns for rare taxa, water quality, and other issues noted in our assessment**.**

If, the USFS does allow the surveys, we strongly suggest that 1) **the survey design be peer-reviewed by experts** to provide the best possible information**,** and **2)** the survey work specifically **address the issues raised in the attached document.**

We appreciate the chance to submit comments and offer our services as the USFS considers this important decision. For more information, contact Larry Willis (ldwillis1028@gmail.com).

Sincerely,

The Scientific and Technical Committee of Preserve Craig, Inc., on behalf of the community

W. Samuel Easterling, Ph.D., Civil Engineering
W. Cully Hession, Ph.D., P.E., Certified Ecological Designer
Scott Klopfer, M.S., Certified Wildlife Biologist
Duane Means, Certified Forester #3301
Brian Murphy, Ph.D., Certified Fisheries Professional
Marie C. Paretti, B.S. Chemical Engineering, Ph.D. English
Gene Seago, Ph.D., J.D. Accounting
Lawrence Willis, Ph.D. Stream Ecology
Bill Wolf
Jim Workman, M.S. Engineering Administration

cc: Kim Smith, US Fish and Wildlife Service, Virginia Field Office
Brian Watson, Virginia Department of Game and Inland Fisheries
Amy Ewing, Virginia Department of Game and Inland Fisheries
Rene Hypes, Virginia Department of Conservation and Recreation
Liz Stout, US Fish and Wildlife Service, WV Field Office
Federal Energy Regulatory Commission
Craig County Board of Supervisors
Preserve Craig Steering Committee
Governor Terry McAuliffe
Senator Mark Warner
Senator Tim Kaine
Congressman Morgan Griffith
State Senator Steve Newman
House of Delegate Gregory Habeeb

ASSESSMENT OF THE IMPACT OF THE MOUNTAIN VALLEY PIPELINE
Prepared by the Scientific and Technical Committee of Preserve Craig, Inc.

Our assessment of the Mountain Valley Pipeline survey request addresses 6 critical areas:

1. Security of Domestic Water Supplies
2. Long Standing Land Management Strategies, Agreements, and Decisions
3. Water Quality, Landscape Considerations, and Best Management Practices (BMPs)
4. Rare, Threatened, Endangered, and Invasive Species
5 Viewsheds
6. Cultural Issues

Based on serious, well-documented, easily predicted violations of both policy and law across these six categories, we find MVP's request for a Special Use Permit to survey Jefferson National Forest Lands in Craig County unsupportable and recommend immediate rejection.

1. Security of Domestic Water Supplies

Virtually every Craig County resident (more than 5000 people) gets their domestic household water supply from water sources that originate in the Jefferson National Forest, and any large-scale disturbance of forested JNF lands will potentially interrupt or degrade these supplies. All households in Craig County draw their domestic water supplies from springs and wells within the county. This includes more than 500 households and businesses and more than 1200 people serviced by the Craig-New Castle Public Service Authority, which relies on local wells. Additionally, every Craig County agricultural operation relies on either groundwater or surface water that originates at least in part from the JNF. Therefore, the entire water supply for Craig County depends on the JNF for spring flow, stream flow, and groundwater flow to wells through easily disturbed karst geology. This highly sensitive karst geology means that fractures, cracks, channels, and sinkholes readily form throughout the region's limestone base, creating a deeply interconnected and fragile water supply. Excavation and blasting for pipeline construction thus has the potential to severely impact many miles and acres of NF and neighboring lands. One need only look at two case studies in this area to understand how sensitive karst-geology water supplies can be damaged 1) wells were disturbed by construction along the I-81 corridor and 2) drilling an exploratory gas well near Paint Bank contaminated the spring feeding the Paint Bank Fish Hatchery.

Moreover, allowing the passage of the pipeline through JNF lands would mean that the proposed pipeline would also pass through approximately 150 private-land parcels in Craig County that would be directly affected by the major forest-clearing, excavating, blasting, and related ground-disturbing activities required to build the MVP pipeline, creating additional risks for residents throughout the county, regardless of whether their land lies along the pipeline route..

The Forest Plan for the JNF (USFS 2004) extensively discusses the need to protect watersheds in the JNF that are relied upon for domestic water supplies. That discussion focuses on domestic water-supply impoundments for urban communities, but ignores the fact that protection of water supplies is equally, if not more, critical for rural communities where no alternative water sources exist. The JNF composes more than 50% of the land in Craig County. Thousands of Craig county residents rely on spring water and well water that depends at least in part, and in many cases substantially or entirely, on hydrology from the JNF. These water sources deserve and need protection just as much as domestic water-supply reservoirs. This issue is an oversight in

the present Forest Plan that certainly needs to be addressed in the next planning phase, but that must also be taken into account immediately as the USFS considers MVP's request.

A survey of surface features will do little more than identify a few existing sinkholes and will provide no information to assess the risks associated with future construction. At the same time, known, planned activities associated with the pipeline construction itself threaten the County's water supply:

- The survey corridor will be stripped of forest cover, removing an important water-filtering component of the forest floor that is particularly critical in karst regions, where channels and sinkholes can take surface water directly into the aquifer.
- A 10-foot-deep trench will be excavated through the rock and soil, and such activity itself has a history of altering groundwater flows.
- A 42-inch metal pipe will be placed in the ground and water breaks will be installed which will unavoidably alter near-surface water movement.
- The survey corridor will be compacted, creating a more-impervious surface.

The Weeks Act charged the Forest Service with restoring and protecting forests, watersheds, and water supplies (Williams 2003, Weeks Act of March 1, 1911; 36 Stat. 961). The domestic water supplies for hundreds of people could be negatively impacted by construction of the MVP pipeline through the JNF in Craig County, and such construction should not even be considered in such a hyrologically sensitive and critical area. ***The residents of Craig County call on the Forest Service to help protect and secure their water supplies by denying the proposed actions of a private company that threaten the water security of many county residents.***

2. Long Standing Land Management Strategies, Agreements, and Decisions

The Mountain Valley Pipeline Alternate Routes 110, 110J, and 110R contradict and outright violate previous USFS studies and decisions, the USFS Land and Resource Management Plan, and private citizens' conservation efforts with other state and federal agencies.

First, in the 1990s a power line was proposed to cross Craig County and the Jefferson National Forest (JNF) in the same general area as the current proposed pipeline routes. **After extensive studies of thirteen proposed routes, the USFS effectively denied a request for a power line to cross the region (USFS 1996a, USFS 2002).** In that decision, the Forest Service considered economic, environmental, technical and other factors to not approve any of the routes in order to best fulfill their statutory missions and responsibilities.

The reasons for that decision are more important today than they were 20 years ago. The proposed route for the MVP most closely resembles routes assessed in 1996 that were among the worst for crossing steep slopes with high erosion potentials. Because a pipeline requires ditch excavation, it is a much more intense disturbance to the land and cultural assets than a power line, and is an equally intense disturbance to recreation and viewsheds (see Section 4). As a result, the proposed MVP routes 110, 110J and 110R would have an even bigger effect on the landscape than a power line. The power line routes through Craig County were also considered *"…the most severe impacts to wildlife habitat and remote recreation experience"* (USFS 1996b). Allowing a pipeline through this area now would contradict the decision made in 1996.

Second, the USFS has adopted a management plan for the Jefferson National Forest (USFS 2004) in which they made the decision that utility rights of way are **not appropriate in some of the areas proposed for the current pipeline**. The development of that plan took many years to complete and relied on extensive public comment. The plan was a well-deliberated compromise of multiple uses that included management prescriptions 6C-Old Growth with Disturbance areas and 8C- Black Bear Habitat.

The management prescriptions for 6C-Old Growth with Disturbance in the Forest Plan (USFS 2004) provide a number of clear, specific reasons for disallowing new pipeline construction and related infrastructure (e.g., roads and staging areas); 6C-026C specifically prohibits new utility right-of-way construction:

> *"These areas are unsuitable for designation of new utility corridors, utility rights-of-way, or communication sites. Existing uses are allowed to continue."* (Page 3-84)

The 8C–Black Bear Management prescriptions are founded on the idea that disturbances such as road construction and use should be kept to a minimum to provide seclusion. Clearly, the activities surrounding the design, construction, and maintenance of the pipeline and resulting corridor will violate this directive. In fact, 8C-028 specifically prohibits new right-of-way construction:

> *"These areas are unsuitable for designation of new utility corridors, utility rights-of-way, or communication sites."* (p. 3-124)

As we have stated, the current Forest Plan, including these prescriptions, resulted from an arduous process involving multiple, diverse stakeholder interests. While it is possible to amend the plan to accommodate the pipeline request, it is not possible to change the reasons these areas were designated as they were. The uses were assigned as the agreed-upon best use of the land, and the limitations were stated for sound scientific, ecological, and social reasons based on input from numerous experts as well as citizen stakeholders. Changing the plan will undoubtedly require a reinvestment of time and energy from stakeholder groups to address the resulting changes and their impacts on management across the JNF. **The proposed survey will not be sufficient to provide the data needed for a major change in USFS Policy.**

Third, although the USFS has stated that it will only be considering Forest Service owned lands in this deliberation, there is undoubtedly a strong connection between private and public lands, and what happens on one strongly affects the other. The proposed routes will degrade private conservation easements, private wildlife habitat restoration projects, and other longstanding, private conservation efforts created by concerned citizens in collaboration with state and federal agencies, land conservancies, and other dedicated conservation entities. These conservation efforts and public participation are important to USFS goals and affect USFS land management activities. Allowing MVP to proceed with its survey on Forest Service land will have ripple effects among hundreds of private land owners who to date have served with the USFS as citizen-stewards of our region's forests.

Together, these violations of current USFS and JNF policies and practices clearly warrant a refusal of MVP's request for a survey.

3. Water Quality, Landscape Considerations, and BMPs

The MVP would clearly negatively impact water quality and landscape, and violate related BMPs. The importance of watershed protection is clear throughout the current Forest Plan, and effectively summarized in the following excerpts:

a. *"Maintenance and restoration of healthy, diverse, and resilient watersheds, which include not only the water, but also the soil and air, will be given the highest priority in all of our management activities."* (Page 2-2, paragraph 2, line 2)

b. *"Water quality remains within a range that ensures survival, growth, reproduction, and migration of aquatic and riparian wildlife species; and contributes to the biological, physical, and chemical integrity of aquatic ecosystems. Water quality meets or exceeds State and Federal standards."* (p. 3-180)

c. *"The biological integrity of aquatic communities is maintained, restored, or enhanced. Aquatic species distributions are maintained or are expanded into previously occupied habitat. The amount, distribution, and characteristics of aquatic habitats for all life stages are present to maintain populations of indigenous and desired nonnative species. Habitat conditions contribute to the recovery of species under the Endangered Species Act."* (p. 3-180)

d. *"Any human caused disturbances or modifications that may concentrate runoff, erode the soil, or transport sediment to the channel or water body are rehabilitated or mitigated to reduce or eliminate impacts. Channel stability of streams is protected during management activities."* (p. 3-181)

e. *"On all soils dedicated to growing vegetation, the organic layers, topsoil and root mat will be left in place over at least 85% of the activity area."* (p. 2-7)

f. *"No herbicide is aerially applied within 200 horizontal feet, nor ground-applied within 30 horizontal feet, of lakes, wetlands, perennial or intermittent springs and streams."* (p. 2-28)

g. *"Use advanced harvesting methods on sustained slopes 45 percent or greater to avoid adverse impacts to the soil and water resources. Use advanced harvest systems on sustained slopes over 20 percent when soils have a high erosion hazard or are failure-prone."* (p. 2-33)

h. *"This Forest Plan meets or exceeds State Best Management Practices. Current State BMP handbooks or manuals are incorporated as direction in the Forest Plan and are implemented for those resource management activities that are covered by the handbooks/manuals. Standards for activities not included in BMP handbooks/manuals are included in Chapters 2 and 3 of this Forest Plan."* (p. A-3)

If any of the proposed routes through Craig County (110, 110J, 110R) were approved, **EVERY** goal and strategy listed above would be violated during both construction and operations, and some of the most important stream habitats within the National Forest boundaries would be adversely affected.

While the subject of route feasibility is one of the goals of a survey, the extensive information already available clearly and directly indicates Alternates 110, 110J and 110R are inappropriate under any circumstances.

Two landscape features standout as particularly obvious problems with regard to water quality along the proposed routes: **steep slopes and extremely sensitive aquatic habitats**.

First, with respect to the slopes, one key reason MVP proposed alternate routes at all was the presence of steep slopes along their original route. These proposed alternates do nothing to address that concern. Alternative Route 110 and all related routes (110J, 11R) traverse extreme slopes in the JNF in Craig County, including:

- the southeast face of Potts Mountain: up to 42% slope
- the northwest face of Sevenmile Mountain: up to 63% slope
- the northwest face of Johns Creek Mountain: up to 63% slope
- the southeast face of Johns Creek Mountain: up to 85% slope
- the northwest face of Sinking Creek Mountain: up to 63% slope
- the northwest face of Cove Mountain: up to 63% slope

As clearly stated in USFS policy, "*Current Forest Service policy directs compliance with required CWA permits and State regulation and requires the use of BMPs to control nonpoint source pollution to meet applicable water quality standards and other CWA requirements"* (USFS 2012; p. v), which clearly includes adherence to BMPs with respect to slope runoff. **Pipeline construction activity on these steep slopes will inevitably violate BMPs and create problems with slope failure, erosion, sedimentation and ground water and surface water quality.**

These problems are not merely *potential* effects – they are certainties, even with all state-of-the-art mitigation practices observed. BMPs are implemented to minimize negative effects; they are never assumed to eliminate effects. Moreover, the effectiveness of BMPs is dependent on many factors, including the steepness of the landscape. The slopes involved in Alternate Routes 110, 110J, and 110R are clearly outside the design limits and are unacceptable under BMPs. In addition, BMPs for road building promulgated by the Virginia Department of Forestry dictate that *"roads should follow contour as much as possible, with grades between two percent and 10 percent"* (VDOF 2011; p. 18). The "Gold Book" (USDI and USDA 2007) that governs oil and gas exploration on federal lands stipulates that

> "[road*] gradient should fit as closely as possible to the natural terrain . . . The gradient should not exceed 8 percent . . . in order to minimize environmental effects. In mountainous or dissected terrain, grades greater than 8 percent and up to 16% may be permissible with prior approval of the surface management agency."* (USDI and USDA 2007; p. 25).

Pipelines are a much more intense disturbance than road building because of the consistent depth of excavation and because they are oriented perpendicular to the slope. The steep slopes encountered along the proposed routes in Craig County will cause erosion, increased runoff and sedimentation problems in the watersheds. **No mitigation procedures are capable of**

eliminating these inevitable problems on the slopes. These problems *will* occur, thereby affecting water quality and the sensitive aquatic habitat in surface streams along the route.

Moreover**,** given the steepness of the slopes, the 300-ft survey corridor, 125- ft construction corridor and the ultimate 75-ft maintenance corridor described in the MVP application are **misleading to the USFS and the public**, as the ultimate corridor would necessarily be significantly wider than stated to accommodate access roads, further increasing runoff, erosion, and sedimentation. In their detailed route analysis of the initial Proposed Route and Alternative Route 1 (MVP 2014; filed 1 December 2014), **MVP rejected using some existing transmission line rights-of-way along Route Alternative 1 due to steep side slopes** that would have to be traversed by the pipeline. MVP further stated that if such slopes were indeed to be traversed, then the impact corridor for pipeline construction will necessarily be much wider than the 125-ft corridor initially described:

> *"Initial flight reconnaissance and ground check revealed that much of the route that followed existing overhead electric transmission line rights-of-way was along severe side slopes. While the overhead transmission lines span significant areas of slide slope, these areas would be required to be crossed directly by the pipeline. As a result of this next phase of route analysis, MVP determined that Route Alternative 1 represented insurmountable construction challenges, as well as a high risk of slope failure and pipeline slips, once the pipeline was to be in operation." (MVP 2014: p. 1-4) . . . However, in areas where Route Alternative 1 is alongside slopes, the construction right-of-way would need to be significantly wider than 125 feet to accommodate significant cut-and-fill that would be required for construction, which would result in an even greater area of construction impact."* (MVP 2014: p. 1-5)

In other words, MVP's own extensive route analyses (MVP 2014) ruled out Route Alternative 1 as presenting *"insurmountable construction challenges"* because of steep slopes. Yet in MVPs filing Summary of Alternative February 2015 (MVP 2015a), the company proposed new Route Alternatives 110/110J/110R through Craig County that cross extreme slopes that reach and even exceed 80%. The exact same construction challenges MVP identified on Route Alternative 1 are present on the severe side slopes along Route Alternatives 110, 110J, and 110R, and would also require a construction corridor significantly wider than 125 feet. This point is never revealed in either MVP's 18 February 2015 filing to FERC that first describes these Route Alternatives (MVP 2015a), nor is it ever mentioned in MVP's application to USFS for the permit to survey in the JNF (MVP 2015b). **Thus the survey-permit application to USFS contains incomplete and/or misleading information.**

On the steep slopes crossed by Route Alternatives 110, 110J, and 110R, it will be impossible to engineer either construction-access roads or maintenance-access roads that meet required USFS BMPs (USFS 2012), even by utilizing the entire proposed 125-ft temporary construction corridor for switchbacks. Properly built roads that represent responsible land stewardship and meet BMP guidelines would necessarily have multiple switchbacks and a properly designed drainage network, which would be impossible to construct even within the larger 125-ft construction corridor, much less the 75-ft permanent easement corridor described by MVP.

Therefore, if the pipeline were ever allowed to be constructed through the JNF in Craig County, either the corridor though the National Forest would be much wider than suggested, or MVP would have to violate accepted BMPs **and USFS would have to contradict its own policies to allow such egregious violations**.

The second key landscape feature concerns the sensitive aquatic habitats along the Alternatives 110, 110J, and 110R. **These routes will negatively affect known sensitive aquatic habitats.** While we defer discussion of the sensitivity of specific habitats and species to Section 4 (Rare, Endangered and Invasive Species), we note here that **several of the streams to be crossed have exceptional water quality that supports species that are especially sensitive to sedimentation.**

With respect to water quality, the proposed routes will remove forest cover that protects critical water resources on both public and private lands and destroy streamside buffers. Construction will compact the soil in the construction corridor, thereby causing increased runoff to nearby stream channels outside the corridor that will result in channel erosion and sediment problems downstream. These are **known, predictable outcomes**. Additionally, construction could potentially destroy ground water connections and clog underground drainage networks. Nearly the entire length of the proposed Alternatives 110, 110J, and 110R intersect karst geology that provides the supply and protection of clean water for wildlife (as well as for residential and agricultural use, as noted in Section 1).

The proposed routes will run along and across innumerable small un-named headwater streams that are essential for aquatic habitat, as well as the more-well-known named streams (Dicks Creek Johns Creek, Sinking Creek, and Craig Creek). Construction of buried pipeline stream crossings is known to cause negative impacts to stream ecosystems (Levesque and Dube 2007). In particular, construction of these crossings will directly impact stream beds and banks, increase suspended sediment and deposition and, thereby, impact fish and macroinvertebrate habitats (Tsui and McCart 1981, Reid et al. 2002). While little research exists concerning the long-term impacts of pipeline crossings, there will certainly be impacts on the local riparian forests and the many recently implemented CRP and CREP conservation efforts in the area.

A survey will do little to improve our already extensive understanding of these water quality issues. We already know where the important resources are and why they are important. We know the proposed route is inappropriately steep. The USFS was formed in large part to protect watersheds, and its formation led to the restoration of millions of acres of denuded, eroded land and the protection of related water resources (Williams, 2003). It would be incongruous to allow that same land to be newly denuded and eroded for a purpose that is clearly unsuitable for the land.

4. Rare, Threatened, Endangered and Invasive Species

The proposed Alternate Route 110 and all related options will negatively impact multiple rare, threatened, and endangered species. The Forest Service Plan makes clear, unambiguous declarations about the USFS goals for protecting important species that inhabit the corridor for MVP Alternative Routes 110J and 110R (USFS 2004):

a. *"Sensitive aquatic species is a concern throughout this watershed. The James spiny mussel is found in all the 6th level watersheds except Upper Barbours Creek. In addition, the orangefin madtom is present in Upper Craig Creek, Johns Creek and Lower Craig Creek. The Atlantic pigtoe, a state-listed threatened mussel and the roughhead shiner a state species of special concern are also found in the Upper James River watershed."*

b. *"Clean water and gravels will be provided in streams inhabited by and upstream of the James spinymussel, Atlantic pigtoe and their host fish, as well as the roughhead shiner*

and orangefin madtom so that populations can be maintained, protected and restored." (p. 4-10)

c. *"Priority Watersheds which Possess Outstanding Aquatic Biodiversity (Potts Creek, Johns Creek, Upper Craig Creek, Lower Craig Creek): Within these watersheds, we will seek opportunities for dialog with adjacent private landowners and work collaboratively with local governments and other Federal government agencies to restore water quality or maintain and restore aquatic habitat. In addition to identification of these priority watersheds, the Forest (Service) has developed a Federally Listed Fish and Mussel Conservation Plan in collaboration with the U.S. Fish and Wildlife Service, and continues to work with the Virginia Department of Game and Inland Fisheries to protect and recover federally listed and sensitive aquatic species."* (p. 2-4)

d. *"Aquatic Habitat Areas: Forest management activities within these areas are designed to protect habitat for threatened, endangered, and sensitive fish and mussels in streams adjacent to or immediately downstream from, National Forest System lands. These lands and their associated streams reflect the physical, chemical, and biological structure that sustains exceptional aquatic diversity."* (p. 3-163);

e. *"Timber harvest is not allowed unless associated with reasonable access to valid existing rights or salvage of hazard trees for public safety and/or aesthetics."* (p. 3-165)

The various alternative routes cross all five known locations for the endangered James spinymussel *(Pleurobema collina)* in the Upper James River watershed including: South Fork of Potts Creek , Little Oregon Creek, Dicks Creek, Johns Creek, and Craig Creek.

All of the known populations of James Spinymussel in the Upper James River basin are directly downhill from National Forest lands and within what are commonly referred to as the boundaries of the National Forest. **This federally protected endangered species would be negatively impacted by any activities in the National Forest that might increase erosion and resultant sedimentation into the headwater streams.** As fully demonstrated in Section 3, there is no doubt that a pipeline on the severe slopes of the proposed routes will cause erosion. There are no BMPs that can possibly eliminate, or even hope to reasonably control, erosion caused by the proposed project. Our assertions of the ineffectiveness of BMPs for pipelines on steep slopes and the problems this can cause with endangered mussels is documented by an important case study of the East Tennessee Gas Pipeline in Tazewell and Smyth Counties, Virginia. In 2006, during construction of a 20-inch gas pipeline, extreme care was taken by FERC, USFWS, the Virginia Department of Conservation and Recreation, and the company to ensure that state-of – the-art erosion control measures were in place (TRC et al. 2009). In addition, hourly turbidity monitoring was conducted by the USGS during construction to provide nearly real-time feedback on construction activities (USGS 2009). In spite of this extreme attention to detail, slopes failed in two independent events resulting in a kill of several hundreds of individuals and multiple species of endangered mussels in Indian Creek and N. F. Holston River (Dinkins 2011). The worst sediment problems originated high in the watershed where small streams transported sediment to the larger streams (USGS 2009, TRC et al. 2009).

Dr. Richard Neves, internationally recognized authority on endangered mollusks, points out the importance of the James spinymussel populations in the upper James basin and specifically relates how projects like the MVP and Alternative Routes 110, 110J and 110R can have catastrophic failures like the incident at Indian Creek. Dr. Neves writes (emphasis added):

Let me answer your 2 questions about the 1) significance of the meta-population of the endangered James spinymussel in upper John's Creek, Dicks Creek, and Little Oregon Creek, and 2) potential effects of a pipeline crossing of those streams. By way of background, ***I co-conducted the initial status survey of this species (Clarke and Neves 1984), assisted Andy Moser, FWS, with preparation of its federal Recovery Plan in 1990, and have supervised graduate students who worked on its life history and habitat requirements*** *(Hove 1989, Hove and Neves 1989, Hove and Neves 1994), and status of various populations (Ensign and Neves 1995, 2000; Petty and Neves 2002, 2006; Johnson, Petty and Neves 2005) throughout the James and Dan river systems, but particularly in the Craig Creek drainage. I have also conducted many mussel surveys for VDOT in Craig and John's creeks for bridge replacement and ford crossing projects over the last 30 years (e.g., Gatenby and Neves 1994), and discovered the Dicks Creek and Little Oregon Creek populations of the James spinymussel during one of those surveys (Gatenby and Neves 1994). Thus I am very familiar with the species and its habitat requirements.*

The meta-population of James spinymussel in John's, Dicks, and Little Oregon creeks is the largest and most reproductively viable population known, throughout the species' range. *Detailed monitoring studies by state malacologist Brian Watson over the last 4 years have confirmed this. My sampling of other populations in various streams throughout its range over the last 30 years, to include Craig Creek, has indicated a gradual decline of those populations, with limited recruitment likely due to poor reproductive success. Conversely,* ***John's Creek has maintained its healthy population because of excellent water quality and minimal impacts to physical habitat in the stream(s)****. For the last 7 years (e.g., Dan and Neves 2014), we have been using gravid females from John's Creek to augment natural reproduction in Craig Creek, as a component of a Biological Opinion issued by FWS to VDOT in 2007. Johns Creek drainage is the only creek system throughout the species' range where we can readily collect reproductively mature females for this project.*

With respect to the potential effects of a pipeline crossing of any of these streams, I can say that ***any negative impact to water quality or physical habitat, such as erosion or sediment (Henley et al. 2000), could jeopardize the resident population, particularly the more isolated populations in Dicks and Little Oregon creeks.*** *This species does best in high-quality headwater streams, witnessed by its present range in small streams with good water quality, stable substrates, and healthy populations of resident host fishes.* ***Relocation is not an acceptable option for this species****, as the resident population(s) in the upper Johns Creek drainage occupy what has been empirically determined by them to be most suitable for their survival, growth, and reproduction. I conducted many mussel surveys for stream crossings of the Jewell Ridge Lateral Gas Pipeline project by Spectra Energy in southwest Virginia (Ostby and Neves 2005), and was called by FWS to assess two known sediment spills in 2006 from this project; one in Indian Creek, Tazewell County, and the other in upper North Fork Holston River (NFHR), Smyth County. The sediment plume in Indian Creek degraded the habitat of 2 federally endangered species (Ostby and Neves 2006), and the washout of the crossing site on NFHR caused the death of some mussels, particularly in the area of the coffer dam (Ostby and Neves 2006a). Evidence of the sediment was detected as far as 2 km downstream (Ostby and Neves 2006b). Thus in spite of a contractor's best efforts and implementation of Best Management Plans, accidents and unexpected events do happen, with potentially serious*

consequences to mussels." [Richard Neves, USGS and Virginia Tech, retired; e-mail communication; March 21, 2015]

The proposed Alternate Routes 110, 110J and 110R pass through and would disrupt the most important streams ***on earth*** for the Federally Endangered James spinymussel, and **because the effect is predictable it violates the Federal Clean Water Act Mandated Best Management Practices**, which state:

"Discharges must not take, jeopardize, adversely modify or destroy the critical habitat of threatened or endangered species as defined under the Endangered Species Act.

In the Recovery Plan the USFWS charges the USFS with giving this area special protection with this statement:

"Wherever possible, the Forest Service should acquire those habitat areas and watersheds, with priority placed on the Craig/Johns Creek watershed" (USFWS 1990).

Recently, the USFWS wrote a letter (dated April 3, 2015) to an agent for MVP recommending alternative routes be developed that avoid the Johns Creek and Craig Creek watersheds because of the importance of the watersheds to the conservation and recovery of the spinymussel. The letter went on to say that presence/absence surveys are not necessary for Craig, Johns, Little Oregon and Dicks Creeks.

In addition to the **likely violations of federal law and stated policies** raised above, Alternatives 110, 110R, and 110J also impact multiple other rare, endangered, threatened, and protected species:

- The Johns Creek Watershed has been proposed as Critical Habitat for the James spinymussel (Hartl 2015)
- Johns Creek and Craig Creek are known habitat for the Federally Endangered Orange Finned Madtom.
- Craig Creek is habitat for the Atlantic pigtoe, which is proposed for Federal Listing as Endangered.
- North Fork of the Roanoke River is documented to contain the Federally Endangered Roanoke Log Perch in the vicinity of Route 110 crossings.
- The proposed routes will pass near known nesting sites for bald eagles.
- All of the proposed routes cross caves that have been historically used by endangered species of bats.
- The proposed routes pass through wetlands that support diverse amphibian assemblages and karst areas that support numerous rare cave organisms.
- Many of the streams that are endangered-species waters are also of concern as known habitat for native brook trout. In addition, Alternate 110J runs alongside Trout Creek for several miles and crosses Pickles Branch, which are both native brook trout streams.

- Sinking Creek riparian wetlands, in the area crossed by the alternative routes are habitat for an endemic, undescribed species of crayfish that will likely receive Federal Protection. Details regarding this species in the Sinking Creek watershed, and other endangered crayfishes that are threatened by the MVP pipeline, can be found on the FERC Docket for the proposed MVP project (http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20150401-5067).

At the same time that the MVP directly threatens multiple rare, threatened, and endangered species, anthropogenic corridors like pipelines are known to **spread invasive species and diseases**. Perhaps the best evidence is a drive down any interstate highway in Virginia. Road rights-of-way are choked with autumn olive, tree of heaven, fescue and multiflora roses, among other state-listed invasive plants (the full number of potential invasive species is too long to list here). Furthermore, the standard mitigation approach to replanting vegetation along the pipeline is to broadcast fast-growing, typically non-native plants, which consistently results in an injection of highly invasive, non-native species into sensitive management areas of the forest - a result that is clearly incompatible with existing management directives. Management of the right of way by the spraying of herbicides or mowing further exacerbates the problem for invasive grasses like fescue. Even if the right of way is seeded with native plants, without active management invasive plants spread on their own in such disturbed areas.

Given the known likely direct threats to federally listed species and potential associated violations of federal law, **the USFS should reconsider its decision to seek a categorical exclusion for the environmental analysis for the permit.** There are potential environmental effects to endangered species that must be examined, and details of those examinations must be addressed. For example, how will the mussel surveys be conducted? Will they be performed in conjunction with long-term studies the USFWS and VDGIF are conducting? Could the mussel surveys interrupt these long-term studies? How will the bat mist-net surveys insure that diseases like white-nose syndrome will not be spread? Will the bat studies identify bat roost trees? Will the bat studies follow the USFWS Indiana bat survey guidelines? MVP has described the surveys as being conducted on foot through the USFS lands, but already low-level aerial (helicopter) surveys are being conducted that are affecting private livestock. Will that be allowed during the surveys and what would be the effect in the 110R corridor between the Brush Mountain Wilderness areas? The USFS should consider doing an environmental analysis on the effect of the surveys before even considering approval of such surveys.

5. Viewsheds

The proposed route will damage viewsheds in ways that violate both the spirit and the letter of the current Forest Plan with respect to visual impact. The Jefferson National Forest Plan (USFS 2004) includes numerous statements about how activities on the Forest Service lands should minimize the effect to viewsheds:

a. "Utility corridors and communication sites on National Forest System lands minimize negative environmental, social, or visual impacts; minimize acres of land affected; are designed using good engineering and technological practices; and clearly benefit society." (p. 2-59)

b. "Linear Rights-of-Way and Communication Sites: Develop and use existing corridors and sites to their greatest potential in order to reduce the need for additional commitment of lands for these uses." (p. 2-60)

c. "When feasible, expansion of existing corridors and sites is preferable to designating new sites." (p. 2-60)

d. "Design new corridors and sites to meet a scenic integrity objective as high as practicable. (p. 2-61)

e. Locate new public utilities and rights-of-way in areas of this management prescription area where major impacts already exist. Limit linear utilities and rights-of-way to a single crossing of the prescription area, per project. "(p. 2-63)

f. "Require mitigation measures including screening, feathering, and other visual management techniques to mitigate visual and other impacts of new or upgraded utility rights-of-way." (p. 2-63)

g. "Designated Utility Corridors: Where possible, existing corridors are expanded as needed rather than creating additional areas. Compatible multiple uses are encouraged, including co-location of communication uses on existing electric transmission towers." (p. 3-71)

In direct violation of these policies, the proposed routes will create a new 75-125 ft-wide corridor through the National Forest that will affect views throughout the county as well as from the Dragons Tooth overlook and from multiple vantage points along the Appalachian Trail (AT). The Forest Service has a long-term connection with outdoor recreation, and especially the Appalachian Trail, as demonstrated by the purchase of property in Millers Cove specifically to protect the AT corridor (USFS 1997). A major reason listed for not approving the power line in 1996 was to protect viewsheds (USFS 1996b). The proposed routes cross and will be visible from the Appalachian Trail and Dragons Tooth, and thus negatively impact this long-standing partnership.

From a viewshed perspective one of the most disturbing aspects of the pipeline is the corridor that runs alongside Trout Creek and next to the Millers Cove property that the USFS bought. It appears virtually impossible to responsibly construct the pipeline as mapped in the extremely steep and narrow Trout Creek gorge without major alterations to the stream, road, and houses. Moreover, the Trout Creek gorge is directly across the valley from Dragons Tooth, which is one of the most iconic day hikes in the region and on the entire AT system. The hike culminates in dramatic views from the Dragons Tooth rock formation that look directly across the valley at Millers Cove and the Trout Creek gorge. The thought of scarring these views is incomprehensible and in direct contradiction to the policies of the current Forest Plan. Moreover, as noted in Section 3 of this analysis, the corridors would likely need to be even wider than the proposed 75-125 feet, exacerbating the damage to these viewsheds.

6. Cultural Issues

Finally, the proposed Alternate 110, 110J, and 110R routes pose a significant cultural risk to the local community. **The citizens of Craig County have a unique connection to the National Forest System, and carving a (minimum) 125-foot-wide corridor through the heart of the National Forest will inevitably have a negative effect on the community and users of the forest.**

Because 54% of Craig County is U.S. National Forest and these federal lands essentially surround all private land holdings, it is impossible to separate what happens on private and federal lands. We all affect each other. Moreover, the citizens of Craig County have a unique

connection to the National Forest and the land, as documented by the cultural attachment study the USFS commissioned in 1995 (James Kent Associates 1996) and these cultural issues were listed as one reason for not approving the power line (USFS 1996b) . Long-term residents have traditional and longstanding cultural attachments to using federal lands, and many new arrivals have moved here because they want to be a part of that culture. The residents of Craig County feel like they live *in* the National Forest, in part because many do technically live within its boundaries.

Given our deep connection to the land, a scar across our Forest would affect us all. It would lessen our sense of living in a unique place, characterized by clean, abundant water in wild streams that support diverse biological communities with minimal impact from development and industrialization. Craig County communities are naturally shaped by the landscape. John's Creek, Sinking Creek and Craig Creeks are not just streams; they are both biological and social communities shaped by the landscape. They are also communities that have historically opposed power lines and now a pipeline. In the 1990s, 80% of the households in the county united to oppose the power line. We are experiencing a similar response to the proposed MVP.

The 1996 Cultural Attachment Study (James Kent Associates 1996) defines an intrusion as "an outside force brought into an area, which will create a significant long-term change in the relationship between people and land which cannot be absorbed into existing culture, thereby changing that culture." The proposed MVP represents just such an intrusion. Our cultural attachment and sense of place cannot be mitigated, and a survey of a proposed route will likely tell you little about the long-term negative effect on our communities. In fact, the proposal of a pipeline and the possibility that the USFS might even consider a pipeline by allowing a survey has been a threat to our communities that we are having trouble absorbing. It is beyond our understanding that a major environmental stressor could be allowed to weave between protected wilderness areas, through our streams and water supplies, through our forest and our homes.

As urbanization of other parts of the country intensifies, natural landscapes like those found in Craig County are increasingly rare and valuable. Craig County is the center of a hotspot of biotic diversity. This wild and rural character may be the county's single greatest asset for attracting and holding land-conscious residents and those seeking to recreate within such landscapes. The degradation of these landscapes through ill-conceived projects like the Mountain Valley Pipeline will only increase opportunities for additional projects (either within the same right of way, or through others) until the cumulative impact degrades the landscape as a whole. The character of the county would then be so deeply changed as to no longer embody the qualities and values that the county and its residents have so carefully stewarded.

SUMMARY

Given the known negative impacts resulting from both the survey and Alternative Routes 110, 110J, and 110R documented in this assessment, the Scientific and Technical Committee of Preserve Craig, Inc. urges the USFS **deny the application by MVP for a Special-Use Permit to conduct surveys on Jefferson National Forest Lands in Craig County, Virginia.** As professionals with extensive expertise in forest management, wildlife management, fish biology, water quality, stream ecology, law, and engineering, we developed our assessment of the proposed project based on our deep familiarity with both the scientific and cultural issues at stake for Craig County. As researchers and environmental professionals, our knowledge combines technical expertise with direct, on-the-ground knowledge of the slopes, habitats,

species, water systems, and ecologies we describe. This assessment reflects over 200 years of combined experience in areas directly related to the issues at hand.

As a result, we respectfully ask the USFS to consider the information documented above, consider the known risks involved for this project (from the survey stage through construction and operation), consider whether a cursory survey such as that proposed will really provide any meaningful or useful new information, and move now to reject the request to survey on the basis that the proposed alternate routes through Craig County are detrimental to water supplies, long-standing Forest Service goals, water quality, endangered species management, viewsheds, and cultural resources. **Moreover, allowing the proposed route creates a preferred pathway for future utilities to collocate, and the potential effects could widen in the future.** The long-term cumulative impacts of such possibilities represent unsustainable, unsupportable damage. The USFS must act now to fulfill its mission and protect JNF resources in Craig County.

THE COMMITTEE

W. Samuel Easterling, Ph.D., Civil Engineering
W. Cully Hession, Ph.D., P.E., Certified Ecological Designer
Brian Murphy, Ph.D., Certified Fisheries Professional
Duane Means, Certified Forester #3301
Scott Klopfer, M.S., Certified Wildlife Biologist
Gene Seago, Ph.D., J.D. Accounting
Lawrence Willis, Ph.D. Stream Ecology
Bill Wolf
Jim Workman, M.S. Engineering Administration

Technical Editor: Marie C. Paretti, B.S. Chemical Engineering, Ph.D. English

REFERENCES

Clarke, A. H. and R. J. Neves. 1984. Status survey of the James River spiny mussel, Canthyria collina, in the James River, Virginia. Final Report to U. S. Fish and Wildlife Service, Newton Corner, MA. 105 pp.

Dan, H. and R. J. Neves. 2014. Streamside infestations of the James spinymussel in Craig Creek, Botetourt County, Virginia. Final Report to Virginia Department of Transportation, Richmond, VA. 7 pp.

Dinkins, G. R. 2011. Assessment of native mussels in the Indian Creek and North Fork Holston River. Prepared for the Nature Conservancy, Abingdon, VA. DBC Project 1169.

Ensign, W. E. and R. J. Neves. 1995. A survey for the endangered James spinymussel (Pleurobema collina) in the South Fork Potts Creek, Monroe County, West Virginia. Final Report to U. S. Fish and Wildlife Service, Elkins, WV. 19 pp.

Ensign, W. E. and R. J. Neves. 2000. Re-survey of the James spinymussel (Pleurobema collina) population in the South Fork Potts Creek, Monroe County, West Virginia. Final Report to U. S. Fish and Wildlife Service, Elkins, WV. 18 pp.

Gatenby, C. M. and R. J. Neves. 1994. A survey of the freshwater mussel fauna at the Route 636 bridge crossing of Dicks Creek, Craig County, Virginia. Final Report to Virginia Department of Transportation, Richmond, VA. 9 pp.

Hartl, B. 2015. Petition to the U.S. Department of Interior and the U.S. Fish and Wildlife Service for Rulemakings Designating Critical Habitat for Nine Northeast Species. Center for Biological Diversity, Washington, DC. Available online at: http://www.biologicaldiversity.org/campaigns/freshwater_mussels/pdfs/CBD_Critical_Habitat_petition_for_9_northeast_species.pdf

Henley, W.F., M.A. Patterson, R.J.Neves, and A.D. Lemley. 2000. Effects of sedimentation and turbidity on lotic food webs: a concise review for natural resource managers. Reviews in Fisheries Science 8(2): 125-139.

Hove, M. C. 1989. Life history of the endangered James River spinymussel (Canthyria collina). M.S. Thesis, Virginia Tech, Blacksburg, VA. 113 pp.

Hove, M. E. and R. J. Neves. 1989. Life history of the James spinymussel. Final Report to North Carolina Wildlife Resources Commission, Raleigh, NC. 72 pp.

Hove, M.C. and R.J. Neves. 1994. Life history of the endangered James spinymussel Pleurobema collina (Conrad, 1837) (Mollusca: Unionidae). American Malacological Bulletin, 11(1): 29-40.

James Kent Associates. 1996. Cultural Attachment: Assessment of Impacts to Living Culture. Appendix M. 18 pp. In: USFS (US Forest Service). 1996. Draft Environmental Impact Statement – APCo 765 kV Transmission Line.

Johnson, N. A., M. E. Petty, and R. J. Neves. 2005. Species occurrence and habitat suitability survey of the endangered James spinymussel (Pleurobema collina) in selected streams of the upper James River Basin, Virginia. 141 pp.

Levesque, L.M., and M.G. Dube. 2007. Review of the effects of in-stream pipeline crossing construction on aquatic ecosystems and examination of Canadian Methodologies for impact assessment. Environmental Monitoring and Assessment. 132:395-409.

MVP (Mountain Valley Pipeline, LLC). 2014. Draft Resource Report #1 and Summary of Alternatives. Filed with the Federal Energy Regulatory Commission (FERC), 1 December 2014. http://elibrary.ferc.gov/idmws/File_list.asp?document_id=14275107.

MVP (Mountain Valley Pipeline, LLC). 2015a. Summary of Alternatives - February 2015 UPDATE. Filed with the Federal Energy Regulatory Commission (FERC), 18 February 2015. https://elibrary.ferc.gov/IDMWS/file_list.asp?document_id=14303168.

MVP (Mountain Valley Pipeline, LLC). 2015b. Updated Mountain Valley Pipeline Application. SF-299. Application for Transportation and Utility Systems and Facilities on Federal Lands. Filed with the USDA Forest Service, 10 March 2015. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3831896.pdf

Ostby, B.J.K. and R. J. Neves. 2005. Survey for endangered mussels at proposed Jewell Ridge Pipeline crossings of streams in Southwest Virginia. Final Report to TRC Solutions, Lowell, MA. 10 pp.

Ostby, B. J. K. and R. J. Neves. 2006a. Assessment of a sedimentation event on mussel habitat in Indian Creek, Tazewell County, Virginia. Final Report to U. S. Fish and Wildlife Service, Gloucester, VA, and Virginia Department of Game and Inland Fisheries, Richmond VA. 21 pp.

Ostby, B.J.K and R. J. Neves. 2006b. Supplemental relocation of freshwater mussels from East Tennessee Gas Pipeline crossings of North Fork Holston River, Smyth County, Virginia, and assessment of sedimentation in habitat downstream of the proposed crossing. Final Report to TRC Solutions, Lowell, MA. 14 pp.

Petty, M. E. and R. J. Neves. 2002. Survey of the newly discovered James spinymussel in the Dan River system, Virginia. Final Report to U. S. Fish and Wildlife Service, Gloucester, VA. 30 pp.

Petty, M.E. and R.J. Neves. 2006. An intensive survey for the endangered James spinymussel in the Potts Creek watershed, Craig and Alleghany counties, Virginia. Final Report to Virginia Department of Transportation, Richmond, VA. 25 pp.

Reid, S.M., S. Stoklosar, S. Metikosh, and J. Evans. 2002. Effectiveness of isolated pipeline crossing techniques to mitigate sediment impacts to brook trout streams. Water Quality Research Journal of Canada. 37(2):473-488.

TRC and Thompson and Litton: Preparers. 2009. Jewell Ridge Lateral Project - East Tennessee Natural Gas, LLC: Erosion and Sediment Control Analysis. 84pp.

Tsui, P.T.P. and P.J.McCart. 1981. Effects of stream-crossing by a pipeline on the benthic macroinvertebrate communities of a small mountain stream. Hydrobiologia. 79:271-276.

USDI (US Department of Interior) and USDA (US Department of Agriculture). 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development: The Gold Book. BLM/WO/ST-06/021+3071/REV 07. Bureau of land Management, Denver, CO.

USFS (US Forest Service). 1996a. Draft Environmental Impact Statement – APCo 765 kV Transmission Line. 5 Volumes.

USFS (US Forest Service). 1996b. Letter to Wayne Smith, Virginia State Corporation Commission and Rick Hitt West Virginia Public Service Commission, concerning the Draft Environmental Impact Statement regarding AEP proposal to cross federal land.

USFS (US Forest Service). 1997. Letters to Senators Charles Robb and John Warner, and Congressmen Rick Boucher and Robert Goodlatte, concerning the purchase of property in Millers Cove for the Appalachian National Scenic Trail.

USFS (US Forest Service). 2002. AEP 765kV Transmission Line – American Electric Power Transmission Line Construction, Jackson Ferry, Virginia to Oceana, West Virginia. 12 pp.

USFS (US Forest Service). 2004. Revised Land and Resource Management Plan, Jefferson National Forest. Management Bulletin R8-MB 115A. US Forest Service Southern Region, Atlanta, GA.

USFS. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. FS-990a. US Department of Agriculture, Washington, DC.

USFWS. 2015. Letter to Valerie Clarkston, Environmental Solutions and Innovations, Inc. Concerning Mountain Valley Pipeline, Virginia Segments.

USGS. 2009. Continuous turbidity monitoring in the Indian Creek Watershed, Tazewell County, Virginia, 2006-2008. Scientific Investigations Report 2009-5085. 33pp.

VDOF (Virginia Department of Forestry) 2011. Virginia's Forestry Best Management Practices for Water Quality. VDOF, Charlottesville, VA.

Williams, G. W. 2003. The beginnings of the National Forests in the South: Protection of Watersheds. www.foresthistorg.org/ASPNET/Policy/WeeksAct/ProtectionofWatersheds

COMMENTS CONCERNING DEFICIENCES OF THE MOUNTAIN VALLEY PIPELINE SITE REGISTRATION APPLICATION FOR THE WEST VIRGINIA GENERAL WATER POLLUTION CONTROL PERMIT NO. WVR310667 (OIL AND GAS)

By Pamela C. Dodds, Ph.D., Licensed Professional Geologist
Prepared for
Indian Creek Watershed Association
March 10, 2017

EXECUTIVE SUMMARY

The Site Registration Application (SRA) submitted by Mountain Valley Pipeline, LLC (MVP) to the West Virginia Department of Environmental Protection (WVDEP) is not only deficient, but also substantiates that proposed construction activities relating to placement of a gas pipeline would result in violation of West Virginia Legislative Rules pertaining to water quality and groundwater protection. The WVDEP is the regulatory authority for surface water and groundwater protection. Both the Water and Waste Office and the Office of Oil and Gas issue stormwater management permits. On the WVDEP website, a link is provided to the "Oil & Gas Construction Stormwater General Permit", with the title of "General Water Pollution Control Permit" (http://www.dep.wv.gov/WWE/Programs/stormwater/csw/Documents/OG%20stormwater%20GP%203_10_15.pdf), Permit No. WV0116815, pertaining to "Stormwater Associated with Oil and Gas related Construction Activities". The permit is issued to the WVDEP by the U.S. Environmental Protection Agency (EPA) to give regulatory authority to WVDEP for stormwater permits in West Virginia. Permit No. WV0116815 expires May 13, 2018. The terms of the permit are as follows:

> "Discharges covered under this General Permit shall not cause or contribute to a violation of the Legislative rules governing water quality or groundwater protection, namely *Requirements Governing Water Quality Standards* (47 C.S.R. 2) and *Requirements Governing Groundwater Standards* (47 C.S.R. 12), in accordance with W. Va. Code § § 22-11-8 and 22-12-4. For purposes of this General Permit, the *West Virginia Water Pollution Control Act*, W. Va. Code § 22-11-1, et seq., shall be referred to as the WPCA and the *West Virginia Groundwater Protection Act*, W. Va. Code § 22-12-1, et seq., shall be referred to as the GWPA. Discharges that are not in compliance with these standards are not authorized."

MVP has submitted to the WVDEP a Site Registration Application (SRA) and Stormwater Pollution Prevention Plan (SWPPP). The proposed MVP gas pipeline construction project extends 196.4 miles through West Virginia, with a work corridor

approximately 125 feet, thereby comprising at least 2976 acres (not including access roads, pipe yards, and additional work areas). The proposed work corridor extends along mountain ridges at the highest elevations in the state, along steep sidehill slopes, and crosses Tier 3 streams and rivers as well as impaired streams assigned Total Maximum Daily Loads for pollutants such as iron and aluminum (released from sediments) and turbidity. Deforestation and compaction of the work corridor, access roads, pipe yards, and additional work areas will result in increased stormwater discharge, decreased groundwater recharge, increased downstream stream bank erosion, increased vertical scour in rivers and streams, and destruction of seeps and springs in headwater areas of first order high gradient streams. The proposed Erosion and Sediment Control Best Management Practices are not sufficient to be in compliance with West Virginia legislation pertaining to water quality and groundwater protection.

It is stated in the DEP's "General Water Pollution Control Permit" that "A Stormwater Pollution Prevention Plan and a Groundwater Protection Plan shall be developed for each project covered by this permit." MVP has not submitted a Groundwater Protection Plan (GPP) even though the impervious surfaces that would result from the proposed construction would result in decreased groundwater recharge and the proposed Best Management Practices (BMPs) are designed to direct water away from the construction areas, thereby further reducing potential recharge to groundwater.

Deficiencies in the Site Registration Application submitted by MVP include:

1) Deforestation in the proposed work corridor, access roads, pipe yards, and additional work areas will result in canopy loss, thereby causing increased stormwater discharge, reduced groundwater recharge, and increased downstream stream bank erosion. Restoring the areas to meadows will not result in the lower stormwater discharge amounts characteristic of forested land because it is the tree canopy which is most effective in reducing rainfall intensity, that is, reducing the impacts of raindrops on the ground.
2) Soil compaction in the proposed work corridor will create impervious areas, resulting in increased stormwater discharge, reduced groundwater recharge, and loss of soil functions, especially in headwater areas of first order high gradient streams, even if topsoil is placed over the compacted soil.
3) Access road widths, stated to be 25 feet in the SRA, are inconsistent with the road construction easements, stated to be 40 feet, as provided in the Draft Environmental Impact Statement submitted by MVP to the Federal Energy Regulatory Commission (FERC). The disturbed/impervious areas created by access roads will be greater in size if the widths are 40 feet rather than 25 feet.
4) Section G.4 of DEP's "General Water Pollution Control Permit" specifies that a Groundwater Protection Plan (GPP) will be provided and that groundwater "means the water occurring in the zone of saturation beneath the seasonal high water table or any perched water zones." It is further specified in Section

G.4.e.2.C.iii. of DEP's "General Water Pollution Control Permit" that, "The applicant shall prepare a GPP that will satisfy the requirements of the Groundwater Protection Rule, 47 C.S.R. 58 § 4.11." However, MVP has not provided a GPP. Although MVP is not necessarily required to submit the GPP with the SRA, Indian Creek Watershed Association requests that the GPP be made available to the WVDEP website for public review.

5) Seeps and springs associated with a perched groundwater table are specified to be dewatered for the proposed construction areas. Seeps and springs provide water necessary to maintain aquatic habitats in headwater areas in watersheds of first order high gradient streams.
6) Baseline water quality analysis and sampling has not been conducted to evaluate the open-cut dry crossing of the Greenbrier River, which is a Tier 3 river and is a WV Natural Stream, NRI listed.
7) MVP has refused the requests made by the U.S. Environmental Protection Agency (EPA) and FERC to conduct quantitative modeling for turbidity and sedimentation for the Elk, Gauley, and Greenbrier River crossings, including an analysis of the duration, extent, and magnitude of turbidity levels and an assessment of the potential impacts on resident biota.
8) MVP has not provided an analysis of sediment released during construction activities, such as that provided by the Universal Soil Loss Equation (USLE) or the Revised Universal Soil Loss Equation (RUSLE), developed by the U.S. Department of Agriculture Natural Resources Conservation Service, to evaluate the increase in sediment to streams and rivers resulting from the increased stormwater discharge.
9) Drainage areas are not delineated on the construction plan sheets.
10) Drainage direction arrows are not shown on the construction plan sheets, except along silt fencing locations.
11) It is stated in Section G.4.e.2.B of DEP's "General Water Pollution Control Permit" that, "The permittee shall submit all… watershed mapping… necessary to explain the technical basis for the stormwater management plan." However, watersheds are not delineated on any MVP maps.
12) Drainage basin areas used in the scour analyses are inconsistent with functional watershed sizes for streams proposed for crossings.
13) It is stated in Section G.4.e.2.B of DEP's "General Water Pollution Control Permit" that, "The permittee shall submit all… calculations… necessary to explain the technical basis for the stormwater management plan." However, MVP has not provided engineering calculations for sizing Best Management Practices.
14) Scour Analyses do not provide post-construction estimates of sediment released by scour to downstream areas and do not account for the increase in stormwater discharge resulting from deforestation, soil compaction, and dewatering.

15) Lateral Erosion Analysis of stream banks was confirmed by the Tetra Tech report prepared for MVP; however, calculations were not performed to show the increase in stream bank erosion due to the increase in stormwater discharge caused by deforestation, soil compaction, and dewatering.
16) MVP has not demonstrated by evidence of calculations and evaluations that the proposed BMPs are adequate to prevent significant sediment quantities to be released to receiving streams and rivers. Studies by the U.S. Geological Survey provide evidence that sediment yields to receiving streams during construction can increase as much as 107 times the pre-construction amounts. Even with less sediment yields after construction, the sediments reaching the receiving streams will increase embeddedness in the stream beds.
17) Cumulative impacts were not assessed. The proposed construction will impact numerous first order high gradient streams which are tributaries to specific larger streams or rivers. For example, the proposed construction will impact headwaters and first order high gradient stream tributaries to Hungard Creek, which is one of the tributaries to the Greenbrier River. Other first order high gradient streams are tributaries to the Greenbrier River, as well. Therefore, there would be cumulative negative impacts to the Greenbrier River due to increased turbidity, increased embeddedness, increased stormwater discharge, increased vertical scour, and increased stream bank erosion.
18) It is stated by DEP in Section G.4.e.2.A.ii.b. of the "General Water Pollution Control Permit" that, "For drainage areas of greater than five acres, a sediment basin providing 3,600 cubic feet per drainage acre shall be installed. Half of the volume of the basin shall be in a permanent pool and half shall be dry storage. Sediment basins must be able to dewater the dry storage volume in 48 to 72 hours. A sediment basin must be able to pass through the spillway(s) a 25-year, 24-hour storm event, and still maintain at least one foot of freeboard." However, sediment basins/traps are not included as part of the MVP Best Management Practices (BMPs).
19) MVP's Landslide Mitigation Plan addresses mitigation measures associated with unstable soils overlying bedrock, where the bedrock is known to be associated with landslides. It is further stated by MVP that additional mitigation measures, such as buttressing, are not anticipated. MVP describes buttressing as "An earth, rock, or riprap fill buttress in front of an unstable slope [that] will increase the weight of the material at the toe of the slope, thereby increasing the slope stability factor of safety." This method is used on unstable slopes in highway construction. The description fails to specify that the buttress must be "keyed" in to solid material at the base.
20) The MVP Landslide Mitigation Plan does not address the bedrock orientation or the orientation of fracture sets where landslides are probable. The orientation of the bedrock and of the fracture sets must be obtained in order to determine if stabilization is even possible.

SECTION 1.0

INCREASED IMPERVIOUS AREAS RESULTING FROM THE PROPOSED MVP PIPELINE CONSTRUCTION ACTIVITIES WILL CAUSE CUMULATIVE NEGATIVE IMPACTS TO WEST VIRGINIA WATER RESOURCES

The proposed MVP gas pipeline work corridor extends along mountain ridges at the highest elevations in the state, crossing hundreds of headwater areas of first order high gradient streams. "Watershed" refers to all of the land that drains to a certain point on a river. A watershed can refer to the overall system of streams that drain into a river, or can pertain to a smaller tributary. Stream order is a measure of the relative size of streams. The smallest tributary is a first order stream, which originates in the highest elevations. The headwater areas for these first order streams are environmentally sensitive and are maintained by seeps, springs, and wetlands in shaded areas where light is filtered and temperatures are lower, sustaining the aquatic organisms at the very base of the food chain.

In 2007, the U.S. Fish and Wildlife Service (USFWS) prepared a document, "Functional Assessment Approach for High Gradient Streams", for the U.S. Army Corps of Engineers to use in assessing impacts and mitigation with respect to processing Clean Water Act 404 permit applications. High gradient headwater streams are characterized as first and second order ephemeral and intermittent streams with channel slopes ranging from 4% to greater than 10%, within watersheds of approximately 200 acres. The significance of this report relates to the proposed MVP gas pipeline construction with regard to how watersheds are evaluated. Because of the impacts of construction on the functions of headwater areas in the watersheds of first order high gradient streams, it is critical to evaluate these areas not simply as a small acreage within the area encompassing the construction project, but rather as functionally contributing areas which are the basis of water quality and aquatic habitat quality within the overall watershed.

The River Continuum Concept was developed by Vannote, R.L., G. W. Minshall, K.W. Cummins, J.R. Sedell, and C.E. Cushing in 1980 and presented in the Canadian Journal of Fisheries and Aquatic Sciences 37: 130-137. The U.S. Environmental Protection Agency and the U.S. Department of Agriculture have embraced the River Continuum Concept as illustrating the strong connection between headwater areas on mountain ridges and various downstream areas. Aquatic insect larvae ("shredders"), are predominant in the forested headwater areas, breaking down organic matter used downstream by collectors, predators, and filter-feeders. The filter-feeders are subsequently consumed by larger benthos and fish. The aquatic larvae within the headwater areas of first order high gradient streams are, therefore, at the very base of the food chain.

SECTION 1.1

Impervious Areas Will Result from Proposed Construction Activities

Impervious areas will result within the proposed MVP gas pipeline construction work corridor of approximately 125 feet, which will be deforested/de-vegetated, excavated and graded to a level surface, and compacted by heavy equipment and surcharge due to stockpiling (Figure 1.1.1). Additionally, increased impervious areas will result from access road construction or widening of existing roads for use as access roads as well as locating work space areas and pipe yards.

Figure 1.1.1 – Leveled work corridor for pipeline installation, showing cut hillsides and evident dewatering into the pipeline trench. Heavy equipment and pick-up trucks provide a scale

Forested ridges intercept rainfall so that it gently penetrates the ground as groundwater rather than flowing overland as runoff. This means that 1) the rain will gently fall to the ground and recharge groundwater and 2) the surface flow of rainwater on the ground will be slower than in cleared areas, thereby reducing the velocity and quantity of stormwater drainage. Conversely, deforestation removes the protective tree canopy, causing increased stormwater discharge and decreased groundwater recharge. The proposed MVP gas pipeline construction would result in deforestation and soil compaction, causing increased stormwater discharge and decreased groundwater recharge. Leveling of the work corridor, access roads, work spaces, and pipe yards, along with trenching for pipe installation, will intercept groundwater, thereby reducing or eliminating the flow of water to rock fractures which serve as a conduit to provide water to seeps, springs, and wetlands, as well as to streams during times of drought. With respect to soil instability on landslide-prone slopes, it is astutely stated in the MVP Landslide Mitigation Plan that “Vegetation generally inhibits surface soil erosion with erosion occurring much more rapidly on bare slopes.”

It is stated in MVP's SRA submittal of the Erosion and Sediment Control Plan (E&SCP) Narrative: "6. Convey Stormwater in a Non-Erosive Manner" that "the pipeline LOD [limit of disturbance] 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." This statement is inconsistent with land cover runoff designations used in standard engineering practices. The WV Department of Highways 2007 Drainage Manual (WVDOH Manual) provides information for determining sheet flow, which is defined as "a shallow mass of runoff on a plane surface with the depth staying uniform across the sloping surface. Typically, flow depths will not exceed two inches." The sheet flow travel time is determined by an equation that uses a "roughness coefficient" (provided in "Hydraulic Design Series 2, Highway Hydrology, October 2002) which reflects the surface roughness over which the surface water is flowing. A gravel surface, which would be similar to the compacted construction work corridor, has a roughness coefficient of 0.024. A grassed surface has a roughness coefficient ranging from 0.15 to 0.24. A forested surface has a roughness coefficient ranging from 0.40 to 0.800. Pipeline construction in originally forested areas will have higher stormwater discharge rates for a meadow with compacted soil.

A surface runoff coefficient is used in stormwater discharge equations to determine the peak stormwater runoff discharge for specific storms, such as a 24-hour 2-year storm. A forested area differs from a meadow because the tree canopy intercepts the rainfall, allowing the rainfall to gently reach the ground surface. The tree canopy thereby reduces the intensity of the precipitation. A meadow does not receive the protection of the tree canopy and therefore receives precipitation with greater intensity and consequent greater stormwater runoff amounts and velocities.

In order to establish level surfaces for the work corridor, access roads, work areas, and pipe yards, it will be necessary for MVP to grade highly irregular terrain and bedrock outcrops. In the MVP Landslide Mitigation Plan, the reported field observations of steep sidehill slope sites include: slides, slumps, rockfalls, scarp locations, drainage features, and gullying. The mitigation plan includes "Excavation and/or Regrading of Upgradient Head Soils: Regrading to a flatter slope upgradient of the pipeline excavation will increase the slope stability factor of safety by reducing the weight of soil at the top of the slope." Leveling and regrading activities are not consistent with the statement by MVP in its E&SCP that, "the pipeline LOD [limit of disturbance] will be restored to a meadow in good condition… maintaining pre-construction drainage patterns". Additionally, leveling and regrading activities are not consistent with the numerous references MVP provides in its DEIS or in its E&SCP to WVDEP that, "Disturbed areas will be restored to their approximate original topographic contours."

SECTION 1.2

Access Road Widths Stated the MVP DEIS are Greater than Those Stated in MVP's SRA

Deforestation and soil compaction associated with access road construction create impervious surfaces. Additionally, the WVDEP Erosion and Sediment Control Best Management Practices Manual (WVDEP, 2006, revised August 29, 2016) states that for access roads and work areas: "A 6-inch course of crushed aggregate shall be applied immediately after grading. Geotextile fabric should be applied to the roadbed for additional stability. In heavy duty traffic situations, stone should be placed at an 8 to10 inch depth to avoid excessive maintenance." Compacted access roads and work areas with gravel surfaces are essentially impermeable. Greater impervious acreage will result from construction of wider access roads. The access road width is stated as 25 feet on the MVP Construction Plan Sheets provided by MVP in its SRA submittal to WVDEP. However, the information provided by MVP in its DEIS differ from those stated in the SRA. All roads in Appendix E-1 of the DEIS are described as" 40 feet maximum proposed width of easement". Table 1.2.1 provides an example of road widths excerpted from Appendix E-1 for Summers and Monroe Counties, West Virginia. It should be noted that the following roads are omitted because the widths are described as "To Be Determined" (TBD): MVU-SU-200 at Mile Post 162.5; MVP-SU-202 at Mile Post 165.6; MVP-SU-205 at Mile Post 170.5; MVP-MLV-AR-20 at Mile Post 170.9; MVP-MLV-AR-21 at Mile Post 171.1; MVP-SU-207 at Mile Post 170.25; MVP-SU-208 at Mile Post 171.3; MVP-SU-208.01 at Mile Post 171.5; MVP-MO-211 at Mile Post 175.2; MVP-MO-212 at Mile Post 175.9; MVP-MO-215 at Mile Post 176.9; MVP-MO-216 at Mile Post 178.3; MVP-MO-218 at Mile Post 181.5; MVP-MO-219 (Mile Post not provided); MVP-MO-220 at Mile Post 183.3; MVP-MO-221 at Mile Post 184.3; MVP-MO-222 at Mile Post 184.6; MVP-MO-223 at Mile Post 184.8; MVP-MLV-AR-22 at Mile Post 185.2; MVP-MO-224 at Mile Post 185.4; MVP-MO-225 at Mile Post 186.2; MVP-MO-226 at Mile Post 186.7; MVP-MO-227 at Mile Post 187.4; and MVP-MO-228 at Mile post 189.7.

Access road construction results not only in the creation of impervious surfaces, but also degradation of headwater areas for first order high gradient streams, especially where the access road is located within the stream valley. For example, access road MVP-SU-201, which joins the proposed MVP work corridor at Mile Post 165.0, is an existing jeep road approximately 10 feet wide located adjacent to a portion of an unnamed tributary (UNT) to Stonelick Branch. The access road crosses the headwater area, with an associated wetland, of this UNT to Stonelick Branch. The MVP DEIS information indicates 100% of the road will be improved, extending 40 feet beyond the existing road footprint and consisting of 5.94 acres of disturbance. Additionally, two work spaces are shown associated with the access road. The area is shown to have steep slopes. Dewatering activities are proposed for the construction area associated with the access road. Consequently, the headwater area and the most upgradient segment of the UNT to Stonelick Branch will receive sediment, reduced groundwater recharge, and increased stormwater discharge.

Table 1.2.1 – Road width information excerpted from Appendix E-1 of the MVP DEIS.

MVP ID	MP	Type	Existing Road Width	Land Disturbance beyond Existing Footprint of Existing Road	Percentage of existing road to be improved	Anticipated acres of improvements for existing access roads
MVP-SU-195	156.9	Perm Roadway widening, grading, Stabilization	12	28	10%	0.23
MVP-SU-197	158.4	Perm New construction	0	40	N/A	N/A
MVP-SU-198	160.8	Temp Roadway widening, grading, stabilization	12	28	100%	7.30
MVP-SU-199	161.3	Perm Roadway widening, grading, stabilization	20	20	50%	4.74
MVP-SU-201	165.0	Temp Roadway widening, grading, stabilization	10	30	100%	5.94
MVP-SU-203	169.9 NOT SHOWN	Perm Roadway widening, grading, stabilization	12	28	10%	0.09
MVP-MO-210	173.6	Perm Roadway widening, grading, stabilization	10	30	50%	3.0
MVP-MO-213	176.2	Perm Roadway widening, grading, stabilization	10	30	70%	4.61
MVP-MO-214	176.5	Roadway widening, grading, stabilization Temp	10	30	100%	1.76
MVP-MO-217	179.1	Perm Roadway widening, grading, stabilization	10	30	25%	0.44
MVP-MO-218	191.1	Temp Roadway widening, grading, stabilization	12	28	50%	0.47
MVP-MO-231.0	193.8	Temp Roadway widening, grading, stabilization	8	32	50%	0.50

SECTION 1.3

Impervious Areas Result in Increased Stormwater Discharge, Increased Frequency of Peak Runoff Rate, and Increased Sediment Transport to Receiving Streams

Increased impervious areas not only increase the amount of stormwater discharge to receiving streams, but also increase the frequency of peak runoff rate because the increased amount of impervious areas results in less infiltration (Stormwater Management Manual, 1999, Virginia Department of Environmental Quality). Consequently, the increase in stormwater discharge to receiving streams will result in greater stream bank erosion.

In October 2016, Tetra Tech, Inc. presented a report for MVP entitled, "Mountain Valley Pipeline: Vertical Scour and Lateral Channel Erosion Analyses" (Scour Analysis Report), which MVP submitted to FERC. In February 2017, MVP provided revisions to this report as "DR4 Water Resources 13e" in response to FERC's Supplemental Data Request. Vertical scour depths for existing stream bed and river bed conditions were estimated based on design discharge, drainage area, stream bed particle size, channel width, depth, and velocity, and depth to bedrock. Values for the median D50 stream bed particle size were estimated based on field notes and on a channel stability assessment relationship between bankfull discharge and channel slope (U.S. Army Corps of Engineers, Channel Stability Assessment for Flood Control Projects, 1994). Vertical scour analyses confirmed that vertical scour is evident during the 2-year peak flow discharge and during the 100-year peak flow discharge. Vertical scour releases sediment to the stream or river, increasing turbidity. Subsequently, the sediment is deposited downstream. The lateral channel migration was estimated based on aerial analysis of historical channel migration. This data confirms channel erosion in the 128 perennial streams that MVP proposes for the gas pipeline to cross. Historical channel migration information was used to determine "set back" distances on either side of the stream or river channel in order to place the proposed pipeline at a prescribed depth. However, lateral channel erosion, that is, downstream stream bank erosion, was not analyzed.

A study of natural channels is presented in Leopold, et al ("Fluvial Processes in Geomorphology", 1964, W.H. Freeman, San Francisco) concluding that natural channels are shaped by the 1½- to 2-year frequency storm event. However, with increased frequency of the 2-year peak rate, increased stream bank erosion will result. The increased impervious areas resulting from the proposed MVP construction activities will therefore result in greater downstream stream bank erosion, which will continue after construction is completed.

Both vertical erosion and stream bank erosion release sediment to the streams, increasing embeddedness (Figure 1.3.1), which fills in the spaces between pebbles and cobbles in the stream bed. These spaces serve as aquatic habitats for insect larvae and minnows, which are necessary for food chain within the river continuum (Vannote, R.L., G. W. Minshall, K.W. Cummins, J.R. Sedell, and C.E. Cushing in 1980 and presented in the Canadian Journal of Fisheries and Aquatic Sciences 37: 130-137).

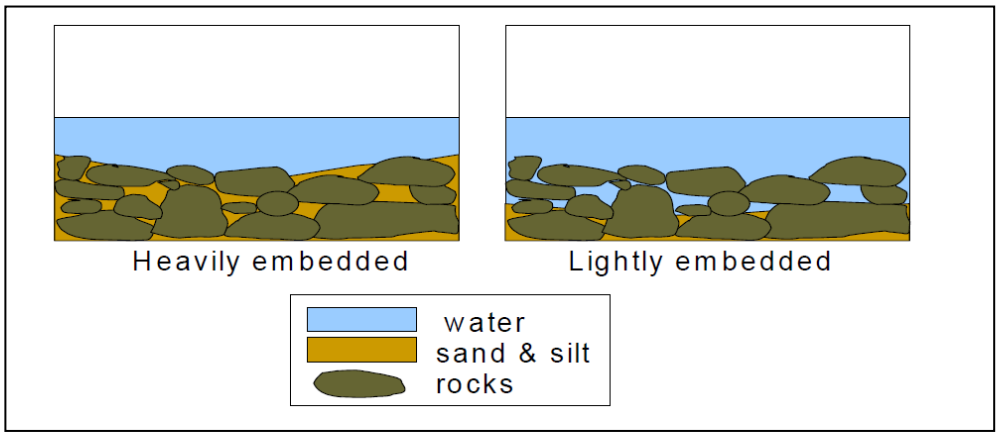


Figure 1.3.1 – Cobbles and pebbles provide aquatic habitats and protection for aquatic organisms. Insect larvae, which constitute the base of the river continuum food chain, reside on the cobbles and pebbles. Minnows and juvenile fish hide in the spaces between cobbles and pebbles for protection. When sand and silt fill the spaces between the cobbles and pebbles, the aquatic habitats and protection areas are destroyed. When the aquatic habitats become heavily embedded or are removed for trenching and stream crossing work spaces, they cannot be restored.

It is emphasized in Technical Memorandum #2 (Jessup and Dressing, 2015, U.S Environmental Protection Agency) that, “Changes in hydrology caused by an increased amount of impervious surface in the drainage area can elevate peak flows and increase erosional forces on channel banks.” Further, it is stated that, “Excessive sediment supply can result in sediment deposition and filling of pools and interstitial spaces among gravel and larger substrates.” The consequences of embeddedness are provided as: “1) Displacement of interstitial habitat space; 2) Clogging of water movement under the channel bed (hyporheic zone); 3) Decreased or altered primary algal productivity; 4) Increased macroinvertebrate drift; 5) Abrasion or smothering of gills and other organs; 6) Uptake of sediment-bound toxicants that are increasingly associated with fine particles; and 7) Larger scale homogenization or disturbance of habitat types.”

In 1978, Wischmeier and Smith published the Universal Soil Loss Equation (USLE) to estimate the soil loss due to erosion, which occurs naturally and during changes in land use, such as construction. In 2013, the U.S. Department of Agriculture – Agricultural Research Service published the Revised Universal Soil Loss Equation, Version 2 (RUSLE2) to estimate the amount of sediment transported to receiving streams, based on soil, slope, land cover, and land use information. The U.S. Geological Survey (USGS) conducted a study (USGS Study), described in USGS Fact Sheet FS-109-00, August 2000, to evaluate 1) the increase in sediment transported during construction; and 2) the predictability of the Universal Soil Loss Equation. During the study, the USGS monitored rainfall depth and intensity, water quality, water level, and water runoff volume (discharge) for a1.72-acre commercial site with a slope of 8 percent and a 0.34-acre residential site with a slope of 4 percent. Pre-construction, during-construction,

and post-construction results of the study included: 1) there was excellent agreement between the soil loss loads predicted by using the USLE calculations and the actual, measured sediment load; 2) the sediment load was 107 times greater during construction at the commercial site and 4 times greater at the residential site; and 3) rainfall intensity was responsible for the greatest concentrations of total and suspended solids.

SECTION 1.4

Drainage Basin Delineations Are Inadequate or Missing

It is stated in Section G.4.e.2.B of DEP's "General Water Pollution Control Permit" that, "The permittee shall submit all… watershed mapping… necessary to explain the technical basis for the stormwater management plan." However, watersheds are not delineated on any MVP maps or construction plans. "Watershed" refers to all of the land that drains to a certain point on a river. A watershed can refer to the overall system of streams that drain into a river, or can pertain to a smaller tributary. Stream order is a measure of the relative size of streams. The smallest tributary is a first order stream, which originates in the highest elevations. The headwater areas for these first order streams are environmentally sensitive and are maintained by seeps, springs, and wetlands in shaded areas where light is filtered and temperatures are lower, sustaining the aquatic organisms at the very base of the food chain. MVP has proposed a gas pipeline route through the steepest terrain in West Virginia. This steep terrain provides the unique geomorphology for first order high gradient streams.

It is critical to delineate a watershed or subwatershed and also the areas of different ground covers within the watershed or subwatershed in order to calculate stormwater discharge. In the Watershed Protection Research Monograph No. 1, prepared by the Center for Watershed Protection (2003), it is emphasized that the relationship between impervious cover and stream quality applies to watersheds of first order streams, second order streams, and third order streams. It is therefore extremely important to evaluate watersheds of the first order streams impacted by the proposed MVP gas pipeline in order to adequately determine the impacts of increased stormwater discharge due to an increase in impervious surfaces.

In the "Rapid Watershed Planning Handbook", prepared by the Center for Watershed Protection in 1998, it is emphasized that streams are impaired when impervious surfaces are just 10 percent of a watershed and that streams cannot support aquatic life when impervious surfaces cover 25 percent of the watershed area. At 12 percent imperviousness, trout and other sensitive species cannot survive. At 8 percent to 10 percent impervious cover, the streams double in the size of the bed due to increased volume, leading to increased stream bank erosion and loss of riparian buffers. The impervious surface amounts increase the stormwater discharge, which is responsible for the consequent erosion. It follows that where stormwater discharge is increased due

to an increase in less permeable surfaces, even without strictly impermeable surfaces, it is the increase of stormwater discharge to specific quantities that causes the damage to streams. Watersheds must be evaluated for stormwater discharge from all the ground covers within the watershed in order to determine if the stormwater discharge is equal to or greater than the stormwater discharge that would result from a 10 percent impervious area within the watershed.

Vertical scour calculations presented in the Scour Analysis Report were intended to provide a depth of scour in the stream beds or river beds proposed for crossing by the MVP gas pipeline. Drainage areas used in the vertical scour calculations were not delineated as watersheds crossed by the proposed MVP gas pipeline. Instead, the drainage areas were obtained from the online tool offered by the West Virginia Department of Environmental Protection Technical Applications and GIS Unit (online tool), which is intended to be used for determining stream flows considered safe for withdrawing water. The stream flow estimates provided in the online tool are based on annual and monthly 7-day, 10-year (7Q10) low flow data. The drainage areas are provided for entire river watersheds rather than for first order, second order, or third order stream watersheds; that is, they are not consistent with watersheds in which impervious cover and stormwater calculations would provide meaningful stormwater discharge quantities.

It is stated by DEP in Section G.4.e.2.A.ii.b. of the “General Water Pollution Control Permit” that, “For drainage areas of greater than five acres, a sediment basin providing 3,600 cubic feet per drainage acre shall be installed.” Additionally, a culvert sizing chart is presented by MVP in its proposed general details portion of the construction plans. The chart is credited as taken from the WVDEP Erosion & Sediment Control BMP Manual (2006) and provides a listing of prescribed culvert sizes based on drainage area and slope of the watershed. However, there are no drainage area delineations on the construction plans. Also, there are no arrows on the construction plans to indicate the direction of drainage that could be associated with any specific BMP structure.

Stormwater discharge is usually calculated using the Rational Method or the TR-55 Method (developed by the NRCS). The watershed or drainage area must be delineated in order to calculate the stormwater discharge. Stormwater discharge based on stream gage data alone is not sufficient to determine the increased discharge to receiving streams.

SECTION 2.0

MVP CONSTRUCTION PLAN SHEETS ARE INCOMPLETE AND DO NOT PROVIDE REQUIRED INFORMATION

Construction Plan Sheets Do Not Provide Information Required in the WVDEP Erosion and Sediment Control Best Management Practices Manual

MVP states in its E&SCP Narrative that, "This E&SCP has been prepared in accordance with the 2006 West Virginia Department of Environmental Protection (WVDEP) Best Management Protection (BMP) Manual." The full title for the referenced manual is the Erosion and Sediment Control Best Management Practices Manual, WVDEP, 2006, revised August 29, 2016 (ES&C-BMP Manual). The manual specifies that a site plan must be provided to 1) "Show existing and proposed contours"; 2) "Indicate drainage basins and direction of flow for individual drainage areas"; and 3) "Label final grade contours and identify developed condition drainage basins." Further, the manual specifies that for conveyance systems, the applicant must 1) "Show grades, dimensions, and direction of flow in all ditches, swales, culverts and pipes" and "Provide details for bypassing offsite runoff around disturbed areas."

The construction plan sheets submitted by MVP in the Site Registration Application provide contours of the existing land surface and indicate the locations of the proposed pipeline work corridor, access roads, work spaces, and erosion and sediment controls. However, there are no drainage area delineations, no drainage direction arrows, and no contours depicting the leveled work corridor and work areas or cut and fill. Figure 2.0.1 is an example of a construction plan sheet submitted to WVDEP for a stormwater management permit. The contours of the existing ground surface are provided, along with the contours associated with the roadway and work pad construction areas. Additionally, drainage areas are delineated and drainage arrows are provided. Figure 2.0.2 is an example of a drainage area delineation. The MVP construction plans are deficient because they do not provide the contours depicting changes resulting from construction and do not provide delineations of drainage areas or drainage direction arrows.

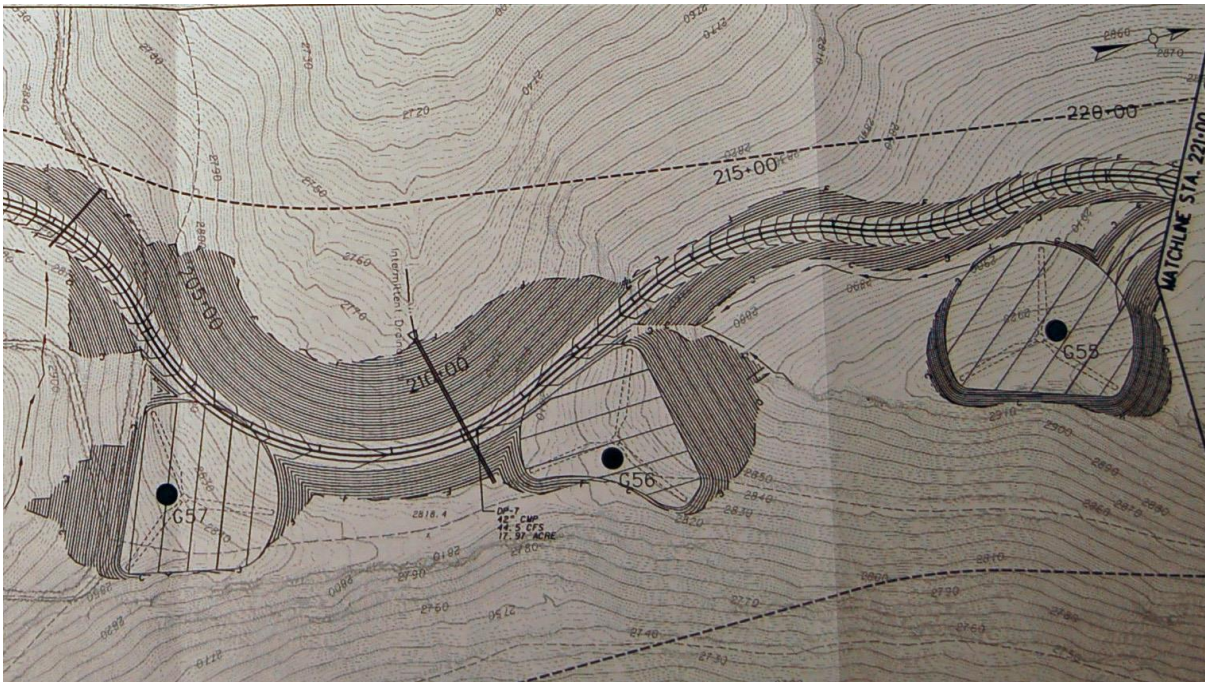


Figure 2.0.1 – Example of construction plan sheet submitted to WVDEP by AES Laurel Mountain, Inc. showing existing contours and also construction contours. Note that the contours along the roadway (linear feature) do not correspond to the contours of the existing land surface because the construction activities will change the topographic expression.

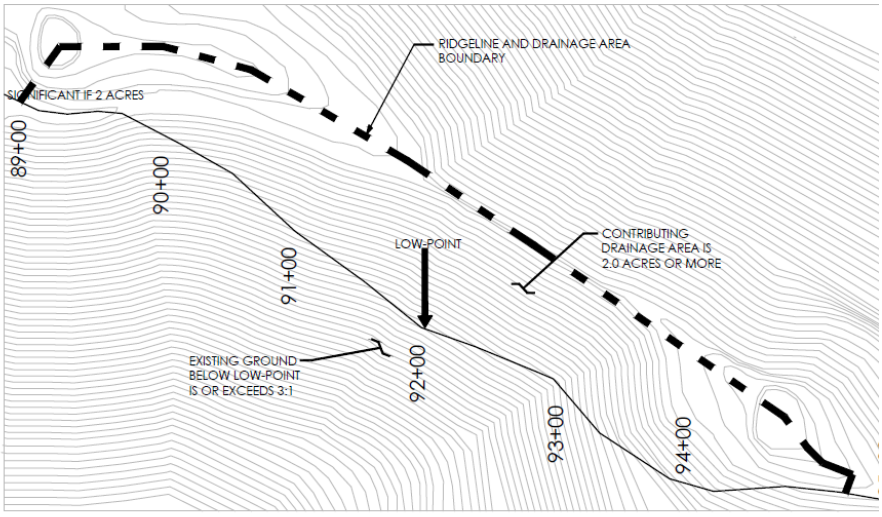


Figure 2.0.2 – Example of drainage area delineation from the ridge line to the low point on the project, excerpted from the Erosion and Sediment Control Best Management practice Manual, WVDEP, 2006, Rev. 2016.

Drainage Area Delineations Provide Information Necessary for Calculating Discharge Velocities and for Sizing Erosion and Sediment Controls

The WVDEP Office of Oil and Gas provides instructions on its website for a "Site Registration Application Form" (SRA) which is required to include specific information (http://www.dep.wv.gov/WWE/Programs/stormwater/csw/Documents/SRAInstructions-2012final-2.pdf). The Site Registration Application Form and the Erosion and Sediment Control Plan (ESCP) comprise the Stormwater Pollution Prevention Plan (SWPPP). "Line 13 B. Structural Controls" of the SRA states that "All sediment-laden water must pass through an appropriate sediment-trapping device", clarifying that "For locations on a site, which have a drainage area of 5 acres or less, a sediment trap that provides a storage volume equal to 3,600 cubic feet per acre of drainage area shall be installed. Half of the volume of the trap will be in a permanent pool and half will be dry storage… Sediment traps do not require an engineering design for the outlets. The minimum size for the weir outlet is 4 feet wide and as a rule of thumb the weir should be 2 feet wide plus another 2 feet for every acre of drainage." Additionally, "For drainage areas of greater than five acres, a sediment basin providing 3,600 cubic feet per drainage acre shall be installed. Half of the volume of the basin will be in a permanent pool and half will be dry storage. Sediment basins must be able to dewater the dry storage volume in 48 to 72 hours… A sediment basin must be able to pass through the spillway(s) a 25-year, 24-hour storm event, and still maintain at least one foot of freeboard. The emergency spillway will be constructed in original ground. Embankments must be built using best engineering and construction standards. It is further specified that the applicant "Provide all calculations used to size the sediment trapping structures."

Drainage area delineations are required in order to determine culvert sizes and sediment basin/trap sizes. However, the MVP construction plan sheets do not include any drainage area delineations. The E&SC-BMP Manual states that design criteria for diversion ditches is based on the drainage areas. For drainage areas greater than 10 acres, it is specified that the ditch capacity "will handle a 2-year frequency storm, 24-hour duration" and that water velocity will be within permissible limits. However, the drainage areas are not provided on the MVP construction drawings.

E&SC BMP Manual requires engineering calculations: "Attach any calculations made for the design of such items as sediment ponds, diversions, and waterways, as well as calculations for runoff and surface water detention design (if applicable). Engineering calculations for permanent structures must bear the signature and stamp of an Engineer licensed in the State of West Virginia. References shall be provided for all variables used." MVP has not provided any engineering calculations in its SRA submittal to WVDEP.

SECTION 3.0

MVP'S SELECTED BEST MANAGEMENT PRACTICES WILL ALLOW INCREASED STORMWATER DISCHARGE AND SEDIMENT TRANSPORT

It is specified in DEP's General Water Pollution Control Permit that "The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit, which has a reasonable likelihood of adversely affecting human health or the environment." Best Management Practices (BMPs) provide the only methods of managing stormwater runoff in order to satisfy the requirements of the stormwater permit. The alternative is to not allow construction which will cause adverse impacts to human health (adequate water supplies within acceptable water quality standards) and the environment (which includes aquatic habitats). The BMPs described by MVP for the proposed gas pipeline construction 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

Evaluations of BMP effectiveness vary widely, but it is recognized that BMPs do not trap 100 percent of the sediment from a construction site. The sediment basin is considered the most effective, but still fails to trap all the sediment from a construction site. Therefore, sediment will reach the receiving stream. Additionally, BMPs are designed with by-pass measures so the BMPs will not be degraded during larger precipitation events. This means the stormwater flows around the BMP without any reduction in sediment load.

Sedimentation in streams not only causes embeddedness, but also releases iron and aluminum from the sediments into the streams. Additionally, fecal coliform trapped in the sediments will be released to the stream water when the sediment is transported to the stream.

SECTION 3.1

Best Management Practices

Temporary ROW Diversion Berm and Sediment Trap Outlet

The detailed typical of this BMP is shown by MVP as consisting of a sediment berm and ditch. The sediment trap outlet consists of a filter sock. E&SC-BMP Manual cautions

that, “Because diversions collect overland flow, changing it into concentrated flows, they can create an additional erosion hazard.” It is recommended that the channel be armored with riprap, especial on slopes over 10 percent. The “Temporary ROW diversion” is located on the construction plan sheets at numerous locations where steep slopes are noted. However, there is no provision on the detail of this BMP to use riprap in the associated ditch. The E&SC-BMP Manual further specifies that the drainage area for this type of BMP should not exceed 5 acres and that the minimum cross section should be adequate for the anticipated flows but at a minimum must handle the peak discharge from a 2-year/24-hour storm. There is no indication that the drainage areas have been delineated to adhere to this specification or that the calculations have been performed to properly size the BMP. Additionally, it is specified that the entire length of the grade for the diversion is limited to 5% and that the diverted runoff must outlet onto a stabilized area, into a properly designed waterway, grade stabilization structure or sediment trapping facility. There is no indication that these specifications have been considered. It should be noted that high intensity storms, greater than the peak discharge design from a 2-year/24-hour storm, can result in overflow or bypass of the diversion berm BMP such that sediment is flushed from the BMP and discharged downslope.

The water within the diversion berm ditch is shown on the MVP typical to be directed into a filter sock. Depending on the quantity of water, this could result in concentrated water flow into adjacent areas, causing erosion in areas with no erosion controls.

Silt Fence, Super Silt Fence and Belted Silt Retention Fence

The E&SC-BMP Manual states that, “Silt fence does not actually filter sediment from muddy water”, and cautions that, “Intercepted sediment laden water must always be diverted to a sediment trap or sediment basin, never silt fence.” Additionally, the ES&C-BMP Manual provides that silt fence is installed properly only when it is “placed on the contour”, that is, perpendicular to the flow of the water. Without drainage area delineations and arrows on the construction plans submitted to DEP in the SRA, it is not possible to evaluate the proper placement of the silt fence.

Compost Filter Socks, Pumped Water Filter Bags

The E&SC-BMP Manual provides velocity maximums for various conveyances in accordance with slope and material. It is critical that the Compost Filter Socks and Pumped Water Filter Bags are in compliance with the velocity maximums. Delineations of drainage areas are a requirement for velocities to be calculated. There are no drainage delineations on the MVP construction plan sheets and no presentation of calculations determining runoff velocities.

Erosion Control Blanket/Flexterra/or equivalent and Vegetative Stabilization

The E&SC-BMP manual explains that "Erosion Control Blanket/Flexterra/or equivalent" consist of netting or blanket materials that are used to stabilize disturbed surfaces and promote the establishment of vegetation. They function by protecting the ground surface from the impact of raindrops and stabilize the surface until vegetation can be established. In the MVP Pipeline General Details, it is stated that the blankets should be on smoothed slopes, which indicates additional compaction and, therefore, additional impervious areas. The increased impervious areas will cause greater stormwater discharge.

Sediment Basins

One of the basic sediment control plan elements stated by the WVDEP (http://www.dep.wv.gov/WWE/Programs/stormwater/csw/Documents/E%20and%20S_BMP_2006.pdf) is that "Prior to leaving a construction site, surface water runoff from disturbed areas shall pass through a sediment basin/trap or other appropriate and approved sediment removal BMP." The WVDEP Erosion Sediment Control BMP manual states as an element that "Points of discharge and receiving streams shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of surface water runoff from the project site."

The stormwater permit includes the definition of a "sediment basin" as "a temporary structure consisting of an earthen embankment, or embankment and excavated area, located in a suitable area to capture sediment-laden runoff from a construction site. A sediment basin reduces the energy of the water through extended detention (48 to 72 hours) to settle out the majority of the suspended solids and sediment and prevent sedimentation in waterways, culverts, streams and rivers. Sediment basins have both wet and dry storage space to enhance the trapping efficiency and are appropriate in drainage areas of five acres and greater." Sediment basins are not included as a BMP for the proposed MVP gas pipeline construction areas.

SECTION 3.2

Landslide Mitigation

MVP's Landslide Mitigation Plan addresses mitigation measures associated with unstable soils overlying bedrock, where the bedrock is known to be associated with landslides. However, the MVP Landslide Mitigation Plan does not address the bedrock orientation or the orientation of fracture sets associated with landslides. The orientation of the bedrock and of the fracture sets must be obtained in order to determine if stabilization is even possible. Where interbedded sandstone and shale are located, the shale will weather more completely than the sandstone. This differential weathering causes the sandstone to collapse where the weathered shale can no longer support the sandstone, resulting in a rock slide. Where bedrock planes are oriented at a similar

angle as the slope of the hillside, bedrock slabs will move downslope causing slump features. Where fracture sets are weathered, rotational slumps and landslides can occur. One of the mitigation measures offered in the MVP Landslide Mitigation Plan is "Bedrock Embedment: Installing the pipeline completely within a bedrock trench will protect the pipeline integrity in the event of a surficial landslide." This mitigation would result in collapse or breakage of the pipeline if there is movement of the bedrock. Evaluation of potential bedrock movement can only be accomplished if the bedrock orientation, along with the orientation of fracture sets, have been measured.

It is further stated by MVP that additional mitigation measures, such as buttressing, are not anticipated. MVP describes buttressing as "An earth, rock, or riprap fill buttress in front of an unstable slope [that] will increase the weight of the material at the toe of the slope, thereby increasing the slope stability factor of safety." This method is used on unstable slopes in highway construction. The description fails to specify that the buttress must be "keyed" in to solid material at the base.

The soil descriptions provided in the areas of concern for landslide potential do not include the information about the material on which the soil is developed. For example, for the area of concern in Summers County, between Mile Post 164.6 and Mile Post 165.15, the NRCS soils maps indicates the presence of Shouns soil. The NRCS description for Shouns soil includes that it is formed in colluvium from sandstone, siltstone, and shale. This information is important because it indicates the bedrock consists of interbedded sandstone, siltstone, and shale, which exhibits differential weathering and therefore presents a rockslide potential. Additionally, colluvium is material which moves downslope by gravity. This indicates the slope is unstable because there is colluvium which is in motion. A more rigorous discussion of the soils present in areas of concern would provide useful information about the potential for landslides and rockslides.

Dewatering is the primary mitigation procedure stated in the MVP Landslide Mitigation Plan. Dewatering will result in depleting water from seeps and springs in headwater areas of first order high gradient streams where aquatic species provide the very base of the food chain. Cumulative damage to aquatic species in headwater areas along the extensive length of the proposed MVP gas pipeline will result in degradation of the entire river continuum.

SECTION 4.0

SURFACE WATER AND GROUNDWATER IMPACTS

Source Water Protection Areas

It is acknowledged in the MVP DEIS that, in accordance with the Safe Drinking Water Act (amended 1996), contamination threats to all public drinking water sources must be

assessed. Public drinking water sources include both surface water and groundwater. The proposed MVP gas pipeline crosses the Big Bend Public Service District (PSD), located partially in Summers County and Monroe County and also the Red Sulphur PSD in Monroe County. These PSDs are classified as state regulated public utilities that operate as community public water supply systems. Both PSDs have developed a Source Water Protection Plan concerned with protecting water sources from contamination and also from depletion. In 2014, amended and new Codes of West Virginia required that each existing public water utility using surface water or ground water influenced by surface water as a source must have completed or updated a source water protection plan.

The surface water intake for the Big Bend PSD is the Greenbrier River, SDWIS #IN001. The proposed MVP gas pipeline is listed in the Big Bend PSD Source Water Protection Plan as Priority Concern #2 for potential sources of significant contamination within the zone of critical concern: "The proposed route of the Mountain Valley Pipeline crosses the Greenbrier River upstream of the water treatment plant. The construction calls the line to be bored under the river, which could cause significant impacts to water quality downstream of the project, at least while the construction is ongoing. In the future, there is the possibility of leaks or other problems with the pipeline that could impair Big Bend PSD's ability to use the water source. These impacts could potentially be difficult to detect and mitigate." Since the publication of the Big Bend PSD Source Water Protection Plan, MVP has changed the proposed gas pipeline crossing of the Greenbrier River to a dry crossing using cofferdam construction.

The Big Bend PSD does not list any groundwater sources used to blend with surface water. However, it is important to note that surface water and groundwater are one integral unit. In times of drought or dry weather when streams have low water levels, groundwater supplies water to the streams. Therefore, it is important to protect both surface water and groundwater resources because of the interconnection between surface water and groundwater. Where the proposed MVP pipeline construction causes increased stormwater discharge and reduced groundwater recharge, the increase in surface water (stream and river water) volumes will result in increased turbidity and sediment deposition. Reduced groundwater recharge will result in lower amounts of available groundwater and reduced groundwater base levels, thereby reducing the amount of water available to supply streams during drought or dry weather. This cumulative impact may result in depletion of public water supply resources.

The Red Sulphur PSD source water consists of a surface water intake at Rich Creek and groundwater sources: 1) Hancock Spring, 2) Coburn Spring, and 3) a well at the plant which is used for blending groundwater with surface water during dry weather. The Red Sulphur PSD also lists the proposed MVP gas pipeline construction as a high concern risk for potential significant contamination to water sources and states that "Given that the water system is located in karst geology, the groundwater is susceptible to contamination much like the surface water source."

Groundwater flow through karst areas (limestone and dolomite) exhibits both diffuse flow and conduit flow. Conduit flow consists of "integrated systems of openings ranging from solutionally widened joints and bedding plane partings to pipelike passages many meters in diameter" (White, 1988). Pipelike passages and larger solutionally widened joints and bedding plane partings can be observed in the caves throughout the area, and are also present, although inaccessible for observation, in limestone and dolomite throughout the area. The karst areas in Monroe County, including caves, sinking streams, sinkholes, and springs, indicate the presence of both diffuse flow and conduit flow in the Valley and Ridge regional aquifer which flows through the Ordovician and older bedrock. Dasher (2000) provides descriptions of groundwater in extensive karst sub-basins of caves within the Greenbrier Limestone. Dye traces provide evidence of the groundwater flow directions within the limestone, which are independent of the surficial topography and watersheds; however, no dye traces have been conducted in the Lindside and Peters Mountain karst areas in Monroe County. Springs attest to the flow of groundwater through fractures and along bedding planes within the limestone, in addition to flow through interconnected voids in the limestone.

It is stated in the MVP DEIS that "The MVP… would not cross any source water protection areas for groundwater resources." This is clearly inconsistent with the listing of groundwater resources for the Red Sulphur PSD. This is also inconsistent with the consideration of groundwater base level supply of streams during times of drought or dry weather in both the Big Bend PSD and the Red Sulphur PSD.

Withdrawal of Water for Hydrostatic Testing

In the MVP DEIS, it is stated that 5,763,483 gallons of water would be withdrawn from the Greenbrier River at Mile Post 170.6, which is where MVP proposes the gas pipeline crossing of the Greenbrier River, close to the public water supply intake. The Greenbrier River is designated as a Tier 3 river, for which the WVDEP's "General Water Pollution Control Permit" specifies an anti-degradation review.

It is stated in the MVP DEIS that, "Surface water withdrawals could reduce stream flows and water levels and entrain or impinge stream biota." Even with the use of the WVDEP withdrawal tool, withdrawal of 5,763,483 gallons from the Tier 3 Greenbrier River is inconsistent with protection of this river, which is further listed in the NRI.

Interception and Diversion of Groundwater Proposed by MVP is Not Consistent with Groundwater Protection

It is stated in the MVP E&SCP that, "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." Additionally, it is stated

in the MVP DEIS that “Dewatering of the pipeline trench may require pumping of groundwater in areas where there is a near-surface water table.” As the best means of landslide mitigation, MVP proposes 1) dewatering seeps, springs, and groundwater within the proposed pipeline trench and 2) directing all surface water away from the area to reduce the amount of water infiltration into the soil. It is specified in MVP’s Sidehill Construction that, “Seeps or springs encountered in the excavation shall be intercepted by transverse trench drains, cutoff drains, or similar, and directed out of the pipeline ditch to an energy dissipating structure (such as a riprap apron).” Additionally, “All streams, gullies, natural drains, field roads or trails, and other water conveying features shall be properly recontoured such that the permanent right-of-way is protected from preferential water accumulation and infiltration.”

Dewatering of near-surface groundwater removes water from seeps and springs that support aquatic habitats in headwater areas of first order high gradient streams and that serve as base level water supply to streams and rivers. Deforestation and soil compaction decrease infiltration of precipitation for groundwater recharge. Therefore, the combination of decreased groundwater recharge along with dewatering of near-surface groundwater will result in permanent depletion of water for seeps and springs in headwater areas of first order high gradient streams.

Groundwater in karst areas moves through carbonate rocks (limestone, dolostone) as conduit flow. MVP has provided the location of sinkholes and has described means of preventing sediment discharges into sinkholes. However, there is no discussion offered by MVP that indicates an evaluation of reduced groundwater recharge to karst aquifers.

SECTION 5.0

STREAM WATER QUALITY

Water Quality Standards

Water quality standards are specified in WV Code 47CSR2 (http://www.dep.wv.gov/WWE/Programs/wqs/Documents/47CSR2%20070816.pdf), which establishes water quality standards for specific water use categories under §47-2-6. Category A pertains to water supplies for human consumption. Category C pertains to water contact for recreation. In this section, it is stated that “at a minimum all waters of the State are designated for the Propagation and Maintenance of Fish and Other Aquatic Life (Category B)... consistent with Federal Act goals.” Category B1 pertains to warm water fishery streams. Category B2 pertains to trout waters. Category B4 pertains to wetlands.

The following water quality standards (as provided in WV Code 47CSR2) are pertinent for stormwater discharge from the proposed MVP gas pipeline construction. Explanations of the relevance of these parameters are provided along with the limits excerpted from WV Code 47CSR2:

- **Parameter 8.1** Dissolved Aluminum (all Aquatic Life)

  Aluminum is released to stream water with sediment from streambank erosion.

- **Parameter 8.13** Fecal Coliform (all Human Health)

  Fecal coliform is discharged to stream water with stormwater discharge. Sources of fecal coliform include wildlife in forested areas and meadows, livestock in pastures, and pets in urban areas. "Maximum allowable level of fecal coliform content for Water Contact Recreation (either MPN or MF) shall not exceed 200/100 ml as a monthly geometric mean based on not less than 5 samples per month; nor to exceed 400 /100 ml in more than ten percent of all samples taken during the month."

- **Parameter 8.15 Iron** (all Aquatic Life and Water Supplies for Human Consumption)

  Iron is released to stream water with sediment from streambank erosion. "Iron concentration limits are 1.5 mg/L for Water Supplies for Human Consumption; 1.5 mg/L for B1 and B4 Aquatic Life; and 1.0 mg/L for B2 Aquatic Life."

- **Parameters 8.16, 8.16.1, and 8.16.2 Lead** (all Aquatic Life and also Human Consumption):

  Radon gas, a component of Marcellus shale which will be transported in the gas pipeline, breaks down into lead. Cleaning operations at the pig launcher locations will release radon and lead to the surrounding area.

- **Parameters 8.26 and 8.26.1 Radioactivity** (all Aquatic Life, all Human Health, and all Other Uses):

  The intended gas to be transported in the proposed MVP gas pipeline is derived from hydrofracturing of Marcellus shale and associated rock units. Marcellus shale contains naturally occurring radioactive elements which are transported in the gas. Radon is one of the elements, which breaks down into lead, considered a toxin. Where pig launchers are located, the gas escapes to the surrounding area. Cleaning operations at the pig launcher locations release radon and lead to the surrounding area. In reference to Parameter 8.26: "Gross Beta activity is not to exceed 1000 picocuries per liter (pCi/l), nor shall activity from dissolved strontium-90 exceed 10 pCi/l, nor shall activity from dissolved alpha emitters exceed 3 pCi/l." In reference to Parameter 8.26.1: "Gross total alpha particle activity (including radium-226 but excluding radon and uranium shall not exceed

15 pCi/l and combined radium-226 and radium-228 shall not exceed 5pCi/l; provided that the specific determination of radium-226 and radium-228 are not required if dissolved particle activity does not exceed 5pCi/l; the concentration of tritium shall not exceed 20,000 pCi/l; the concentration of total strontium-90 shall not exceed 8 pCi/l in the Ohio River main stem."

- **Parameter 8.29 Temperature** (Aquatic Life B1):

  Increased turbidity from sediment discharged to streams results in increased temperatures. Deforestation also results in higher temperatures and can be detrimental to aquatic species in the headwater areas of first order high gradient streams. "Temperature rise shall be limited to no more than 5^{o}F above natural temperature, not to exceed 87^{o}F at any time during months of May through November and not to exceed 73^{o}F at any time during the months of December through April. During any month of the year, heat should not be added to a stream in excess of the amount that will raise the temperature of the water more than 5^{o}F above natural temperature. In lakes and reservoirs, the temperature of the epilimnion should not be raised more than 3^{o}F by the addition of heat of artificial origin. The normal daily and seasonable temperature fluctuations that existed before the addition of heat due to other natural causes should be maintained."

- **Parameter 8.33 Turbidity** (Aquatic Life B1, B2, B4; and Human Health A and C):

  Turbidity results from the introduction of sediment into stream water. Sediment is introduced to stream water from stormwater discharge and from streambank erosion. "No point or non-point source to West Virginia's waters shall contribute a net load of suspended matter such that the turbidity exceeds 10 NTU's over background turbidity when the background is 50 NTU or less, or have more than a 10% increase in turbidity (plus 10 NTU minimum) when the background turbidity is more than 50 NTUs. This limitation shall apply to all earth disturbance activities and shall be determined by measuring stream quality directly above and below the area where drainage from such activity enters the affected stream. Any earth disturbing activity continuously or intermittently carried on by the same or associated persons on the same stream or tributary segment shall be allowed a single net loading increase."

The 2006 West Virginia Erosion Sediment Control BMP Manual, revised August 2016, (http://www.dep.wv.gov/WWE/Programs/stormwater/csw/Documents/E%20and%20S_BMP_2006.pdf) further explains that, "The primary numeric water quality standard addressing earth disturbing activities is turbidity. Other criteria that could be violated by runoff from a construction project include pH and iron. Turbidity is defined as an expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample. It is an indirect measurement of how much suspended material is in a sample of water."

The U.S. Environmental Protection Agency (EPA) is the regulatory agency for the Clean Water Act Section 402 Stormwater Permit. It is specifically stated by EPA that, "The pollutant of concern during oil and gas-related construction is usually sediment (expressed as total suspended solids or turbidity). Regardless of the type of pollutant(s) in a discharge, all water quality standards of the receiving waterbody must be protected." (https://www.epa.gov/npdes/oil-and-gas-stormwater-permitting#when).

Total Maximum Daily Loads

The E&SCP-BMP manual explains: If construction activities will contribute pollutants for which a specific receiving water is listed as impaired, permittees must comply with Total Maximum Daily Loads (TMDLs) set for the receiving stream. Construction sites may be designated as contributors to the impairment if a stream is listed as impaired because of sediment or iron."

For example, Appendix D of the Lower New River Watershed Report (WVDEP, 2008; http://www.dep.wv.gov/WWE/watershed/TMDL/grpd/Documents/Upper%20and%20Lower%20New%202008/D_Upper_New_River_Appendix_6-25-08.pdf) establishes Total Maximum Daily Loads (TMDLs) for specific water quality parameters in the Lower New River watershed, including tributaries within the Indian Creek, Hans Creek, and Rich Creek watersheds. It is stated in Appendix D that potential aluminum and iron sources include discharges from construction activities and streambank erosion. Sediment released during construction activities and streambank erosion introduce iron and dissolved aluminum to stream water. Identified potential nonpoint sources for fecal coliform bacteria include stormwater runoff from pastures, croplands, and residential and urban areas. Fecal coliform bacteria, sedimentation, and iron are identified as significant stressors for biological impairment of streams, including those in tributaries within the Indian Creek and Rich Creek watersheds. As another example, the Greenbrier River Watershed TMDL Report includes TMDLs for the Greenbrier River and Hungard Creek in Summers County.

It is further stated in Appendix D that WVDEP issues construction stormwater permits to regulate stormwater discharges associated with construction activities, requiring that "the site have properly installed best management practices (BMPs), such as silt fences, sediment traps, seeding/mulching, and riprap, to prevent or reduce erosion and sediment runoff."

Additionally, in the WVDEP 2008 report, "Total Maximum Daily Loads for Streams in the Greenbrier River Watershed, West Virginia" (Greenbrier River Watershed TMDL Report), the WVDEP emphasizes that surface contamination can quickly infiltrate and contaminate groundwater in karst landscapes, formed by the dissolution of soluble limestone and consisting of depressions such as sinkholes, disrupted surface water drainages (sunken streams) and large springs, and caves or underground drainage networks.

Construction Pertaining to River Crossings

The MVP ESCP narrative describes "***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."

Cofferdam construction is indicated for use in the dry crossing technique of the Greenbrier River. The E&SC-BMP manual states that "The production of significant amounts of sediment is inevitable when conducting construction activities in a stream."

Using the Greenbrier River (a WV Natural Stream, listed in the NRI) crossing as an example, the crossing length is given in the MVP DEIS as 1,841 feet. Aquatic habitats will be destroyed in the construction area. Sediment will be released to the river during construction, causing embeddedness in downstream aquatic habitats and, thereby, degradation of downstream aquatic habitats. FERC stated the following to MVP: "Mountain Valley should file with the Secretary the results of quantitative modeling for turbidity and sedimentation associated with wet open-cut crossings of the Elk River, Gauley River, and Greenbrier River. The analysis should address the duration, extent, and magnitude of turbidity levels and assess the potential impacts on resident biota. The analysis should also include a discussion on the physical and chemical characteristics of the sediments, the estimated area affected by the transport and redistribution of the sediments, and the effect of the suspension and resettlement on water quality; as well as an assessment of the effectiveness of the proposed turbidity curtains." However, the MVP Response to this Post-Draft Environmental Impact Statement Environmental Information Request Issued January 27, 2017 was "Because the dry-ditch crossing technique significantly reduces the amount of sedimentation and turbidity, a quantitative analysis is not necessary."

Scour Analysis Provides Data to Evaluate Impacts on Water Quality and Aquatic Habitats

Scour refers to erosion within a stream bed or river bed as well as stream bank erosion. During scour of stream beds or river beds, sediment is eroded and transported downstream, where it is deposited at a new location. "Technical Supplement 14B: Scour Calculations", in the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) National Engineering Handbook (2007), provides guidance for analyzing potential scour as part of the design procedure for placing any hard structure within a stream or river channel. In this publication, the NRCS focuses on stream bed or river bed scour and emphasizes that maximum scour depth estimates are critical for insuring that the structure extends below the maximum scour depth. Although the intent of scour analysis is to determine the safe depth of a structure, such

as the proposed MVP pipeline, useful information is provided in the scour analysis to assess impacts of the proposed construction on water quality and on aquatic habitats.

Scour analysis was conducted for MVP by Tetra Tech in their report “Vertical Scour and lateral Channel Erosion Analyses Mountain Valley Pipeline” (Scour Analysis Report), originally submitted to FERC October 2016, then revised February 2017. It is stated in the Scour Analysis Report that “Potential scour is limited to the bedrock surface. Therefore, no additional mitigation is required if the pipeline is installed below the bedrock surface”. Scour analysis pertains to scour of sediments within the stream bed or river bed, but not to bedrock. If bedrock is exposed in a stream bed or river bed, the implicit assumption is that there is no scour at that location. Because there are no comparisons (or contrasts) of pre-construction scour analyses and post-construction scour analyses, there is no consideration of changes where bedrock in a stream bed or river bed would be removed for the proposed pipeline trench excavation and subsequently filled with sediment that could be scoured after construction.

It is not succinctly stated in the Scour Analysis Report that the scour analysis would be completely different for the river bed conditions consisting of a sediment cover over the proposed pipeline trench than for river bed conditions consisting of bedrock. However, it is stated that “Mountain Valley would consider using an armoring layer at the pipeline crossing as a mitigation option” or “would consider using revetment mats at the pipeline crossing as a mitigation option”. The armoring layer is described in the Scour Analysis Report as consisting of sediment greater than 6 mm (gravel and larger). The industry describes revetment mats as articulating block mats consisting of cable-reinforced concrete block mattresses. Such materials on the river bed will not create conditions suitable for aquatic habitats or natural river bed form processes.

Where bedrock is encountered at proposed river crossings, MVP proposes that it will be removed by machinery or by blasting in order to excavate the proposed pipeline trench. Scour analysis conducted prior to the proposed construction is based on existing conditions prior to the proposed construction. However, river bed conditions will be changed where bedrock is removed for the proposed trench excavation. Therefore, where bedrock currently exists at a river crossing, the scour analysis would be based on a bedrock surface in the river bed. When the bedrock is removed for the proposed trench excavation, the river bottom will no longer be bedrock, but rather, there will be sediment covering the proposed pipeline trench. The original scour analysis results will not be accurate if bedrock is removed.

The Scour Analysis Report states that the median particle size is 35 mm (pebble-size gravel) at the proposed crossing for the Greenbrier River in Summers County. The median particle size is the “middle” value of particle sizes which separates the higher half of a data set from the lower half. The median particle size is considered to be the most typical at a particular sampling location. This means, of course, half of the particle sizes are greater than 35 mm, ranging up to boulder size, and half are smaller, ranging down to clay size. During times of peak discharge in the Greenbrier River at the

proposed crossing location, scour of the river bed will result in transport of sediment ranging from clay size to at least pebble size and possibly cobble and boulder size. The clay, silt, and sand size particles cause turbidity, which impacts water quality, and also is deposited after transport in aquatic habitats consisting of gravel size particles, thus causing embeddedness of the aquatic habitats.

High Quality Streams

West Virginia streams designated for Tier 2 Protection are High Quality Waters and for Tier 3 Protection are Outstanding National Resource Waters. It is stated in West Virginia Title 60 Legislative Rule, Department of Environmental Protection Secretary's Office, Series 5, Antidegradation Implementation Procedures Tier 2 and Tier 3 waters must undergo antidegradation review to determine water quality impacts, based on the baseline water quality parameters. This indicates that the water should be analyzed for baseline water quality and that an analysis must be provided to determine potential degradation to the stream that would occur as a result of a particular activity, such as the proposed MVP gas pipeline construction crossing the stream or river. The MVP ESCP narrative provides a listing of proposed Tier 2 and Tier 3 stream/river crossings, as excerpted below.

Table 4.0.1 – Special protected waters, excerpted from the MVP ESCP narrative (includes only streams and rivers in Summers and Monroe Counties, WV). Note: WWF indicates warm water fishery.

Identifier	Stream	County	Tier		COMMENTS		
S-HH10	UNT to Stoney Creek	Monroe	2	WWF	-	-	
S-H62	UNT to Stoney Creek	Monroe	2	WWF	-	-	
S-H63	UNT to Stoney Creek	Monroe	2	WWF	-	-	
S-CD22	UNT to Stony Creek	Monroe	2	WWF	-	-	
S-G48	Wind Creek	Monroe	3	-	-	-	
S-IJ64	UNT to Little Stony Creek	Monroe	3	-	-	-	
S-A63	Slate Run	Monroe	3	-	-	-	
S-A60	Slate Run	Monroe	3	-	-	-	
S-D25	UNT to Hans Creek	Monroe	3	-	-	-	
S-F18	UNT to Hans Creek	Monroe	3	-	-	-	
S-Z4	UNT to Hans Creek	Monroe	3	-	-	-	
S-MN2	UNT to Hans Creek	Monroe	3	-	-	-	
S-G43	UNT to Hans Creek	Monroe	3	-	-	-	
S-E40	Dry Creek	Monroe	3	-	-	-	
S-C39	Painter Run	Monroe	3	-	-	-	
S-C40	UNT to Painter Run	Monroe	3	-	-	-	
S-OP1	Stony Creek	Monroe	3	WWF	-	-	
S-D31	Indian Creek	Monroe	3	WWF	-	-	
S-H61a	UNT to Stoney Creek	Monroe	3	WWF	-	-	
S-H61	UNT to Stoney Creek	Monroe	3	WWF	-	-	
S-QR22	UNT to Indian Creek	Monroe	3	WWF			
S-I13	UNT to Lick Creek	Summers	2	WWF	-		-
S-I14	UNT to Lick Creek	Summers	2	WWF	-		-
S-I15	UNT to Lick Creek	Summers	2	WWF	-		-
S-I16	UNT to Lick Creek	Summers	2	WWF	-		-
S-AB33	UNT to Lick Creek	Summers	2	WWF	-		-

S-I17	UNT to Lick Creek	Summers	2	WWF	-	-
S-I18	UNT to Lick Creek	Summers	2	WWF	-	-
S-I10	UNT to Lick Creek	Summers	2	WWF	-	-
S-I20	UNT to Lick Creek	Summers	2	WWF	-	-
S-J11	UNT to Hungard Creek	Summers	2	WWF	-	-
S-QQ10	UNT to Hungard Creek	Summers	2	WWF	-	-
S-FF2	UNT to Hungard Creek	Summers	2	WWF	-	-
S-J10	UNT to Hungard Creek	Summers	2	WWF	-	-
S-L8	UNT to Hungard Creek	Summers	2	WWF	-	-
S-J9	UNT to Hungard Creek	Summers	2	WWF	-	-
S-L7	UNT to Hungard Creek	Summers	2	WWF	-	-
S-J8	UNT to Hungard Creek	Summers	2	WWF	-	-
S-L6	UNT to Hungard Creek	Summers	2	WWF	-	-
S-J7	UNT to Hungard Creek	Summers	2	WWF	-	-
S-K11	UNT to Hungard Creek	Summers	2	WWF	-	-
S-K13	UNT to Hungard Creek	Summers	2	WWF	-	-
S-N5	UNT to Hungard Creek	Summers	2	WWF	-	-
S-K16	UNT to Hungard Creek	Summers	2	WWF	Permanent water bar shown in headwater area	-
S-N3	UNT to Hungard Creek	Summers	2	WWF	-	-
S-CD23	UNT to Hungard Creek	Summers	2	WWF	-	-
S-N4	UNT to Hungard Creek	Summers	2	WWF	-	-
S-M2	UNT to Hungard Creek	Summers	2	WWF	-	-
S-ST32	UNT to Hungard Creek	Summers	2	WWF	-	-
S-ST33	UNT to Hungard Creek	Summers	2	WWF	-	-
S-KL29	Righthand Fork Hungard Creek	Summers	3		--Timber Mat	-
S-I8	Greenbrier River	Summers	3	-	-	WV Natural Stream, NRI Listed
S-J5	Kelly Creek	Summers	3	-	-	-
S-I12	Lick Creek	Summers	3	WWF	-	-
S-I19	Lick Creek	Summers	3	WWF	-	-
S-N2	Hungard Creek	Summers	3	WWF	-Timber Mat	-
S-M3-Braid	Hungard Creek	Summers	3	WWF	-	-
S-M3-Braid	Hungard Creek	Summers	3	WWF	-	-
S-M3	Hungard Creek	Summers	3	WWF	-Timber Mat	-
S-M1	Hungard Creek	Summers	3	WWF	-	-
S-J12	UNT to Lick Creek	Summers	3	WWF	-	-

SECTION 5.0

CONCLUSIONS

The MVP's Site Registration Application to the WVDEP is incomplete and deficient. The WVDEP's responsible evaluation would be to deny the permit request because the WVDEP would not be able to allow such an expansive project to be constructed in keeping with the West Virginia Code.

The deficiencies include the following:

1) Deforestation in the proposed work corridor, access roads, pipe yards, and additional work areas will result in canopy loss, thereby causing increased stormwater discharge, reduced groundwater recharge, and increased downstream stream bank erosion. Restoring the areas to meadows will not

result in the lower stormwater discharge amounts characteristic of forested land because it is the tree canopy which is most effective in reducing rainfall intensity, that is, reducing the impacts of raindrops on the ground.

2) Soil compaction in the proposed work corridor will create impervious areas, resulting in increased stormwater discharge, reduced groundwater recharge, and loss of soil functions, especially in headwater areas of first order high gradient streams, even if topsoil is placed over the compacted soil.
3) Access road widths, stated to be 25 feet in the SRA, are inconsistent with the road construction easements, stated to be 40 feet, as provided in the Draft Environmental Impact Statement submitted by MVP to the Federal Energy Regulatory Commission (FERC). The disturbed/impervious areas created by access roads will be greater in size if the widths are 40 feet rather than 25 feet.
4) Section G.4 of DEP's "General Water Pollution Control Permit" specifies that a Groundwater Protection Plan (GPP) will be provided and that groundwater "means the water occurring in the zone of saturation beneath the seasonal high water table or any perched water zones." It is further specified in Section G.4.e.2.C.iii. of DEP's "General Water Pollution Control Permit" that, "The applicant shall prepare a GPP that will satisfy the requirements of the Groundwater Protection Rule, 47 C.S.R. 58 § 4.11." However, MVP has not provided a GPP. Although MVP is not necessarily required to submit the GPP with the SRA, Indian Creek Watershed Association requests that the GPP be made available to the WVDEP website for public review.
5) Seeps and springs associated with a perched groundwater table are specified to be dewatered for the proposed construction areas. Seeps and springs provide water necessary to maintain aquatic habitats in headwater areas in watersheds of first order high gradient streams.
6) Baseline water quality analysis and sampling has not been conducted to evaluate the open-cut dry crossing of the Greenbrier River, which is a Tier 3 river and is a WV Natural Stream, NRI listed.
7) MVP has refused the requests made by the U.S. Environmental Protection Agency (EPA) and FERC to conduct quantitative modeling for turbidity and sedimentation for the Elk, Gauley, and Greenbrier River crossings, including an analysis of the duration, extent, and magnitude of turbidity levels and an assessment of the potential impacts on resident biota.
8) MVP has not provided an analysis of sediment released during construction activities, such as that provided by the Universal Soil Loss Equation (USLE) or the Revised Universal Soil Loss Equation (RUSLE), developed by the U.S. Department of Agriculture Natural Resources Conservation Service, to evaluate the increase in sediment to streams and rivers resulting from the increased stormwater discharge.
9) Drainage areas are not delineated on the construction plan sheets.
10) Drainage direction arrows are not shown on the construction plan sheets, except along silt fencing locations.

11) It is stated in Section G.4.e.2.B of DEP's "General Water Pollution Control Permit" that, "The permittee shall submit all… watershed mapping… necessary to explain the technical basis for the stormwater management plan." However, watersheds are not delineated on any MVP maps.
12) Drainage basin areas used in the scour analyses are inconsistent with functional watershed sizes for streams proposed for crossings.
13) It is stated in Section G.4.e.2.B of DEP's "General Water Pollution Control Permit" that, "The permittee shall submit all… calculations… necessary to explain the technical basis for the stormwater management plan." However, MVP has not provided engineering calculations for sizing Best Management Practices.
14) Scour Analyses do not provide post-construction estimates of sediment released by scour to downstream areas and do not account for the increase in stormwater discharge resulting from deforestation, soil compaction, and dewatering.
15) Lateral Erosion Analysis of stream banks was confirmed by the Tetra Tech report prepared for MVP; however, calculations were not performed to show the increase in stream bank erosion due to the increase in stormwater discharge caused by deforestation, soil compaction, and dewatering.
16) MVP has not demonstrated by evidence of calculations and evaluations that the proposed BMPs are adequate to prevent significant sediment quantities to be released to receiving streams and rivers. Studies by the U.S. Geological Survey provide evidence that sediment yields to receiving streams during construction can increase as much as 107 times the pre-construction amounts. Even with less sediment yields after construction, the sediments reaching the receiving streams will increase embeddedness in the stream beds.
17) Cumulative impacts were not assessed. The proposed construction will impact numerous first order high gradient streams which are tributaries to specific larger streams or rivers. For example, the proposed construction will impact headwaters and first order high gradient stream tributaries to Hungard Creek, which is one of the tributaries to the Greenbrier River. Other first order high gradient streams are tributaries to the Greenbrier River, as well. Therefore, there would be cumulative negative impacts to the Greenbrier River due to increased turbidity, increased embeddedness, increased stormwater discharge, increased vertical scour, and increased stream bank erosion.
18) It is stated by DEP in Section G.4.e.2.A.ii.b. of the "General Water Pollution Control Permit" that, "For drainage areas of greater than five acres, a sediment basin providing 3,600 cubic feet per drainage acre shall be installed. Half of the volume of the basin shall be in a permanent pool and half shall be dry storage. Sediment basins must be able to dewater the dry storage volume in 48 to 72 hours. A sediment basin must be able to pass through the spillway(s) a 25-year, 24-hour storm event, and still maintain at least one foot of

freeboard." However, sediment basins/traps are not included as part of the MVP Best Management Practices (BMPs).

19) MVP's Landslide Mitigation Plan addresses mitigation measures associated with unstable soils overlying bedrock, where the bedrock is known to be associated with landslides. It is further stated by MVP that additional mitigation measures, such as buttressing, are not anticipated. MVP describes buttressing as "An earth, rock, or riprap fill buttress in front of an unstable slope [that] will increase the weight of the material at the toe of the slope, thereby increasing the slope stability factor of safety." This method is used on unstable slopes in highway construction. The description fails to specify that the buttress must be "keyed" in to solid material at the base.
20) The MVP Landslide Mitigation Plan does not address the bedrock orientation or the orientation of fracture sets where landslides are probable. The orientation of the bedrock and of the fracture sets must be obtained in order to determine if stabilization is even possible.

USDA United States Department of Agriculture | Forest Service | George Washington and Jefferson National Forests | 5162 Valleypointe Parkway Roanoke, VA 24019 540-265-5100

File Code: 2720; 1900
Date: March 9, 2016

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington, DC 20426

Dear Ms. Bose:

Subject: Comments on Final Resource Reports for the Mountain Valley Pipeline Project
OEP/DG2E/Gas 3
Mountain Valley Pipeline, LLC
Docket No. CP16-10-000

The Forest Service appreciates the opportunity to review the final resource reports filed by Mountain Valley Pipeline, LLC for the proposed Mountain Valley Pipeline (MVP) Project (Docket No. CP16-10-000). The proposed project would affect National Forest System (NFS) lands on the Jefferson National Forest.

The Forest Service has reviewed the final resource report and identified information and data requirements necessary for the assessment of effects of the proposed MVP Project on NFS lands. The requirements are detailed in the attached document, along with comments and discussions of the Forest Service's concerns about specific aspects of the proposed project.

For questions, please contact Jennifer Adams, Special Project Coordinator, at (540) 265-5114 or by email at jenniferpadams@fs.fed.us.

Sincerely,

JOBY P. TIMM
Forest Supervisor

Forest Service Comments on Final Resource Reports Dated October 2015

Mountain Valley Pipeline Project (Docket No. CP16-10)

GENERAL COMMENTS

Federal Lands

All materials associated with this proposal should depict and explicitly identify the federal lands potentially involved including, but not limited to, the Jefferson National Forest, NPS-Acquired Lands managed by the Jefferson National Forest (JNF), the Appalachian National Scenic Trail, Peters Mountain Wilderness, and Brush Mountain Wilderness, as well as properties owned in fee by the Army Corps of Engineers. Please update diagrams, topographic or quad maps, alignment sheets, details and ancillary sites, etc. accordingly.

Plans

Some comments on plans (e.g., revegetation plans) may be included, in part, in the tabled comments below though more detailed comments are forthcoming. Also see comments found in the Forest Service's comments on draft resource reports filed on August 18, 2015 and issued by the Federal Energy Regulatory Commission (FERC) on August 11, 2015.

Archeology Survey

In a letter filed with FERC on September 17, 2015, the Forest Service indicated that the archeology survey for the Mountain Valley Pipeline Project (MVP Project or project) would be conducted by the Forest Service. Please note that Mountain Valley Pipeline, LLC (MVP) will now conduct the archeology survey.

Water withdrawals and discharges

Per the JNF Land and Resource Management Plan (LRMP), water withdrawals from NFS lands on the JNF are not authorized without analysis of the instream flow or lake level needs sufficient to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values, and withdrawal is not permissible if any of the above resources are adversely affected. In the event this analysis shows that water withdrawals adversely affect the above resources, then water required for hydrostatic testing, boring, horizontal directional drilling, dust abatement, or any other use during construction, operation, and maintenance of the proposed project will need to be hauled in rather than withdrawn from NFS lands. Any used or unused water will need to be hauled out and disposed of offsite.

The locations and sources of proposed water withdrawals, and the locations of proposed discharges of water or other solutions, should be evaluated within a watershed water-use context in order to identify any off-site effects on sensitive resources. Effects on sensitive resources would be subject to compliance with Forest Service guidance and direction, and laws and regulations including but not limited to the Endangered Species Act and the National Historic Preservation Act.

For each project activity requiring water during the construction, operation, and maintenance of the proposed project on NFS lands, identify the following:

a. volume of water needed;

b. proposed source where water would be withdrawn;

c. volume of water to be discharged;

d. location and details of discharge (transport method, discharge rate, erosion control measures, etc.);

e. number and weights of loads of water that would be hauled from the water source to the site; and

f. number and weights of loads of water to be hauled from the work site to the discharge site.

Proposed Crossing of the Appalachian National Scenic Trail

The description of this specific portion of the overall proposal is not comprehensive or sufficiently detailed. There are several critical discrepancies and omissions as discussed in the bullets below.

- It is not clear to the reviewer that the route of the pipeline as shown in Figure 1.11-1, on topo map 36, and on alignment sheets 215 and 216 is the same location, nor exactly where that location is with respect to the actual location of the ANST footpath and the NFS tract boundaries.
- It is not explicitly clear to the reviewer whether MVP plans to follow the original proposed route at this location, the Alternative 200 proposed route, or some other route.
- It is not clear to the reviewer that the proponents are aware that for most of the length of Peters Mountain in the vicinity of the proposed crossing, the westernmost portion of the federal land was actually acquired by the National Park Service for the protection of the Appalachian National Scenic Trail. (See NPS ANST Segment Map 492). The route as shown in Figure 1.11-1 appears to cross only NFS lands, but this is a critical point and must be made explicitly clear.
- Figure 1.11-1 – the legend does not capture or identify the special shading on NFS lands. Peters Mountain should be shown and labelled as Peters Mountain Wilderness on the map and in the legend. The western boundary of Peters Mountain Wilderness is shown incorrectly – per the official Legislative Map, dated April 28, 2008, this portion of the wilderness boundary is officially a 100' offset from the centerline of Forest Road 11080.
- Figure 1.11-2 –the legend does not capture the special shading on NFS lands. Brush Mountain should be shown as Brush Mountain Wilderness on the map and in the legend. The southern boundary of Brush Mountain Wilderness, as shown on the official legislative map dated May 5, 2008 appears to be accurate as shown.
- In Figure 1.11-1, on topo sheet 36, on alignment sheets 215 and 216, in Resource Report-8 pages 8-39 and 8-40, the depiction of the conventional bore location of the proposed pipeline contradicts the statement on Resource Report -1 page 1-66, and elsewhere in the Resource Reports, that the conventional bore underneath the Appalachian National Scenic Trail will result in no surface disturbance within 100 feet of the trail. The dogleg in the depictions is significantly closer than 100' to the ANST. It is important that this measurement be to the closest point of the ANST, not necessarily the point where the bore hole passes under the ANST.
- The description of management prescription 4A (Appalachian National Scenic Trail Corridor) in the 2004 FLRMP defines the corridor as the mapped visual foreground zone visible from the footpath, and lists an absolute minimum distance of 100 feet for protection from social, aural, and other impacts. The proponents should be responsible for mapping that location accurately in the area of their proposed activity. All activities within MRx4A should protect the ANST experience. The proponents do not show anywhere in the Resource Reports a need to conduct any surface disturbance within 4A, or why the proposed conventional bore cannot be significantly more distant from the ANST than shown, keeping it outside of the ANST management prescription, and eliminating the need for a Forest Plan amendment for the purpose of changing the ANST management prescription.
- Throughout all the Resource Reports and supporting documents, the proponents state that there will be no access roads, and no ATWS anywhere on NFS lands. It is not clear whether the northern/western bore pit for the proposed conventional bore under the ANST will be on NFS lands or private lands. It appears clear that the southern/eastern bore pit will be on NFS lands. There are no access roads or ATWS shown or described or quantified to access this bore pit. Please identify whether access roads or ATWS are planned on NFS lands in this area.

Please note that the Forest Service has not agreed to the proposed crossing of the ANST, nor the placement of the bore pits, nor the length of the bored section of the proposal. Please see the Forest Service's letter filed with FERC on September 17, 2015 identifying the Forest Service's concerns about the proposed crossing of the ANST and recommending further consultation regarding the proposed crossing.

Please develop and submit a contingency plan for crossing the ANST in the event that the bore is unsuccessful.

Evacuation Distance for Natural Gas Pipeline Leaks and Ruptures based on Blast Radius

Based on the diameter of the pipe and the pressure of the gas contained in the pipe, identify the evacuation feet in distance.

Identify the possible causes of an unanticipated explosion of the pipeline.

Please identify the distance from the proposed pipeline to each facility potentially used by forest users and Forest Personnel on NFS lands.

Discuss the potential effects of an unanticipated explosion on the following:

- sensitive resources in the area;
- forest facilities, forest users, and Forest personnel; and

- the potential for wildfires on NFS lands.

Groundwater Protection

Also identify the measures that would be implemented to protect groundwater from potential contamination as a result of the project. The Forest Service has received comments from stakeholders who have cited chemical spill(s) in the news resulting in effects on water district(s) and landowners' wells and springs. Please identify the project-related sources of potential groundwater contamination that could affect users of water from wells and springs in the watershed.

COMMENTS ON RESOURCE REPORTS AND PLANS

RR# Or Plan Name	Page #	Section #	Comment
1	1-1	1.1.2	The purpose and need described in this section should be expanded to include a discussion of the necessity to cross Federal lands, in particularly National Forest System lands. Forest Service Manual 2700, Special Uses Management (FSM 2700), §2703.2 describes Forest Service policy relating to the use of National Forest System lands (NFS). §2703.2(2) states to authorize use of NFS lands only if: a) the proposed use is consistent with the mission of the Forest Service to manage NFS lands and resources in a manner that will best meet the present and future needs of the American people; b) the proposed use cannot reasonably be accommodated on non-NFS lands. §2703.2(3) goes on to state not to authorize the use of NFS lands solely because it affords the applicant a lower cost or less restrictive location when compared to non-NFS lands. Therefore, in MVP's discussion, they should clearly articulate why the project cannot reasonably be accommodated off NFS lands. This discussion should not cite lower costs or less restrictive locations as the sole purpose of crossing NFS lands.
1	1-23	1.4.3	This section of the report should have a statement that all restoration activities located on NFS lands shall be completed to accepted federal, state, and local Best Management Practices (BMP's) and to the satisfaction of the Forest officer(s) in charge. In addition, as-built drawings of the segments crossing NFS lands will be provided to the Forest Service and all National Forest boundaries disturbed or damaged within the project area will be re-established upon completion of installing the pipe and establishing the right-of-way corridor.
1	1-66, more	1.11	The Project Description within the Jefferson National Forest is very vague and needs additional specificity and details. Table 1.11-1 should include column totals. JNF is managed under many additional specific regulations and policies than solely the 2004 FLRMP. The length of the MVP proposal crossing on NFS lands as listed in section 1.11 and as shown on Figures 1.11-1 and 1.11-2 conflict with Alignment Sheets 215, 216, second 216 – which appears to be mis-numbered and should be 217 - and 218. Per the alignment sheets, portions of NFS lands past MP 196.9 are clearly impacted.
1	1-66, more	1.11	Figure 1.11-2 shows the proposed pipeline crossing Craig Creek twice on NFS lands, after its initial crossing of Craig Creek on private land to the west. Alignment sheet 240 appears to show the actual pipeline crossing Craig Creek a total of 5 times – 3 on private land and 2 on NFS lands. Four of these crossings are not necessary and highly impactive on water and aquatics. In addition, the discrepancy leads to questions of which version to consider accurate, and leads reviewers to question the level of critical analysis which was dedicated to developing these "final" products.
1		Figure 1.11-2	This map appears to show MVP proposing to cross Craig Creek three times within a 0.75 mile length of valley bottom. Two crossings very close together on NFS lands as the proposed route takes two very sharp turns within a short distance. This appears to be an unnecessary zig-zag in the line location where one crossing would be sufficient. This extensive work in and near the riparian area and stream channel will increase soil compaction and stream sedimentation probabilities, quantities and areal extent. Please include an alternative that would reduce the number of crossings.
Multiple	Multiple	Multiple	It appears that significant materials, including viewshed analyses and maps, have been left out of this comprehensive package of "final" Resource Reports. The proponent should re-review this entire package to ensure completeness.
App 1B	36 & 40		The Congressionally designated Wildernesses are not included on the topo maps. The proximity of the proposed pipeline to Wildernesses is important information to consider with regards to the proposed alignment. The potential concern is for noise during construction that would impact the experience and values being sought by visitors to Wilderness and for scenery viewing from the Wilderness during construction and during the life of operations. This can be resolved by adding the Peters Mountain Wilderness and Brush Mountain Wilderness boundaries to the topo sheets.

RR# Or Plan Name	Page #	Section #	Comment
RR1, Giles Co. Align-ment Sheets 1	2		The aerial photography imagery that helps indicate the land use is clear in some areas and not clear or non-existent in others. An example is sheet 2 of Giles County Alignment Sheets 1. Is satellite imagery available for these portions of the sheets where aerial photography is unavailable or of poor quality making land uses difficult to ascertain?
RR1 Alignme nt Sheets	All	Legend	The legend includes items that are not described in Resource Report 1. The following symbols that appear on the legend should be clarified as whether they are proposed as part of the pipeline facilities and if so described and their purpose/need stated in Resource Report 1. If the symbols indicate existing features, then clarification is needed as to whether they will be removed as part of the proposal or are anticipated to remain. These items include but may not be limited to Mailbox, PI Symbol, Test Station, Line Marker-Vent Pipe, and Tank.
1	1.5.1	Table 1.5-1	The inspection/patrol intervals need clarification. Instead of "7.5 months but at least twice per year" should it read "7.5 months but at least twice per *calendar* year"? And instead of "15 months but at least once per year" should it read "15 months but at least once per *calendar* year"?
1	1.10	1-52 to 1-53 and Table 1.10-1	The guidelines for past, present and future projects included in the Cumulative Affects analyses is insufficient for considering potential impacts on scenery and related socio-economics. A broader scale analyses is needed for the long-term, cumulative impacts on driving for pleasure and tourism. Tourists drive to enjoy the scenery, particularly for viewing the mountains, along U.S. 11, U.S. 460, Route 42, I-81, and other "through roads" of Virginia. The steady increase in the number and/or size of communication towers, electric transmission lines, gas transmission lines, etc., as viewed during a multiple hour drive through the mountains has the potential to negatively impact the visitors' experience and tourism. The National Visitor Use Monitoring Report for the Fiscal Year 2011 visitor surveys that occurred on the GWJeff indicates that about 20% of the national forest visitors traveled 100 miles or more to get to the national forest location where they were surveyed (more than half of those actually travelled more than 200 miles). The top recreation activities of those surveyed, in order, were hiking/ walking, fishing, bicycling, viewing scenery and hunting. These five accounted for almost 2/3 of all national forest visits. [1] Table 1.10-1 should include all maintained corridors on the national forests that are visible[2] from major highways, interstates, the Appalachian National Scenic Trail, the Blue Ridge Parkway, and designated State and Forest Service Byways within at least 70 miles (roughly 1.5 hours drive at an average of about 45 m.p.h.) along these same travel routes. Visible corridors to add to the analyses should include electric transmission lines, communications lines (overhead and underground), pipelines, major transportation projects with maintained corridor widths of 40 feet or greater.
1	1-61-62	1.10	Section titled *Vegetation, Wildlife and Habitat, and Aquatic Resources* is very general, incomplete, and needs to include a more thorough cumulative effects analysis by alternative.
1	1-63	1-10 Visual Resources	The description of potential impacts on scenery is insufficient in that it doesn't provide a discussion about the changes in color, line, form or texture. These are the basic visual elements for determining the degree to which the characteristic landscape of the national forest will be potentially changed by a proposed project. There is an emphasis on above-ground facilities, and not enough detail about the potential impacts to scenery where there are no above-ground facilities. This section should discuss the intrinsic value of the various land-use categories and the potential changes in scenery that would result if the pipeline is constructed and operated, with references to changes (contrasts created) in the characteristic landscape, particularly the mountainous, forested land use type.
1	1-61	1.10	There is a one paragraph general discussion on cumulative effects to surface water, and one paragraph on groundwater resources, but no quantitative discussion of pipeline effects in relation to other actions as outlined in Table 1.10-1.
1	1-62	1.10	The section titled *Vegetation, Wildlife and Habitat, and Aquatic Resources* does not mention anything about aquatic resources.

[1] "USDA Visitor Use Report", George Washington-Jefferson NF, USDA Forest Service Region 8, National Visitor Use Monitoring Data Collected FY 2011.

[2] Landscape visibility elements and the process for inventorying/categorizing and mapping visible landscapes are defined in "Landscape Aesthetics: A Handbook for Scenery Management," USDA Forest Service Agriculture Handbook Number 701.

RR# Or Plan Name	Page #	Section #	Comment
1		1-B	Each map should reference USGS quadrangle names.
1		1-C	Typical drawings need to include cross section details for steep slopes.
1		1-G	*Project-Specific Erosion and Sediment Control Plan* is absent from the report.
1		1-H	The *Fire Prevention and Suppression Plan* needs to include a section about prescribed fires on NFS lands. The Forest Service often employs prescribed fire as a tool for hazardous fuels reduction and landscape habitat and vegetation treatments. MVP needs to discuss what, if any, effect prescribed fire would have on pipeline facilities or the right-of-way and what restrictions, if any, within or near the pipeline right-of-way might be required for Forest Service prescribed fire planning. For example, are there critical facilities such as valves, stems, signs, etc. associated with the pipeline that would need to be considered in planning for prescribed fire operations?
2	2-22	2.1.4	Applicant states "Impacts will be minimized or avoided by implementation of the construction practices outlined in the FERC Plan and Procedures and as described in the mitigation measures detailed below." Needs supporting independent research citation to back up this statement or remove it. Simply stating that mitigations are effective is not sufficient.
2	2-23	2.1.4.1	Applicant states "Impacts will be minimized or avoided by implementation of the construction practices outlined in the FERC Plan and Procedures and in this section." Needs supporting independent research citation to back up this statement or remove it. Simply stating that mitigations are effective is not sufficient.
2	2-23	2.1.4.1	Applicant states "A depth of 10 feet is above most surficial aquifers utilized as a water source and most existing wells that might be drilled in a shallow aquifer will be cased to at least 20 feet." Please provide citation for the source of this information and explain how this relates to project-related disturbance.
2	2-26	2.1.4.2	Applicant states: "Use of controlled blasting techniques should avoid the impacts of blasting and limit rock fracture to the immediate vicinity of detonation along the trench line, and contain impact to within the construction right-of-way." Provide credible citation of this limited area of effect from controlled blasting. A statement like this, which can be interpreted as a mitigation of the project's effects, must be supported by credible evidence.
			Applicant makes the following statement: "The Project will comply with 10 CFR 1022 with no significant loss of flood storage as above ground facilities will displace approximately 1 acres within 100-year flood zones, therefore a floodplain assessment is not necessary." There is no evidence of the project complying with 10 CFR 1022 or that a floodplain assessment is not necessary. A reading of the CFR finds no exceptions for size as the applicant implies in the statement. The conditions necessitating floodplain assessment appear to be contained in § 1022.5 of 10 CFR Parts A through E of the code. These list exceptions to the floodplain assessment that include among others: routine maintenance of existing structures ((d) (1)); site characterization, environmental monitoring, or environmental research activities ((d) (2)); and minor modification of an existing facility or structure in a floodplain or wetland to improve safety or environmental conditions ((d) (3)). Outside of these very narrow circumstances, it appears that the Department of Energy has the authority to decide the necessity of floodplain assessments. The applicant should explain how the proposed facilities meet the exemptions from 10 CFR 1022 or submit the proposal to the appropriate regulating body for a ruling regarding the necessity of a floodplain assessment.
2	2-51	2.2.3	Applicant proposes withdrawing millions of gallons of water from streams and discharging them at separate locations. For all withdrawals and discharges on the Jefferson National Forest, the project must comply with Forestwide Standards 3 and 4: FW-3: Prior to authorizing or re-authorizing new or existing diversions of water from streams or lakes, determine the instream flow or lake level needs sufficient to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values. FW-4: Water is not diverted from streams (perennial or intermittent) or lakes when an instream flow needs or water level assessment indicates the diversion would adversely affect protection of stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values. Please identify all withdrawals that occur either on or have the potential to effect National Forest Lands (upstream or downstream) and conduct an instream flow analysis for all the beneficial uses as identified in these standards. Simply stating that these withdrawals do not occur on or upstream of the NF is not sufficient. Withdrawals upstream of the NF could decrease flows and have a negative effect on the NF. Withdrawals downstream could lower the water table and cause dewatering of the

RR# Or Plan Name	Page #	Section #	Comment
			streams on the NF and have a negative effect. Analysis should include a calculation of the minimum flows to sustain a healthy beneficial use and the demonstration that the proposed removals will not dip below these thresholds.
2	2-51	2.2.4	Applicant states "While it is not possible to know how much water would be needed for dust suppression on the pipeline construction right-of-way, during dry seasons, MVP estimates that there would be approximately five 1,000-gallon water trucks per construction spread on a given day." The complete lack of an estimate of the water use for dust suppression is unacceptable because it precludes any credible analysis. A credible estimate of ALL water uses, including those for dust suppression, must be made and this amount must be used for the analysis of the effects of water withdrawal on beneficial uses. The cumulative effect of all water withdrawals must be analyzed for all beneficial uses.
2	2-51	2.2.4	The report states that "While it is not possible to know how much water would be needed for dust suppression on the pipeline construction right-of-way, during dry seasons, MVP estimates that there would be approximately five 1,000-gallon water trucks per construction spread on a given day. MVP anticipates using 11 construction spreads, which would total 55,000 gallons for 55 water trucks per day". However, it does not specify where the water will be withdrawn from. This information needs to be provided and evaluated within a watershed water-use context. Water will be withdrawn at a time of the year (dry season) when streams already have a low flow, additional withdrawal could impact water quality and aquatic organisms. An instream minimum flow analysis needs to be done and effects analyzed when withdrawal is proposed, so that in informed decision can be made.
2	2-51	2.2.5	Applicant states "ATWS will be located at least 50 feet away from the water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land or as noted with a site specific explanation of the conditions." ATWS locations must comply with the Jefferson Forest Plan (see Riparian Corridors pp 3-178 through 3-187). Ground disturbance is not permitted for these purposes within the core riparian area for all stream types or in a slope adjusted no-equipment zone around intermittent and perennial streams and wetlands. Set-backs could vary up to 150 feet by stream type and side slopes in the immediate area and must comply with the Jefferson Forest Plan.
2	2-51	2.2.5	Applicant states "However, there are 5 locations where the pipeline route parallels a waterbody within 15 feet as listed in Table 2-A-4 in Appendix 2A." It appears that Table 2-A-4 does not exist in Appendix 2-4-A or any of the other submitted appendices. Also, paralleling waterbodies within 15 feet will not be allowed on the NF. No substantial parallel routes within the riparian corridor will be allowed on the NF.
2	2-52	2.2.5	Applicant states "There are no liquids in the pipeline that would be released to groundwater or surface water in the unlikely event of a leak." There is an abundance of evidence that condensates of water and organics occur in natural gas transmission pipelines. Please identify all condensates that could form in the proposed pipeline and be released accidentally by a leak. Discuss the potential effects of a release of condensates.
2	2-56	2.2.5	Applicant discusses "temporary impacts" to streams, mentioning only turbidity. Please identify all short term impacts. Also, no mention of effects to long-term stream hydrology is made. Blasting could affect stream hydrology permanently by fracturing aquifers or damaging perched water tables. It could also directly and indirectly affect fish and macroinvertebrates. Please provide a full discussion of blasting effects supported by independent scientific research.
2	2-51	2.2.5	Text states that ATWS will be 50 feet from water's edge. The JNF LRMP requires all ground disturbing activities be at least 100 feet from perennial streams; this distance increases with slope. There are likewise set-back distances for ground disturbing activities for intermittent and ephemeral streams, seeps, springs, and lakes. See Tables A1 and A2 in Appendix A in the Forest Plan for required distances from water bodies.
2	2-52 to 2-53	2.2.8	There is a general discussion on *Impacts to Waterbodies from Crossings and Mitigation Measures* in this section; however there has been no site specific analysis of potential impacts to waterbodies or aquatic biota. There has not been a sediment analysis done on the pipeline, access roads, or staging areas, therefore there is not quantitative data with which to do an effects analysis or alternative comparison. A sediment analysis should be completed to determine the potential amount of sediment delivered to the stream systems and subsequent effect on fisheries, and downstream mussels.
2	2-52 to 2-53	2.2.8	The open cut methods as described in this section is proposed for the crossings on National Forest, including 2 crossings of Craig Creek 0.1 miles apart on National Forest (RR3, page 3-58). The report states that temporary sediment barriers will be installed within 24 hours of completing instream activities. The sediment barriers should be concurrent with activities, not after completion of

RR# Or Plan Name	Page #	Section #	Comment
			activities. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. A more thorough analysis of impacts from these crossings needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored.
2	2-52 to 2-53	2.2.8	The open cut methods as described in this section is proposed for the crossings on National Forest, including 2 crossings of Craig Creek 0.1 miles apart on National Forest (RR3, page 3-58). The report states that temporary sediment barriers will be installed within 24 hours of completing instream activities. The sediment barriers should be concurrent with activities, not after completion of activities. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. A more thorough analysis of impacts from these crossings needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored. This segment was reviewed in the field, and is considered unacceptable given impact to stream, riparian, and aquatic resources. The line as staked, parallels the stream entirely too close and for too long of a distant. Consider the turn to the east being on top of Brush Mountain, rather in the Craig Creek bottom, or realign the entire crossing of Craig Creek.
2	2-54 to 2-55	2.2.8	There is a general discussion on *Impacts to Waterbodies from Turbidity and Sediment Runoff and Mitigation Measures* in this section; however there has been no site specific analysis of potential impacts to waterbodies or aquatic biota. There has not been a sediment analysis done on the pipeline, access roads, or staging areas, therefore there is not quantitative data with which to do an analysis. A sediment analysis should be completed to determine the potential amount of sediment delivered to the stream systems and subsequent effect on fisheries, and downstream mussels. Three pipeline open-cut stream crossings and ¼ mile of access roads, including a road crossing, are all proposed within a ½ mile reach of Craig Creek, in part, on National Forest. One of the pipeline crossings is proposed as downslope with a winch construction method (Figure 1.11-2), meaning it is at the base of a very steep slope. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. A more thorough analysis of potential sedimentation and effects needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored.
2	2-55	2.2.8	Report states: "To minimize and/or mitigate potential impacts from pipeline construction and disturbance from other facilities, MVP will implement the FERC Plan and Procedures and our E&SCP, specifically with respect to erosion and sedimentation control, bank stabilization, and bank revegetation, which will minimize impacts related to turbidity and sediment transport into adjacent waterbodies." Recent experience with pipelines on the Forest has shown that frequent E&S inspection and maintenance is necessary to help control off-site erosion. Site specific monitoring and mitigation plans will be necessary to adequately address effects, since just stating that impacts will be minimized or mitigate does not quantify the effects.
2	2-58	2.2.8	There is a general discussion on *Impacts to Waterbodies from Rock Blasting and Mitigation Measures* in this section; however there has been no site specific analysis of potential impacts to waterbodies or aquatic biota. The text states that impacts could include increased sediment load and injury from shock wave. One of the pipeline crossings with shallow bedrock is on Craig Creek on National Forest land (table 2.2-11) and is also proposed as downslope with a winch construction method (Figure 1.11-2). Further site specific analysis of effects needs to be done for adequate evaluation and decision.
2	2-61	2.3	Applicant states "A Nationwide Permit application will be submitted to the Norfolk District USACE for work in the Waters of the United States (including wetlands) within Virginia." All permits to be submitted to the USACE that propose the destruction or modification of wetlands on NF lands shall be submitted to the FS before submission to the USACE. Mitigation for wetlands destroyed by the construction of this pipeline should be assumed to be in-kind mitigation at a minimum of 2:1.
2	2-71	2.3.4	The applicant states "ATWS areas will, to the extent practicable, be located in upland areas a minimum of 50 feet from the wetland edge. In most instances our ATWS is located beyond 50 feet of the wetland. However, there are locations where MVP has located ATWS within 50 feet of the wetland due to topography or other constraints."

RR# Or Plan Name	Page #	Section #	Comment
			The Jefferson Forest Plan assigns the same protection to wetlands as it does to perennial streams. Ground disturbance will not be allowed within the 100 foot core area or the slope adjusted area beyond.
2	2-72	2.4	This discussion specific to the Jefferson National Forest and list of waterbodies crossed does not include a site specific analysis of sediment and erosion potential. According to Table 2.4-1 there are 11 permanent access road stream crossings, 3 permanent pipeline stream crossings, and 15 temporary access road or workspace crossings within the riparian corridor. Several of the roads are Forest Service roads as identified in Appendix 2-C-6, however, they are not indicated as such in the access roads table in Appendix 1F. An accurate and complete picture of the project needs to be generated and a more thorough analysis of potential sedimentation and effects needs to be done so that an informed decision can be made.
2	2-72	2.4	The determination that there will be no water contamination from long term operation and maintenance is unsupported by quantitative analysis of potential sedimentation or other adverse effects, or relevant literature. There was not a readily accessible discussion on acres of exposed soil and miles of road construction/reconstruction, broken down by slope, soil type, and time of the year/length of exposure. These are all things that are necessary when determining the timing and magnitude of effects to aquatic resources.
3	3.2.11 3.2.10 Appendix 3C	3-23 - 24	We commend the desire to restore "The areas disturbed by construction…to their original grades, condition and use or better, to the greatest extent practicable" (para. 4, page 3-23). However, it appears from para. 3, page 3-24 that vegetative restoration in the temporary construction zone will rely on "Natural revegetation of shrub and forest cover types… to take significantly longer, with some saplings and nurse trees established within 5 to 10 years, and tree cover then continuing through natural succession of the forest type". Given the age, size, and condition of many of the upland sites coupled with the level of disturbance expected, natural regeneration to current vegetation cover types, is unlikely in most situations. The oak species, which dominate the impacted areas, do not readily regenerate from seed on disturbed sites. Oak is an advanced growth dependent species. Natural regeneration certainly does occur, but this most often occurs from a combination of stump sprouts and existing established seedlings that have germinated and developed in the understory over decades (advanced regeneration). Given the level of disturbance in the temporary construction zones, it is highly unlikely that the Oak Forest Community Types would naturally regenerate to eventually achieve their "original condition and use or better". A logical impact of this proposal is the conversion of Oak Forest Community Types to grass and herbaceous in the permanent ROW and Mixed-Mesophytic Forest (mesic sites), red maple (no real Community Type here, just a Dry Mesic Oak without the Oak on dry sites), to Xeric Pine and Pine Oak (again without the oaks most likely on xeric sites) in the temporary construction zones. The acreages of these expected conversions and loss of hard mast producing habitat (e.g. oaks) should be disclosed in the EIS Of course non-native invasive plants are also very likely candidates to revegetate all disturbed areas as recognized in section 3.2.10 and Appendix 3C. We appreciate the emphasis on prevention and monitoring described in Appendix 3C relating to NNIS. However, we question the reluctance to utilize herbicides, especially with regards to woody invasive species (e.g. ailanthus, paulownia, autumn olive, multiflora rose). Hand pulling and/or cutting (Appendix 3C) will not "eradicate" these species. Herbicides have proven to be the safest, most inexpensive, and most effective method of control for species like this. We suggest that MVP recognize the role that herbicide control of invasive species will most assuredly play and to analyze the effects of herbicide treatment in the EIS. The chemicals likely to be used should be identified and the impacts disclosed in the EIS. Herbicides used on the NFS lands must have an appropriate risk assessment on which the disclosure of effects is based. We strongly suggest that MVP adhere to herbicides and application rates for which risk assessments have already been completed (http://www.fs.fed.us/foresthealth/pesticide/risk.shtml). Incorporating a thorough discussion of the use of chemicals and disclosure of impacts relating to those applications in the EIS will allow a decision on the use of herbicides to control NNIS to be made now, rather than creating the need for yet another analysis and decision later when the inevitable need arises.
Through-out	Through-out	Through-out	Deficiency: There is no sediment analysis for comparison of effects described or performed in the document. For purposes of analysis and assessment of impacts, the applicant should use a sediment modeling program that includes the delivery estimates of sediment to streams through evaluation of the following variables at a minimum: a. Proposed disturbance area: including the disturbed area of the pipeline corridor, access roads, staging areas, and any other ground disturbance associated with the installation

RR# Or Plan Name	Page #	Section #	Comment
			and maintenance of the pipeline and associated facilities. Any sedimentation from illegal use by ATV's, horses, vehicles, or other unauthorized activities that are possible as a direct result of the pipeline construction should also be estimated and modelled. The decision to include these activities in monitoring should be based on the existing legal and illegal uses of FS and adjacent lands in the immediate vicinity. b. Slope (both the slope of the disturbed surface and the side slope in the vicinity of the proposed disturbance) c. Soil type (to include the fine fraction of the soil) d. Distance to a sediment delivering channel (for the FS, this is equivalent to the flow path that begins at an 11-acre watershed The analysis should estimate the amount of sediment delivered to the channel (generally expressed in tons), and the fate and impact of that sediment in the context of the natural background sediment of the watershed. Discussions of sediment impacts should be related to the beneficial use of the waterbody and should quantify the amount of sediment produced by the proposed action and its effects on the stream habitat. The analysis should be performed in sufficient detail so that FS specialists can evaluate the impacts to Threatened, Endangered, and the Regional Forester's Sensitive Species (TES) and the stream health. Sufficient stream habitat information should be collected to assess these impacts. These should one or more of the following: pebble counts or other physical habitat assessments, benthic macroinvertebrates monitoring, stream chemistry and turbidity. Selection of the appropriate assessment and monitoring strategy should be coordinated in advance with a FS specialist. Cumulative effects of associated activities and pipeline construction on private property in the analyzed watersheds, past activities, and anticipated future activities in the modeled watersheds on public and private property must be considered and included in the estimated disturbance as is appropriate. Without sediment analysis, no credible statement of impacts or comparison of impacts can be made by the applicant. The FS requires that sediment analysis be performed by the terms above at a minimum. Simply listing the anticipated impacts and promising to mitigate impacts is insufficient for the FS to make an informed and credible decision.
3	3-12	3.1.4.2	The statement that "Sediment-related impacts are generally temporary, lasting only during the period of active in-stream construction" does not take into account potential sediment impacts from upslope grubbing, trenching, grading during construction of pipeline corridor and access roads. Impacts from these activities need to be quantitatively evaluated via sediment analysis and effects on water bodies and aquatic biota disclosed.
3	3-10	3.1.4	The statement that "no long-term effects on dissolved oxygen, pH, benthic invertebrates, or fish communities are expected to occur due to the construction or operation of the project facilities" is unsupported by quantitative analysis or relevant literature. This information is necessary for adequate evaluation and decision.
3	3-13	3.1.4.3	Text states that ATWS will be 50 feet from water's edge. As stated in FS comments, the Jefferson National Forest plan requires all ground disturbing activities be at least 100 feet from perennial streams; this distance increases with slope. This also should be applied when near a stream, and not necessarily just crossing it as specified in the response. See Tables A1 and A2 in Appendix A in the Forest Plan for required distances from water bodies.
3	3-13	3.1.4.3	The statement "Implementation of the FERC Plan and Procedures will minimize short and long-term water quality impacts within the waterbodies crossed by the proposed pipeline" is unsupported by quantitative analysis or relevant literature. This information is necessary for adequate review and decision.
3	3-24	3.2.11	The report recognizes the potential impacts to forested vegetation (primarily trees) adjacent to the ROW. However, we question the conclusion that such impacts are "anticipated to be minimal", especially considering the potential for stress on these adjacent trees to trigger an oak decline event that could potentially grow far beyond the edges of the ROW. Firstly, you state that trees can spread their root systems "up to 2.9 times beyond the dripline" based upon Gilman, 1988. Upon reading Gilman, we interpret this to mean 2.9 times the distance from the bole of the tree to the edge of the crown, or approximately 3 times live crown radius. Based on this "2.9" number you then conclude that because the trench will be located 37 feet away from the nearest standing tree "impacts are anticipated to be minimal". Based upon equations developed by Bechtold (Crown Diameter Prediction Models for 81 Species of Stand Grown Trees in the Eastern United States, Bechtold W. Southern Journal of Applied Forestry, Vol. 27, No. 4. Nov. 2003) an 18" chestnut oak would be predicted to have a crown width of 30'. The dripline would be approximately 15' and 3 times that dripline in the neighborhood of 45 feet. Thus it seems quite likely that the trench itself is likely to disturb roots of dominant trees located 37 feet away.

RR# Or Plan Name	Page #	Section #	Comment
			Secondly, digging of the trench is not the only source of impact to the roots of adjacent trees. Soil compaction from heavy equipment can also have a negative impact on tree roots. Such heavy equipment use in the construction zone directly adjacent to standing trees is likely. Such use would be expected to stress those trees. This stress to mature and overmature oak species (especially black and scarlet oaks) on marginal to poor sites will likely trigger oak decline (see Incidence and Impact of Oak Decline in Western Virginia, 1986. Oak, Steven W., Cindy M. Huber, Raymond M. Sheffield. Southeastern Forest Experiment Station Resource Bulletin SE-123). Please improve the effects disclosure with respect to indirect impacts to adjacent trees to be more realistic and include the impacts of compaction as well as trenching in the EIS. While a quantitative analysis of the potential for oak decline may be difficult, please qualitatively address the potential for triggering oak decline due to the proposed construction activities.
3	3-30-32	3.3.3	The section of *Migratory Birds* needs more detailed analysis of effects of proposed actions and is missing some high priority species known to occur in the proposed corridor alternatives. Despite previous comments submitted of the existence of a significant wintering golden eagle population in West Virginia, Virginia, and North Carolina, there is no mention of golden eagles or analysis of potential effects of proposed actions on wintering habitat or impacts to individual birds, as required by the Bald and Golden Eagle Act. Cerulean warblers have been documented along the Blue Ridge Parkway and associated slopes below the ridgelines as far south as Floyd County. Potential impacts of the proposed project on habitat on this species should include the area of the Parkway and Blue Ridge Mountains currently being proposed to cross. Potential impacts of this project on high priority migratory bird species should include all life cycles (breeding, post-breeding, migrating, wintering) for the species that utilize habitat along the proposed route, during the time periods they are there. As the golden eagle illustrates, the Appalachians and Piedmont provide important wintering habitat, as well as migratory corridors, for high priority species that may not breed in this area.
3	3-34	3.3.3	Thank you for proposing to partner with WHC for vegetation restoration, in particular considering native seed mixes for pollinators, incorporating Integrated Vegetation Management, and restoring a gradual transition of vegetation across the proposed corridor. Especially where the corridor proposes to cross mature forest, a gradual transition of vegetation to the actual pipeline location from each side will minimize a hard edge and help provide cover for species needing to travel across the proposed corridor.
3	3-34 through 3-55	3.4 and 3.5	The entire sections of *Endangered, Threatened, and Special Concerns Species*, and associated *Environmental Consequences on Jefferson National Forest Lands* are incomplete, as it does not describe direct, indirect, or cumulative effects of the proposed pipeline, by alternative, on described species found within the area. Please provide a complete analysis for review and decision.
3	3-43 through 3-56	3.4.3 and 3.5.2	T&E surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-54	3.4.5	The statement " the Project corridor has been determined to be unoccupied by state and federally listed species" is incorrect and confusing, based on information provided in other sections, for instance the survey information detailing a number of locations for the threatened northern long-eared bat. And based on statements that multiple surveys are incomplete and ongoing at the time of submission of what have identified as final resource reports.
3	3-55	3.5	The entire section of *Environmental Consequences on Jefferson National Forest Lands* is woefully inadequate since it does not describe direct, indirect, or cumulative effects of the pipeline on biotic resources found within the area. Please provide a complete analysis for review and decision.
3	3-55	3.5.1	The report provides recognition and inclusion of impacts to old growth communities. However, old growth may not necessarily be limited to just the 6C Mgmt. Rx. While we strive to maintain the accuracy of stand data, we are always refining this data through field surveys when we propose management activities that disturb vegetation. These field surveys are also used to address the operational definition of old growth in areas proposed for disturbance. We are prepared to work with MVP "to schedule the requested vegetation survey and site index measurement for the portions of the Project on USFS lands" as stated on page 3-56. Impacts to old growth should also include the permanent access road along the southeast flank of Peters Mountain.
3	3-56	3.5.2	T&E surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-56	3.5.1	The report discloses impacts in terms of acres by Major Forest Community types, as well as impacts to stands greater than 40 and 100 years old. This will provide the necessary specificity required to make an informed decision as it relates to forested vegetation. We do note, however, that this information is based on geospatial data. While we strive to maintain the accuracy of this data, we

RR# Or Plan Name	Page #	Section #	Comment
			are constantly refining this data through field surveys when we propose management activities that disturb vegetation. We are prepared to work with MVP "to schedule the requested vegetation survey and site index measurement for the portions of the Project on USFS lands" as stated on page 3-56.
3	3-57	3.5.3	Sensitive species surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.4	There is no discussion of proposed project and alternative effects to MIS or their habitat. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.5	An analysis of site-specific impacts on locally rare species and habitat, and comparison between alternatives, is necessary for adequate review and decision. Example from Table 3.5-4: Hellbender surveys within the project area are still ongoing.
3	3-57	3.5.3	Sensitive species surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.4	There is no discussion of proposed project and alternative effects to MIS or their habitat. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.5	An analysis of site-specific impacts on locally rare species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-58	3.5.7	The section on *Stream Crossings within National Forest Land* only discussed 3 pipeline stream crossings on NFS lands although there are additional waterbody crossings on Jefferson National Forest according to Table 2.4-1 (specifically, 29 including access roads and workspace). Of special concern are the 3 pipeline open-cut stream crossings and ¼ mile of access roads, including a road crossing, all proposed within a ½ mile reach of Craig Creek, in part, on NFS lands. One of the pipeline crossings is proposed as downslope with a winch construction method (Figure 1.11-2), meaning it is at the base of a very steep slope. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. Craig Creek has downstream Federally listed, FS Sensitive and locally rare aquatic species. Surveys are incomplete. It is also important to note that it is within the Chesapeake Bay watershed. A more thorough analysis of potential sedimentation and effects needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored.
6	6-1	6.1	Section 6.1 provides regional-scale geologic settings. In addition, the Resource Report needs to provide the geologic settings at a scale more relevant to the portions of the Jefferson National Forest (JNF) traversed by the MVP pipeline corridor. Section 6.7 JNF (page 6-49) begins to address the JNF geologic setting but needs more reference to and analysis of existing geologic information. This geologic setting specific to the JNF needs to consider and refer to published geologic reports and maps relevant to portions of JNF to be traversed by the project, such as: A.P. Schultz, C.B. Stanley, 2001. Geologic Map of the Virginia portion of the Lindside Quadrangle, Virginia Division of Mineral Resources Publication 160, 1:24,000-scale map. Schultz, A.P., Stanley, C.B., Gathright, T.M., II, Rader, E.K., Bartholomew, M.J., Lewis, S.E., and Evans, N.H., 1986, Geologic map of Giles County, Virginia: Virginia Division of Mineral Resources Publication 69, 1:50,000-scale map. Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Display the pipeline corridor (and any project facilities such as access roads) within the JNF surface ownership boundary overlaid on the most detailed scale published geologic maps available. The geologic setting specific to the JNF is more than just the geologic units listed by mileposts (Table 6.1-2; Appendix 6-A). Using the most detailed published geologic maps and reports available, the geologic setting needs to discuss the project within the context of geologic materials (lithologies and surface deposits), geologic structures (such as strike and dip of beds, joints, faults, and other discontinuities), geologic processes (such as landslides, floods, etc.), and geomorphic landforms (such as dip slopes, anti-dip slopes) relevant to the construction and operation of the project on the JNF. Based on the types of geology and level of detail in published sources, the geologic setting specific to

RR# Or Plan Name	Page #	Section #	Comment
			the JNF would provide an indication of the type and level of detail of geologic field investigations that may be needed to address the issues related to geologic resources and geologic hazards.
6	6-4	6.1.2	Section 6.1.2 Topography states: "Topography along the pipeline route varies from flat to slopes exceeding 45 percent…For topographic details along the MVP route, see the U.S. Geological Society (USGS) 7.5-minute series topographic quadrangle excerpts located in Resource Report 1". However, more slope information is need for the National Forest. Because slope steepness is so important in the analysis of the proposed pipeline, provide a detailed display and analysis of slopes on the National Forest relevant to the proposed pipeline. Quantify and classify the slope gradients on the JNF using the best DEM or elevation data available. Prepare a slope map covering the JNF pipeline corridor and the areas upslope and downslope of the corridor that are relevant to assessing 1) potential landslides (including debris flows) that may affect proposed facilities, 2) runout pathway for potential debris flows caused by cut slope or fill slope failures. Prepare similar slope map for areas of potential access road construction on JNF. The slope breaks used to classify slopes on the slope map should include slope breaks relevant to slope stability and/or used in project design. For example, one slope break should be the slope % at which cut-and-fill road construction would change to full bench road construction. Another example, a similar slope break should by the slope % at which cut-and-fill pipeline corridor construction would change to full bench construction. Other examples of slope breaks to include in slope map are the slope % used to determine major differences in types of pipeline corridor construction, such as: a) side hill excavation that is parallel or sub-parallel to slope contours; b) excavation that is perpendicular to slope contours and using winch lines; and c) excavation that is perpendicular to slope contours and not using winch lines. The slope map is also needed to assess slope stability of any proposed disposal sites for excess excavation (such as from full bench construction).
6	6-15	6.4	Comment on entire section 6.4. Geologic hazards are geologic processes or conditions (naturally occurring or altered by humans) that may create risks to public health and safety, infrastructure, and resources. Describe the affected environment of existing or potential geologic hazards that the MVP project may affect or be affected by on National Forest lands in a site-specific manner for each geologic hazard discussed in section 6.4.
6	6-17	6.4.1.2	Figure 6.4-1 Seismic Hazards map provides a regional setting. In addition, provide a more detailed map showing the Giles County Seismic Zone (GCSZ) and the Pembroke Fault Zone (PFZ) in relation to the JNF traversed by the pipeline corridor.
6	6-17	6.4.1.2	This Seismicity section states: "The PFZ is primarily known for being the epicenter of a strong May 31, 1897 earthquake that was subsequently characterized under modern standards of MM-VIII, magnitude 5.8." Since this is a known active earthquake zone, assess the potential for the zone to produce earthquakes with greater than magnitude 5.8 and greater than MM-VIII. Include discussion of magnitude 7 earthquake estimated by Bollinger (1988, 1981). Bollinger, G.A., Wheeler, R.L., 1988, The Giles County, Virginia, Seismic Zone Seismological Results and Geological Interpretations, U.S. Geological Survey Professional Paper 1355. Bollinger, G.A., 198l, The Giles County, Virginia, seismic zone Configuration and hazard assessment, *in* Beavers, J. E., ed., Earthquakes and earthquake engineering; The eastern United States: Knoxville, Tennessee, September 14-16,1981, Proceedings, v. 1: Ann Arbor Science, Ann Arbor, p. 277-308. Include discussion of magnitude 7.4 earthquake for Paleozoic extended terrane seismotectonic zone estimated by USGS: Petersen, M.D., et al, 2014, Documentation for the 2014 update of the United States national seismic hazard maps: U.S. Geological Survey Open-File Report 2014–1091, 243 p., *http://dx.doi.org/10.333/ofr2014109* Using the deaggregation tool in Petersen, M.D., et al, 2014, display the contribution of earthquakes of different magnitudes to the 0.14 g estimate for peak acceleration in PFZ.
6	6-17	6.4.1.2	Peak ground acceleration for the MVP pipeline crossing the JNF was estimated at 0.14 g in Figure 6.4-1 and Appendix 6-D Table 6.1 (Draper Aden Associates 2015c – Appendix 6-D). However, ridgetop amplification could increase this acceleration number by a factor of two or three times. Whisonant Watts, and Kastning (1991) state: "According to these data, the 1897 Pearisburg earthquake (M = 5.8) would have produced a seismic acceleration in the Sinking Creek Muntain area of approximately 0.12 G. Ridgetop amplification could have enhanced this number by a factor of two or three times along the crest of Sinking Creek Mountain (Bollinger, personal communication)." Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina.

RR# Or Plan Name	Page #	Section #	Comment
			The pipeline corridor crosses three ridgetops on JNF (Peters Mountain, Sinking Creek Mountain, and Brush Mountain). Assess the potential for ridgetop amplification to increase seismic acceleration by a factor of two, three or more times.
6	6-17	6.4.1.2	Peak ground acceleration for the MVP pipeline crossing the JNF was estimated at 0.14 g in Figure 6.4-1 and Appendix 6-D Table 6.1 (Draper Aden Associates 2015c – Appendix 6-D). The estimate is based on data from U.S. Geological Survey (Petersen et al, 2014). The USGS tool (Petersen et al, 2014) uses seismotectonic zone models. The zones cover vast areas of the eastern U.S. The Paleozoic extended terrane seismotectonic zone extends from Mississippi to Canada, and includes the Giles County seismic zone or PFZ. The Giles County Seismic Zone (GCSZ) or the Pembroke Fault Zone (PFZ), because it is a known active seismic area at a specific location along the MVP corridor, deserves additional, specific analysis beyond that provided by the seismotectonic zone models of Petersen et al (2014). For example, a detailed analysis of the Giles County Seismic Zone was provided by Bollinger in 1981 and 1988. Provide an updated analysis specific to Giles County Seismic Zone (GCSZ) or the Pembroke Fault Zone (PFZ). As part of the updated analysis, consider the more recent correlations of peak ground acceleration and modified Mercalli intensity. For example, Wald et al (1999; Table 1) provide for California earthquakes a range of ground motions for modified Mercalli intensities showing Peak Acceleration (% g) range of 34-65 for an MM intensity of VIII. Similar relationships are discussed in Worden et al (2012). Another example, Atkinson and Kaka, 2007 provide for Oklahoma earthquakes a Peak Acceleration (% g) range of 27 for an MM intensity of VIII. Dangkua and Cramer, 2011 provide similar relationships for modified Mercalli intensities and peak acceleration for eastern North America. The May 31, 1897 earthquake has been characterized as MM-VIII. Provide an estimate of the peak acceleration for the Giles County 1897 MM-VIII earthquake using Dangkua and Cramer, 2011 and other research as appropriate.
6	6-17	6.4.1.2	The May 31, 1897 earthquake with MM intensity of VIII has been characterized as a magnitude 5.8 earthquake. The GCSZ or PFZ is a known active seismic zone capable of generating earthquakes of magnitude 6 and 7. Draper Aden Associates 2015c report in Appendix 6-D states that the estimate 0.14 g is "expressed as a fraction of gravitational acceleration, g), with a 2 percent probability of occurring in 50 years (i.e., mean return period of approximately 2,500 years)". Return periods can be modeled and estimated for the GCSZ or PFZ, but the return periods are not known, and cannot be known without earthquake records for thousands of years for the GCSZ or PFZ. Moreover, earthquakes do not occur on regimented, clockwork return periods. Assuming for a moment a 2500 year return period for 0.14 g, it is possible for multiple earthquakes exceeding 0.14 g to occur within a 2500 year return period. The return periods for earthquakes are subject to the same misunderstandings as the return periods for floods. Some people living in a 100 year floodplain are surprised when multiple 100 year flood events occur, sometimes within a few years of each event. So, even assuming a 2500 year return period for 0.14 g, given the active GCSZ or PFZ seismic zone, one might also assume a case for multiple events exceeding .14 g within the 2500 year return period. In such a case, the probability of exceeding 0.14 g would be greater than a 2 percent probability of occurring in 50 years. More fundamentally, the relationships of MM Intensity to peak accelerations from some studies, such as Wald et al (1999) and Atkinson and Kaka (2007), suggest that earthquakes with MM intensity of VIII, in general and thus possibly including the May 31, 1897 earthquake, may have peak accelerations significantly greater than 0.14 g. The estimated magnitude 5.8 earthquake was within the magnitude 5 to 6 range of the more common earthquakes that the GCSZ or PFZ might generate compared with the less frequent, higher magnitude 6 or 7 earthquakes. The May 31, 1897 earthquake occurred just over 100 years ago and is in a known active seismic zone. In estimating peak acceleration to use for the MVP pipeline for the next 50 years, it would seem sensible and conservative to use an estimate at least as great as an estimate of the peak acceleration for the May 31, 1897 earthquake. Provide an estimate of the peak acceleration for the 1897 Giles County MM-VIII earthquake using Dangkua and Cramer, 2011 and other research on relationships of MM Intensity to peak accelerations as appropriate. Display median and ranges for peak ground acceleration for these estimates. In addition, as another approach, estimate the peak ground accelerations for a M5.8 as a function of distance using ground motion prediction equations (GMPEs) such as Toro, Abrahamson and Schneider (1997) and Tavakoli and Pezeshk (2005). Display median and ranges for peak ground acceleration for these estimates.

RR# Or Plan Name	Page #	Section #	Comment
			Compare the estimates from these other approaches with the estimate of 0.14 g. The estimates from these other approaches are needed to provide a check on whether the 0.14 g estimate is reasonable or not for the GCSZ or PFZ in light of the May 31, 1897 earthquake M 5.8 and MM intensity of VIII. Also, check on whether the 0.14 g estimate is reasonable or not for the GCSZ or PFZ in light of this following statement from page 6-44: "The effects of the 2011 magnitude 5.8 earthquake near Mineral, Virginia are being widely studied due to the proximity of the North Anna nuclear power station. The USGS estimated that the 2011 earthquake produced a peak ground acceleration of 0.26 g at the NAPS site." Wald, D. J., V. Quitoriano, T. H. Heaton, and H. Kanamori (1999). Relationships between peak ground acceleration, peak ground velocity and modified Mercalli intensity in California, Earthquake Spectra 15, 557–564. Worden, C.B., Grettenberger, M. C., Rhoades, D. A. and Wald, D. J. , 2012, Probabilistic Relationships between Ground-Motion Parameters and Modified Mercalli Intensity in California, Bulletin of the Seismological Society of America, Vol. 102, No. 1, pp. 204–221, February 2012, doi: 10.1785/0120110156 Atkinson, G.M. and I. Kaka, SL.I, 2007, Relationships between Felt Intensity and Instrumental Ground Motion in the Central United States and California, Bulletin of the Seismological Society of America, Vol. 97, No. 2, pp. 497–510, April 2007, doi: 10.1785/0120060154 Dangkua, D.T. and Cramer, C.H., 2011, Felt Intensity versus Instrumental Ground Motion: A Difference between California and Eastern North America?, Bulletin of the Seismological Society of America, Vol. 101 no. 4, p. 1847-1858 doi: 10.1785/0120100133 Toro, G.R., N.A. Abrahamson and J.F. Schneider (1997). A Model of Strong Ground Motions from Earthquakes in Central and Eastern North America: Best Estimates and Uncertainties. *Seismological Research Letters,* v.68, no. 1, pp. 41-57. Tavakoli, B and Pezeshk, S, 2005, Empirical-Stochastic Ground-Motion Prediction for Eastern North America, Bulletin of the Seismological Society of America, Vol. 95, No. 6, pp. 2283–2296, December 2005, doi: 10.1785/0120050030
6	6-17	6.4.1.2	In addition, assess the large rock block landslides on Sinking Creek Mountain as evidence for potentially much more powerful and destructive earthquakes than magnitude 5.8 and MM-VIII. The pipeline corridor traverses the JNF on the southeast flank of Sinking Creek Mountain. A series of large rock block slides extends for miles along the southeast flank of Sinking Creek Mountain (Schultz, A.P., 1993). Schultz (1993) states that the analysis shows that the rock block slides may have been emplaced as a single catastrophic event of short duration. Schultz and Southworth (1989) state: "The apparent clustering of large landslides near the Giles County, Virginia seismic zone suggests that seismic shaking may have been an important triggering mechanism." Whisonant, Watts, and Kastning (1991) did a study of landslides in the Giles County Seismic Zone (GCSZ) and identified landslides on Sinking Creek Mountain and elsewhere as landslides likely to be of seismic origin or to contain evidence of seismic events. Review and discuss the studies which have considered earthquakes as a triggering mechanism for the large rock block landslides on Sinking Creek Mountain, such as: Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Schultz, A.P., and Southworth, C.S., 1989, Large bedrock landslides of the Appalachian Valley and Ridge of Eastern North America, in Schultz, A.P., and Jibson, R.W. (eds.), Landslide processes of Eastern United States: Geological Society of America Special Paper 236, Chapter 4, p. 57-74. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina.

RR# Or Plan Name	Page #	Section #	Comment
6	6-19	6.4.1.3	This section on "Active Faults" is focused on active faults with known surface expression (surface faulting). However, there also are active faults with uncertain or no known surface expression. There are several issues for this "Active Faults" to consider. First, in the arid and semi-arid western U.S., the ground cracks and scarps of surface faulting produced by some earthquakes are relatively easy see in sparsely vegetated lands; and the evidence of surface faulting can be preserved on the land surface for long periods in the drier climate. In contrast, in the humid eastern U.S., the ground cracks and scarps of surface faulting that might be produced by some earthquakes would be more difficult to find in sparsely populated, and heavily vegetated mountains of western Virginia; and the evidence of surface faulting would be difficult to preserve on the land surface for long periods in the wetter climate. Consider changing title of section from "Active Faults" to a title such as "Surface rupture potential from faulting" or "Active surface faults" or "Active surface faults and rupture potential from surface faulting" in order to reflect the specific hazard addressed in this section. Assess potential for 1) surface faulting on known faults and 2) potential for new faulting to rupture the ground surface within the pipeline corridor (Collins, T.K., 1990, New Faulting and the Attenuation of Fault Displacement, Bulletin of the Association of Engineering Geologists, Vol. XXVII, No. 1, pp. 11-22). After the August 3, 2011 earthquake of magnitude 5.8 in Louisa, Virginia, geologists from the federal and state agencies were searching for evidence of surface faulting. No known surface faulting was associated with historic earthquakes in the Central Virginia Seismic Zone (CVSZ). Despite the lack of evidence of historic surface faulting in CVSZ, there was recognition that the August 3, 2011 earthquake of magnitude 5.8 might have produced surface faulting. If an earthquake of magnitude 5.8 like the 1897 earthquake were to occur again in Giles County, geologists from the federal and state agencies would be searching for evidence of surface faulting in the GCSZ or PFZ. The geologists would be conducting the kind of intense, scientific search that was not conducted in 1897. Thus, the potential for surface faulting is not a negligible hazard when one recognizes that every damaging earthquake generated by GCSZ or PFZ, such as the 1897 magnitude 5.8, would likely be followed by geological field investigations to see if surface faulting occurred. Moreover, if a damaging earthquake were to occur in the GCSZ or PFZ during the operation of the MVP pipeline, it is likely that MVP would inspect the pipeline to see if surface faulting occurred and displaced and damaged the pipeline. Such surface faulting may occur on preexisting faults or on new faults (Collins, 1990). The potential for surface faulting would be present for each damaging earthquake in the GCSZ or PFZ; the stronger and more damaging the earthquake, the more potential for surface faulting; and the pipeline would be a long, linear feature traversing the GCSZ or PFZ. In this sense, the risk of potential surface faulting to the pipeline in the GCSZ or PFZ ought not to be dismissd as a "negligible risk".
6	6-23	6.4.1.5	Describe historic accounts of landslides from the May 31, 1897 earthquake. It is important to find out as much as possible about these landslides because these types of landslides will likely be common with earthquakes of similar or greater magnitude. In addition, consider potential for landslides generated by earthquakes with epicenters outside the GCSZ or PFZ, such as described by Jibson and Harp, 2012. Jibson, R.W and Edwin L. Harp, E.L., 2012, Extraordinary Distance Limits of Landslides Triggered by the 2011 Mineral, Virginia, Earthquake, Bulletin of the Seismological Society of America, Vol. 102, No. 6, pp. –, December 2012, doi: 10.1785/0120120055
6	6-23	6.4.1.5	Identify the large rock block landslides on Sinking Creek Mountain. The pipeline corridor traverses the JNF on the southeast flank of Sinking Creek Mountain. A series of large rock block slides extends for miles along the southeast flank of Sinking Creek Mountain (Schultz, A.P., 1993). Schultz (1993) states that the analysis shows that the rock block slides may have been emplaced as a single catastrophic event of short duration. Schultz and Southworth (1989) state: "The apparent clustering of large landslides near the Giles County, Virginia seismic zone suggests that seismic shaking may have been an important triggering mechanism." Whisonant, Watts, and Kastning (1991) did a study of landslides in the Giles County Seismic Zone (GCSZ) and identified landslides on Sinking Creek Mountain and elsewhere as landslides likely to be of seismic origin or to contain evidence of seismic events. Review and discuss the studies which have considered earthquakes as a triggering mechanism for the large rock block landslides on Sinking Creek Mountain, such as:

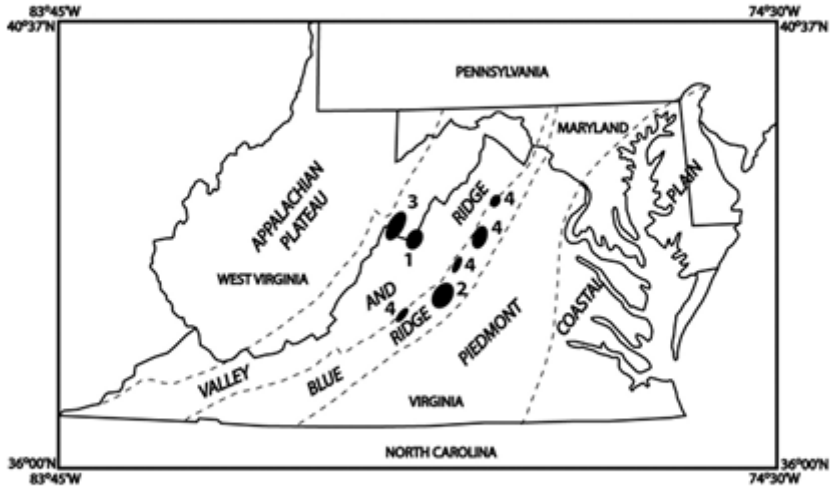
RR# Or Plan Name	Page #	Section #	Comment
			Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Schultz, A.P., and Southworth, C.S., 1989, Large bedrock landslides of the Appalachian Valley and Ridge of Eastern North America, in Schultz, A.P., and Jibson, R.W. (eds.), Landslide processes of Eastern United States: Geological Society of America Special Paper 236, Chapter 4, p. 57-74. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina.
6	6-32	6.4.3	This statement is incorrect: "Slope information along the Project is provided in Resource Report 1, Appendix 1-I". Correct statement to show that the slope information is in Appendix 1-J.
6	6-32	6.4.3.	This reference is incorrect: "Watt 1982". Watt was Secretary of Interior, not the author. Correct reference to show authors of Landslide Overview Map of the Conterminous United States.
6	6-34	6.4.3	The Landslide section states: "MVP has performed a preliminary inventory of potential areas of landslide or rockfall concern along the pipeline alignment. This was completed through review of available historic aerial photographs, soils, topographic data to identify indications of potential landslide hazards." The review does not mention a review of geology, which is required to inventory potential landslide or rockfall concerns along the pipeline corridor. Landslides are geologic hazards. Geology is the overarching discipline for considering landslides because geology encompasses not only soils and topography, but a host of surface and subsurface factors relevant to landslides, such as lithology, structure, climate, vegetation, groundwater, and a multitude of landslide type ranging from shallow slides to deep-seated landslides. Correct this deficiency of geologic information by providing a review of geologic setting on the JNF relevant to inventory of potential areas of landslides or rockfalls by a professional geologist or engineering geologist. Consider and refer to published geologic reports and maps relevant to portions of JNF to be traversed by the project, such as: A.P. Schultz, C.B. Stanley, 2001. Geologic Map of the Virginia portion of the Lindside Quadrangle, Virginia Division of Mineral Resources Publication 160, 1:24,000-scale map. Schultz, A.P., Stanley, C.B., Gathright, T.M., II, Rader, E.K., Bartholomew, M.J., Lewis, S.E., and Evans, N.H., 1986, Geologic map of Giles County, Virginia: Virginia Division of Mineral Resources Publication 69, 1:50,000-scale map. Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Display the pipeline corridor (and any project facilities such as access roads) within the JNF surface ownership boundary overlaid on the most detailed scale published geologic maps available. Identify the types of landslides mapped in the vicinity of the pipeline corridor. Based on existing information, discuss the geologic factors (such as lithology, surficial deposits, structure, discontinuities, etc.) relevant to potential landslides along the pipeline corridor on the JNF.
6	6-34	6.4.3	The Landslide section states: "Areas where the alignment crosses steep hill slopes are identified in Table 6.4-6, and Appendix 6-D.3 includes a map set depicting these areas. As shown in the table, the pipeline route traverses approximately 3.8 miles of steep hill slopes that of potential stability or landslide concern." The steep slopes on the JNF are not identified in Table 6.4-6, and Appendix 6-D.3. Identify the steep slopes on the JNF by milepost and slope (%).
6	6-36	6.4.3	The Slope (%) column in Table 6.4-6 has a footnote: "a/ Design slope is based on desktop and field review, or range from map analysis of alignment." Specify how the Slope (%) was calculated for the JNF portion of the pipeline corridor. Was Slope (%) calculated using 10 meter DEM or other basis. Define what Slope (%) is considered "steep" for Table 6.4-6, and Appendix 6-D.3.
6	6-37	6.4.3	The Landslide section of Resource Report 6 failed to recognize the largest known landslides in eastern North America on Sinking Creek Mountain. The pipeline corridor on the JNF crosses Sinking Creek Mountain which has the largest known landslides in eastern North America (Schultz and Southworth, 1989). The pipeline corridor on Sinking Creek Mountain (MP 217.2 – 218.0) traverses one of the large bedrock landslides mapped by Schultz (1993). The Landslide section of Resource Report 6 failed to identify this large bedrock landslide on a published geologic map (Schultz, 1993).

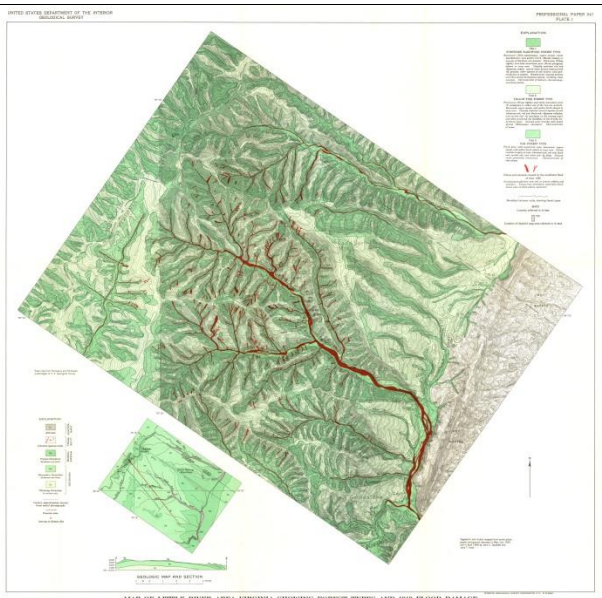
RR# Or Plan Name	Page #	Section #	Comment
			The failure of the Landslide section of Resource Report 6 to recognize an existing large bedrock landslide traversed by the pipeline corridor and the failure to assess the potential for large bedrock landslides in the pipeline traverse of Sinking Creek Mountain needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The pipeline corridor on the JNF crosses Peters Mountain which has some similarities (lithologies, structures, etc.) to Sinking Creek Mountain. The failure of Resource Report 6 to recognize and assess potential for large bedrock landslides (similar to the Sinking Creek Mountain landslides) in the pipeline traversing of Peters Mountain needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The pipeline corridor on the JNF crosses Peters Mountain, Sinking Creek Mountain, and Brush Mountain. These mountains have the potential for more frequent types of rockslides of lesser dimensions than the large bedrock landslides of Sinking Creek Mountain. The failure of Resource Report 6 to recognize and assess potential more ordinary types of rockslides in the pipeline traverse of Peters Mountain, Sinking Creek Mountain, and Brush Mountain needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The Landslide section of Resource Report 6 failed to assess the site-specific debris flows hazards for the pipeline corridor traversing the JNF on Peters Mountain, Sinking Creek Mountain, and Brush Mountain. For example, the pipeline corridor on Sinking Creek Mountain (MP 217.2 – 218.0) traverses a debris flow deposit mapped by Schultz (1993). The Landslide section of Resource Report 6 failed to identify the debris flow deposit on a published geologic map Schultz, 1993). The failure of the Landslide section of Resource Report 6 to recognize existing debris flow deposits traversed by the pipeline corridor and the failure to assess the potential for debris flows in the pipeline traverse of Sinking Creek Mountain, Peters Mountain and Brush Mountain, needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The Landslide section states: "MVP is in the process of conducting field observations at these steep hill slope sites of potential stability issues…These investigations are being conducted by a geotechnical engineer experienced with landslide evaluation." It is essential that investigations also need to be conducted by an engineering geologist (not just a geotechnical engineer) on steep slopes on JNF. An investigation by an engineering geologist is especially important because of the Resource Report 6 major deficiencies in geologic information relevant to potential landslides on JNF. For the JNF portions of the pipeline corridor, provide site-specific geologic maps of consolidated and unconsolidated deposits, and geologic structures, such as dip slopes and the orientation of bedrock discontinuities (bedding, joints, and other fractures). Consider the types of landslides relevant to the site-specific geology, such as debris slides, debris flows, slumps, rockfalls, and rockslides including the potential for large bedrock landslides on Sinking Creek Mountain and Peters Mountain. Conduct on-site engineering geologic investigation and mapping such as described by Keaton and DeGraff (1996): Keaton, J.R. and DeGraff, J.V., Surface Observation and Geologic Mapping, pp. 178-230 in Landslides Investigations and Mitigation, Special Report 247, Turner A.K. and Schuster R.L. editors, 1996, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., pp. 674. Identify existing slope stability conditions in the footprint and upslope and downslope of the footprint of the proposed facilities (such as existing landslides; streamside slopes subject to undermining by streams; geologic structures that may be adverse to slope stability such as dip slopes; existing or potential debris flow paths).
6	6-37	6.4.3	The Landslide section needs to consider and make reference to such sources of geologic information as: Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Schultz, A.P., Stanley, C.B., Gathright, T.M., II, Rader, E.K., Bartholomew, M.J., Lewis, S.E., and Evans, N.H., 1986, Geologic map of Giles County, Virginia: Virginia Division of Mineral Resources Publication 69. Schultz, A.P., Bartholomew, M.J., and Lewis, S.E., 1991, Surficial Geology of the Radford 30x60° quadrangle, Virginia and West Virginia: U.S. Geological Survey I Map 2170A.

RR# Or Plan Name	Page #	Section #	Comment
			Schultz, A.P., Miller, E.V., Bollinger, G.A., Gathright, T.M., Rader, E.K., and Hubbard, D.A., 1985, Geologic and seismic hazard potential, Giles County, Virginia, including a discussion and map of bedrock geology: Prepared by the Virginia Division of Mineral Resources; the Department of Geological Sciences, Virginia Polytechnic Institute and State University and the United States Geological Survey under contract #14-08-0001-A0076, 44 p., 2 maps at 1:50,000. Schultz, A.P., 1986, Ancient, giant rockslides, Sinking Creek Mountain, southern Appalachians, Virginia: Geology, v. 14, no. 1, p. 11-14. Southworth, C.S., and Schultz, A.P., 1986, Characteristics of giant rock-slides in the Appalachian Valley and Ridge, Virginia, West Virginia, Maryland, and Pennsylvania: U.S. Geological Survey Open-File Report 86-94, 4 p. with 3 oversized sheets. Southworth, C.S., and Schultz, A.P., 1986, Photogeologic interpretation reveals ancient, giant rockslides in Appalachian Valley and Ridge Province, Virginia and West Virginia, in Association of Engineering Geologists Newsletter, v. 29, no. 2, p. 31-33 and back cover. Schultz, A.P., 1987, Failure kinematics of ancient giant block slides and rock slumps, southern Appalachian Valley and Ridge Province, in Schultz, A.P., and Southworth, C.S. (eds.), Landslides of eastern North America: U.S. Geological Survey Circular 1008, p. 32-33. Schultz, A.P., and Southworth, C.S., 1989, Large bedrock landslides of the Appalachian Valley and Ridge of Eastern North America, in Schultz, A.P., and Jibson, R.W. (eds.), Landslide processes of Eastern United States: Geological Society of America Special Paper 236, Chapter 4, p. 57-74. Schultz, A.P. (ed. & compiler), 1989, Roadlog and site description for the 1989 Southeast Friends of the Pleistocene Field Excursion: surficial geology of the New River Valley, southwest Virginia: U.S. Geological Survey Open-File Report 89-635, 72 p. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 2 – Preliminary Investigation of Caves in the Giles County Seismic Zone Possibly Containing Evidence of Seismic Events. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina. Whisonant, R.C. and Watts, C.F., 1991. Comprehensive Stability Analysis of Ancient Giant Landslides, Valley and Ridge Province, (abs), In Proceedings of the 34th Annual Meeting of the Association of Engineering Geologists, Chicago, IL, pp 612-620.
6	6-37	6.4.3	The Landslide section states: "MVP is in the process of reviewing areas of potential slope stability issues. This information will be assessed and field evaluations completed. The impacts to the pipeline and vice versa, will be evaluated for each area identified and mitigation measures recommended. The recommendations will be included in the final pipeline design." The engineering geologic field evaluations and assessments of potential slope stability issues and "impacts to the pipeline, and vice versa" are needed for the Draft Environmental Impact Statement (DEIS), not just for final pipeline design. Provide field evaluations and assessments conducted by an engineering geologist on the JNF for the DEIS.
6	6-37	6.4.3	Describe the scope and magnitude of historic debris flows events, such as in: Plate 1 from Hack, J. T., and Goodlett, J. C., 1960, USGS Professional Paper 347.http://pubs.er.usgs.gov/publication/pp347 Morgan, B.A. et al., 1999, INVENTORY OF DEBRIS-FLOW AND FLOODS IN LOVINGSTON AND HORSESHOE MOUNTAIN, VA: 7.5 MINUTE QUADRANGLES FROM THE AUGUST 19/20, 1969 STORM IN NELSON COUNTY, VA, USGS OFR-99-518. http://geology.er.usgs.gov/eespteam/terrainmodeling/ofr99_518.htm Discuss the frequency of debris flow events, including the major debris flow events in Virginia and West Virginia from 1949 to 1996: Figure 1 from Eaton, L.S., Morgan, B. A.,Kochel, R.C. and Howard A.

RR# Or Plan Name	Page #	Section #	Comment
			D., 2003, Role of debris flows in long-term landscape denudation in the central Appalachians of Virginia, *Geology* 2003;31;339-342. http://geology.gsapubs.org/content/31/4/339.short Recognize that intense storms can occur outside the hurricane season as well as in hurricane season.
6	6-37	6.4.3	Describe any slope instabilities with existing pipelines in the mountainous areas of Virginia and West Virginia, such as the Celanese pipeline traverse of Peters Mountain. Provide details sufficient to characterize the factors involved so that the potential for similar slope instabilities can be assessed on the MVP project.
6	6-37	6.4	Add a section under Geologic Hazards titled "Floods and Other Stream Hazards" and describe the affected environment for floods, stream erosion and scour in a site specific manner for the MVP project on the Jefferson National Forest.
6	6-37	6.4	Add a section under Geologic Hazards titled "Acid-Producing Rocks" and describe whether acid-producing rocks (lithology) are present along the MVP project on the Jefferson National Forest.
6	6-31	6.6	In order to assess impacts on the Jefferson National Forest (JNF), the location and magnitude of the proposed slope modifications (excavations and fills) need to be identified in a site specific manner. Provide plans and typical drawings showing the dimensions of the slope modifications (cut and fill) for each type of MVP project footprint to be located on the JNF such as: Access roads to pipeline right-of-way (ROW) corridor (incudes new construction and reconstruction) Pipeline ROW excavation for trench (ditch). Pipeline ROW excavation for roads (travel area and working area) Pipeline ROW loose material from trench excavation (ditch spoil storage) Pipeline ROW topsoil (topsoil storage). Pipeline ROW loose material from construction road excavation (travel area and working area). Additional Temporary Workspace (ATWS). Contractor yards and equipment staging/storage areas. Disposal areas for excess excavation or other materials. For each type of footprint (such as listed above), state whether it will be or will not be located on the JNF.
6	6-39	6.6.1.2	Correct this statement: "These techniques and other best management practices are outlined in the typical construction drawings included in Appendix 1-D, Typical Construction Drawings, of Resource Report 1." The typical drawings are in Appendix 1-C1.
6	6-39	6.6.1.2	The construction typical drawings of mainline construction in Appendix 1C-1 are largely for flat land, and are not adequate for the steeper slopes typical of the National Forests. Provide construction typical drawings for the range of slopes gradients (%) requiring excavation on NFS lands, including a typical drawing for the maximum slopes (%) to be excavated in the construction right-of-way. Label the loose material from all excavations not just the trench excavation. While additional field information may refine the designs, MVP needs to provide, before or at the start of DEIS process, the typical drawings requested here and in related comments below; the slope and other information currently available should allow MVP to provide initial typical drawings with dimensions suitable for assessing the location and magnitude of construction on National Forests. Provide construction typical drawings with dimensions showing a cross-section of original slope and cut-and-fill for each slope class (in 10% increments) where cut-and-fill construction would occur on the National Forest. For example, if cut-and-fill construction is planned on slopes ranging from 10% to 78%, then provide a construction typical drawing for each of these construction slopes: 10%, 20%, 30%, 40%, 50%, 60%, 70%, and 80%. Provide in each typical drawing a cross-section showing the construction details from the top of the cut to the toe of the fill. Because the angle of the cut slope (or cut slope ratio such as 1:1, ¾:1, ½:1 or ¼:1) may vary depending on the geologic site conditions, the typical drawing may include a maximum and a minimum cut-slope to bracket the likely variation in cut-slope angles. Similarly the angle (or slope ratio) of fill slopes may vary, and so, the drawing may include a minimum and maximum fill-slope. Provide these typical drawings (at 10% slope intervals) for each of the three types of mainline construction techniques within the JNF as identified on Figures 1.11-1 and 1.11-2 (Resource Report 1) : 1) Typical Overland Construction, 2) Down Slope with Winch, 3) Down Slope without Winch.
6	6-39	6.6.1.2	The typical drawing for mainline construction on a ridge (Appendix 1-C1, Drawing No. MVP-8) in Resource Report 1 is inadequate and too generalized to assess the magnitude of the proposed slope modifications (excavations and fills) on ridges in the National Forest. Drawing No. MVP-8 shows ditch spoil storage on a ridge sideslope, but does not identify the slope (%) of the ridge sideslope, nor does

RR# Or Plan Name	Page #	Section #	Comment
			it identify the maximum slope (%) of a ridge sideslope that spoil would be allowed for slope stability (for temporary storage or permanent disposal). Even more critical, Drawing No. MVP-8 does not show the temporary storage or permanent disposal of the main excavation of the ridge. The main excavation in the construction ROW is much greater volume than the ditch excavation. Provide a range of typical drawings to show the temporary storage or permanent disposal of the main excavation for the range of typical slopes (%) along ridgetops and perpendicular to ridgetops (sideslopes) on the JNF. Where the main excavation will not be stored and/or disposed in the ROW, identify where the excavated material will be stored and/or disposed. Provide construction typical drawings with dimensions showing a cross-section with original slope (natural grade) and cut-and-fill for each typical ridgetop where construction would occur on the National Forest. For example, if construction would be on six different slope forms of ridgetops, (such as six ridgetops with symmetric side-slopes of 10%, 20%, 30%, 40%, 50%, 60%), then provide a typical drawing for each of these six types of ridgetops with symmetric slopes. Provide similar construction drawings for each typical ridgetop with asymmetric side-slopes (such 10% on one side-slope and 50% on other side-slope of ridgetop. Of special concern is the potential for failure of loose excavated material during construction and the potential for failure of fill slopes (including fill in reclaimed slopes) in the many years after construction. Display in the typical drawings the maximum extent (dimensions) of the loose excavated material in temporary storage or in permanent disposal or fill. For Down Slope Construction with or without winch as identified on Figures 1.11-1 and 1.11-2 (Resource Report 1), two drawings for needed for each typical ridge: 1) a drawing oriented perpendicular to ridge (such as Drawing No. MVP-8), 2) a drawing oriented parallel to the ridgeline showing the original ground and the final grade of the main construction ROW. This information is needed for Down Slope or ridge construction in order to assess the slope stability of cut slopes and fills slopes that may fail parallel to or perpendicular to the linear ROW. The need for this type of information is recognized in the following statement on page 6-43: "When steep side slopes are encountered, additional measures will be taken to ensure slope stability. Slope stability will be addressed during Project design and construction for both excessively steep parallel and side slopes." However, what is not recognized is the need for some of this information now in order to identify the scope and magnitude of the proposed slope modifications (excavations and fills) on the JNF and to assess potential effects on slope stability on the JNF for the Draft Environmental Impact Statement (DEIS). Provide the mileposts and a map showing the location (length along centerline) to which each typical drawing applies.
6	6-39	6.6.1.2	For each typical drawing of mainline construction on JNF, provide a typical drawing for reclamation with dimensions showing a cross-section of reclamation in relation to construction cut-and-fill and original ground surface. The section states: "MVP will minimize impacts by returning contours to pre-construction conditions to the maximum extent practicable…" Recognize that returning to original contour using fill on steep slopes may be unstable and subject to slope failure. Describe criteria that will be used to determine whether excavated material will be stable if returned to original contour. If fill placed to original contour would be unstable, describe alternative reclamation method. Assess the potential for failure of fill slopes resulting from reclamation on steep slopes regardless of whether or not the fill is placed back to original contour. If fill for reclamation on steep slopes would be unstable, describe alternative reclamation method.
6	6-39	6.6.1.2	Provide typical drawings for showing the dimensions (magnitude) of proposed modifications on cut slopes and fill slopes along existing Forest Service access road on Peters Mountain. Provide an assessment by an engineering geologist of the proposed slope modifications.
6	6-39	6.6.1.2	Provide an engineering geologic assessment of 1) the potential for natural landslides to impact the project, and 2) the potential for failure of project-constructed slopes to impact the project and to impact infrastructure, resources and public safety. Project-constructed slopes include all slope modifications (excavations, cut slopes, fills slopes, backfills, excess excavation or excess fill disposal areas, reclamation fills and slope modifications, etc.). Assess risks to people, facilities, and resources associated with potential failure of slopes modified for the project. Assess short-term slope stability (during construction of the pipeline) and long-term slope stability (during operation of the pipeline and beyond).

RR# Or Plan Name	Page #	Section #	Comment
			Because of the overarching influence of geologic structures (dip slopes and antidip slopes) on both natural landslides and project-related slope failures, provide engineering geologic assessment divided into 4 sections on JNF: the west flank of Peters Mountain, the east flank of Peters Mountain, the east flank of Sinking Creek Mountain, and the west flank of Brush Mountain. 1. –**Natural landslides**: Identify existing slope stability conditions in the footprint of, or relevant to, the proposed facilities (such as existing landslides; streamside slopes subject to undermining by streams; geologic structures that may be adverse to slope stability such as dip slopes; debris flow paths). Assess potential for various types of landslides (mass movements, mass wasting) to affect pipelines, access roads, 2. – **Natural debris flows**: Assess the potential for debris flow type of landslides to impact the pipeline and associated facilities. Consider the frequency of debris flow events, including the major debris flow events in Virginia and West Virginia from 1949 to 1996 (Figure 1 from Eaton, L.S. et. al., 2003). **Figure 1. Areas affected by debris-flow events in Virginia and West Virginia from 1949 to 19 1—June 17–18, 1949, storm in western Virginia and eastern West Virginia; 2—August 19–2 1969, storm in western Nelson County, Virginia; 3—November 3–5, 1985, st...**  Eaton L S et al. Geology 2003;31:339-342 THE GEOLOGICAL SOCIETY OF AMERICA ©2003 by Geological Society of America Credit: Figure 1 from Eaton, L.S., Morgan, B. A.,Kochel, R.C. and Howard A. D., 2003, Role of debris flows in long-term landscape denudation in the central Appalachians of Virginia, *Geology* 2003;31;339-342. http://geology.gsapubs.org/content/31/4/339.short 3. - Assess the potential impacts on pipeline and access roads of swarms of debris flows, such as occurred in June 1949 in Augusta County (Figure 2) and in August 1969 in Nelson County (Figure 3).

RR# Or Plan Name	Page #	Section #	Comment
			 Figure 2 - A June 17-18, 1949 storm triggered more than 100 debris flows in the Little River area on the North River Ranger District in Augusta County, Virginia. Credit: Plate 1 from Hack, J. T., and Goodlett, J. C., 1960, USGS Professional Paper 347.http://pubs.er.usgs.gov/publication/pp347  Figure 3 - Debris flows in Davis Creek area triggered by remnants of Hurricane Camille August 19/20, 1969 in Nelson County, Virginia. Credit: Map excerpt from Morgan, B.A. et al., 1999, INVENTORY OF DEBRIS-FLOW AND FLOODS IN LOVINGSTON AND HORSESHOE MOUNTAIN, VA: 7.5 MINUTE QUADRANGLES FROM THE AUGUST 19/20, 1969 STORM IN NELSON COUNTY, VA, USGS OFR-99-518. http://geology.er.usgs.gov/eespteam/terrainmodeling/ofr99_518.htm 3a. – **Project-related slope failures (landslides)**: Assess the slope stability of proposed cut slopes and fill slopes during construction and operation of the pipeline, access roads, and associated facilities. Identify any risks to people, facilities, and resources associated with potential failure of slopes modified for the project. 3b. –**Access road cut slope and fill slope stability**: Assess the stability of any cut slopes or fill slopes to be modified on existing Forest Service access road on Peters Mountain. Identify methods and locations for disposal of excess excavation.

RR# Or Plan Name	Page #	Section #	Comment
			3c. – **Trench backfill stability**: In considering the stability of fill in pipeline trenches, determine the slope % at which fill in trenches would be unstable and subject to fill slope failure. Prepare a slope map of the project area. Use slope % at which fill in trenches would be unstable as one of the slope breaks in classifying slopes on the slope map. Identify methods and locations for disposal of excess excavation from the trenches. 3d. –**Pipeline corridor road slope stability**: The access roads to reach the pipeline corridor are a familiar type of road. In contrast, the road built in the pipeline corridor is a different type of road, cutting a wide swath across the landscape in order to accommodate heavy construction equipment traffic to dig the trench and install the pipeline. While different in scale and layout than an access road, the construction within the corridor is basically a wide road with an adjacent pipeline trench (Figure 4).  Figure 4 – Example of construction road with adjacent pipeline trench. Material excavated for the road is piled on uphill side of road; material excavated for the trench is piled in a berm on downhill side of trench. Assess the slope stability of the corridor road and adjacent pipeline trench during construction and operation of the pipeline. Of special concern is the loose, unconsolidated material (soil, colluvium, weathered or fractured bedrock) resulting from the mainline excavation (not just trench excavation) and stored in temporary piles or berms. Show the volume (cubic yards) of loose, excavated materials in temporary storage, and state how long these piles or berms would remain before some or all of the material is used for backfill or is graded as part of reclamation? If a significant rainstorm occurs during the time these temporary piles or berms are present (such as in Figure 4), it could result is a mass failure of the temporary piles or berms, and then, a debris flow that could produce off-site damage downslope and in stream channels. To estimate the volume and stability of these temporary piles or berms, a cross-section of this stage of the construction process is needed. The project design would have three types of cross-sections: 1) original ground surface, 2) final cut-and-fill, 3) cross-section to temporary piles or berms at construction stage of maximum loose excavated material, that is, before the trench is backfilled or pipeline ROW roadway is reclaimed. Longitudinal profiles showing the slope % or grade along the corridor road at this stage of construction would also be needed to assess slope stability. 3e. – **Project-related debris flows:** Assess the potential for debris flows caused by failure of fill slopes created by the project (such as access roads, pipeline corridor road and pipeline construction,

RR# Or Plan Name	Page #	Section #	Comment
			and associated facilities). Assess the potential for debris flows caused by failure of waste disposal areas (such as disposal areas for excess excavation along access roads, corridor road and pipeline). Assess risks to public safety, downslope infrastructure, streams and other resources associated with potential failure of fill slopes or disposal areas for the project. Recognize the potential for fill failures to result in debris flows that can travel hundreds or thousands of feet downslope (Collins, T. K., 2008, Debris flows caused by failure of fill slopes: early detection, warning, and loss prevention. Landslides. 5:107–120). http://link.springer.com/article/10.1007/s10346-007-0107-y#page-1 Provide a slope map covering the mountainside from the ridge above, to the creek below, for the pipeline on the JNF in order to assess the debris flow potential upslope from the pipeline, as well as potential for debris flows caused by fill slope failure from the pipeline project. 4. –**Seismically induced landslides**: Assess potential for seismically induced landslides to impact the pipeline. Assess potential for large bedrock rockslides, such as found along Sinking Creek Mountain, to occur on Peters Mountain as well as Sinking Creek Mountain. Assess potential for earthquakes to trigger cut slope failure or fill slope failures originating on slopes modified by MVP project.
6	6-39	6.6.1.2	The following statement is premature in respect to JNF: "The overall effects of construction and operation of the Project facilities on topography and geology will be minor. Primary impacts will be limited to construction activities and will include temporary disturbance to slopes within the construction right-of-way resulting from grading and trenching operations." Until the geologic information requested in comments on Section 6.4.3 is gathered and then assessed in accord with the comments Section 6.6.1.2, it is premature assess the effects on the JNF.
6	6-41	6.6.1.2	This section states: "MVP is in the process of reviewing areas of potential slope stability issues. This information will be assessed and field evaluations completed. The impacts to the pipeline and vice versa, will be evaluated for each area identified and mitigation measures recommended. The recommendations will be included in the final pipeline design." An engineering geologic field evaluations and assessments of potential slope stability issues and "impacts to the pipeline, and vice versa" are needed for the Draft Environmental Impact Statement (DEIS), not just for final pipeline design. Provide the field evaluations and assessments conducted by an engineering geologist for the DEIS.
6	6-44	6.6.1.3	This section has two statement claiming that 0.28 g is used for the MVP project: "As noted above, peak seismic loading for the Project alignment in Virginia and West Virginia was estimated to be 0.28 g or less (USGS 2014a)." "Based on the assessed seismic-related risks in West Virginia and Virginia (i.e., no known active faults at surface; probable peak ground acceleration of 0.28 g) it is anticipated that PGD hazards to the Project alignment will remain low." However, these statements are inconsistent with Section 6.6.4 Seismic Hazards and the two reports in Appendix 6-D which state that 0.14 g (not 0.28 g) is used for the MVP project. Clarify this inconsistency.
6	6-43	6.6.1.3	See several comments on Section 6.6.4 Seismic Hazards, and revise this Section 6.6.1.3 as appropriate.
6	6-43	6.6.1.3	See comment about adding a seismically induced landslides section within Section 6.6.1.2. Provide a cross-reference here to the seismically induced landslides section.
6	6-49	6.6	See comment about adding a "Floods and Other Stream Hazards" section within Section 6.4. In conjunction, add a "Floods and Other Stream Hazards" section within 6.6. Assess the potential for floods to impact the MVP project and the potential for the MVP project to affect flooding, for example, by failure of constructed slopes resulting in temporary landslide dam in narrow mountain valleys and hollows. Assess potential for flooding to affect pipelines, roads, and associated facilities.
6	6-49	6.6	See comment about adding a "Acid-Producing Rocks" section within Section 6.4. In conjunction, add a "Acid-Producing Rocks" section within 6.6. State whether acid-producing rock is identified in the corridor traversing the National Forests. If acid-producing rock is identified, assess the potential for release of sulfuric acid from acid-producing rock into water bodies and wetlands.
6	6-49	6.6.2	This section on Operational Impacts and Mitigation mainly describes mitigation. There is only on short sentence to assess impacts: "Operational impacts on geologic resources are expected to be minimal." This is a grossly deficient assessment of the various geologic hazards that may affect, or be affected by, the pipeline projects over the many decades of operations. See all the comments on geologic hazards in Section 6.6.1 Construction Impacts and Mitigation. Apply these same comments to Section 6.6.2 Operational Impacts and Mitigation.
6	6-49	6.7	This section states: "The JNF is located in the area with highest seismic hazards as discussed in Section 6.4.1. However, these hazards - including soil liquefaction near water crossings and the

RR# Or Plan Name	Page #	Section #	Comment
			potential for landslides and rock falls - are not considered severe and can be mitigated with appropriate construction design." Contrary to the above statement, the potential for seismically induced landslides is likely the most severe geologic hazard in terms of potential catastrophic destruction of the pipeline. The Landslide Section 6.4.3 and Section 6.4.1.5 failed to recognize the largest known landslides in eastern North America on Sinking Creek Mountain. The pipeline corridor on the JNF crosses Sinking Creek Mountain, which has the largest known landslides in eastern North America (Schultz and Southworth, 1989). The pipeline corridor on Sinking Creek Mountain (MP 217.2 – 218.0) traverses one of the large bedrock landslides mapped by Schultz (1993). The Landslide section 6.4.3 failed to identify this large bedrock landslide on a published geologic map (Schultz, 1993). The Landslide section 6.4.3 failed to recognize research on the seismic origin of the Sinking Creek Mountain landslides (Whisonant, Watts, and Kastning (1991); Schultz and Southworth (1989); Schultz (1993). See the comments on Section 6.4.1, and revise Section 6.7 accordingly. Assess the potential for seismically induced landslides to disrupt large sections of pipeline on Sinking Creek Mountain, Peters Mountain and Brush Mountain.
6	6-50	6.7.1	Change "Forests" to "Forest" and change "within the Forests" to "within the pipeline corridor on the Forest" to read: "Communication with Tom Collins, Forest Geologist, revealed that no permits for the collection have been issued for the Forest (Collins, 2015) and that Mr. Collins is not aware of existing paleontological sites (collection sites or "type sections") within the pipeline corridor on the Forest."
7	FERC Env Info Request Report 7, Aug 11, 2015	#13	It appears this request has not been completed regarding 7.3.1.6 and soil amendments and revegetation aids. MVP refers the reader to Section 1.4 and RR-3, which do not have this information. This is important because MVP does not mention fertilizer or lime additions in RRs-7, 1 or 3 nor do they say when they will used these soil amendments or other revegetation aids listed in FERC's Upland Erosion Control Revegetation and Maintenance Plan, May 2013.
7	FERC Env Info Request Report 7, Aug 11, 2015	#3	This request from FERC is not adequately addressed by MVP as they have not identified high water tables, compaction hazard or reclamation potential in the tables displaying the soils by milepost, Appendices 7-A1 and 7-A2. These are soil characteristics which are important in determining potential effects to soils from the project and location potential problem areas for reclamation/revegetation. The reader is referred to Section 7.2, Appendices 7-A1 and 7-A2 and Appendix 7-B, which do not contain the requested information.
7			MVP Final RR-7 does not use the same criteria as NRCS to assess erosion potential. NRCS uses K-factor, slope and rockiness; MVP uses slope, soil capability class. NRCS erosion hazard rating is the standard and should be used on NFS lands These ratings can be found in the NRCS Web Soil Survey website and SSURGO database.
7	7-17	7.3.1.1	The timing paragraph on this page states that MVP will attempt to complete final cleanup and install permanent erosion control measures in and area within 30 days after backfilling the trench in that area, weather and soil conditions permitting. This does not comply with FERC's 2013 edition of Upland Erosion Control, Revegetation and Maintenance Plan (UECR&MP), which MVP says it will follow on page 7-1 of Final RR-7. FERC's UECR&MP on page 20 says to complete final grading, topsoil replacement and installation of permanent erosion control structures within 20 days after backfilling the trench. A lot of erosion can occur within 10 days and the chance of a storm event happening while the area is very susceptible to erosion increases. Please be advised that the Forest Service may have requirements that exceed FERC's requirements.
7	7-18	7.3.1.2	The Forest Service, as the land management agency, requires that topsoil be segregated and used in the reclamation process on Forest Service managed land disturbed by this project. The Forest Service is not included in the list of areas where topsoil will be segregated automatically; please add the Forest Service to this list and ensure topsoil is conserved during construction as described in Section 7.3.1.2, RR-7. This stipulation should be added to Section 7.4, RR-7.
7	7-21	7.3.1.6	The last sentence on Page 7-20 beginning with "Unless…" says when grading is completed after the end of a seeding season the area will be seeded "by" the next available seeding season. This word "by" on first line of Page 7-21, is not correct, as this would lead to seeding out of season. Change "by" to "during" to make this statement read correctly.
8	3	Appendix 8-E	Consistency result for *FW-3: Prior to authorizing or re-authorizing new or existing diversions of water from streams or lakes, determine the instream flow or lake level needs sufficient to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values.* states "N/A – standard refers to FS action". This is not true; the standard refers to any action,

RR# Or Plan Name	Page #	Section #	Comment
			including special uses. The consistency result should be "NO", since an instream flow analysis has not been done.
8	3	Appendix 8-E	Consistency result for *FW-4: Water is not diverted from streams (perennial or intermittent) or lakes when an instream flow needs or water level assessment indicates the diversion would adversely affect protection of stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values.* States "N/A. The Project will not withdraw water from streams located on Forest Service land". This is not currently true since section 2.2.4 does not specify where dust control suppression water will come from and an instream flow analysis has not been done.
8	8-21	8.3.1.1	The Forest Service understands that MVP's proposed route also crosses federal lands under the jurisdiction of the Army Corps of Engineers in West Virginia. The report needs updating to include this information.
8	N/A	8.5	We submitted a comment on Draft Resource Report 8 relating to the impacts of the pipeline on future use of prescribed fire as a management tool on NFS lands. A word search of RR8 reveals no such discussion. Prescribed fire is a very important tool in managing forests and woodlands to achieve our Desired Conditions set forth in the Forest Plan. In this context, it is a land use. We are concerned that the pipeline itself will impact the ability to use that tool by isolating areas that cannot be feasibly burned. Please evaluate if prescribed fire will still be a viable management tool allowed within and/or adjacent to the corridor in the EIS.
8	N/A	8.5	We submitted a comment on the Draft Resource Report relating to the impacts of the pipeline on Lands Suitable for Timber Production on NFS lands. A word search of RR8 reveals no such discussion. Commercial timber harvest is a very important tool in managing forests and woodlands to achieve our Desired Conditions set forth in the Forest Plan. In this context, it is a land use. We are concerned that the pipeline itself will impact the ability to use that tool by removing lands that are currently suitable for timber production or isolating suitable areas that cannot be feasible harvested. Please disclose the number of acres of lands suitable for timber production that will be removed from production by the pipeline, either directly or indirectly through isolation of currently manageable tracts, in the EIS.
8	8-40	8.4.3	**Peters Mountain Wilderness** – The narrative covers foreground views and distant views to the pipeline simultaneously, resulting in confusion as to whether distance alone accounts for the low to no visual impacts to the distant view of the pipeline, or whether vegetation that would mitigate the foreground view will also mitigate the distant view. The discussion about the potential views of the pipeline in the foreground and the potential views to the middleground should be provided as separate sentences or paragraphs. Furthermore, statements about screening vegetation should state whether that vegetation is evergreen or deciduous. If deciduous, MVP needs to assess whether the deciduous vegetation during leaf-off is dense enough to screen views of the pipeline.
8	8-40 and 260 of 260 in RR8	8.4.3 and App. 8F	**Appalachian National Scenic Trail (ANST)** – Information provided in this report is deficient about the process to choose the location and number of Key Observation Points for the ANST. The number of KOPs is likely insufficient. The report lacks a broader landscape topographic map depicting the proposed pipeline route and the ANST, making it impossible for the reader to get the big picture about the potential impacts and whether the visual assessment is adequate. A "seen area" area map is needed that includes national forest boundaries, topography, the ANST and the preferred route alternative, at a minimum. The photo provided in Appendix 8F for the ANST on Peters Mountain is not informative and is deficient for use in determining potential impacts to scenery as viewed from the ANST. The deficiencies include the horizontal cone of vision, the vertical/height of view included in the photograph, the leaf-on condition (clearly deciduous forest, so there is no evergreen visual screen) when the standard protocols for visual assessments is during the leaf-off season. As stated above, additional visual simulations are likely needed to demonstrate whether or not the SIOs would be met for the ANST with a 100 foot buffer of vegetation or not. Also, additional photo simulations may be needed for middleground and background views from the ANST.
8		8.4.3 Expansion or new sub-section needed	**Missing from this Report – Other Concern Level 1 Routes/Areas** – The USDA Forest Service's SMS requires that visual resource analysis occurs not only for special areas such as the national scenic trails, scenic byways, resorts, etc., but also for all "primary travelways and use areas." The guidance is provided on pages 4-8 and 4-9 of the SMS Handbook. MVP states that the USDA Forest Service's SMS protocols will be utilized for private lands as well as national forest and other public lands (Section 8.4 page 8-29 and Section 8.4.3 page 8-32).

RR# Or Plan Name	Page #	Section #	Comment
			At a minimum, the report is deficient in that it does not include visual analysis for highways U.S. 460, U.S. 11 or Interstate 81, all major interstate routes with a Concern Level of 1. A broad scale, landscape level map depicting not only roads and trails *crossed* by the pipeline, but also routes and viewing platforms not crossed by the pipeline but potentially within the seen area "viewshed" of the pipeline, so that readers can discern whether all primary, sensitive routes and areas have been considered and included in the report. These could be roads, trails, rivers and streams popular with kayakers or anglers, highly sensitive communities and primary summer home tracts, etc., with views to the national forest. These need to be taken into account during project level analysis, regardless of whether they are included in the forest-level SMS inventory. A higher level of ground-truthing occurs during project level analysis.
8	8-51	8.5.1	The report indicates there is a summary of land use impacts to USFS lands, however, there is no analysis of impacts in this section. In addition, this section should clarify if the 80.4 acre temporary construction right-of-way figure includes all ATWS, contractor yards, pipe storage locations, and other work spaces required on NFS lands during the construction phase.
8	8-51	8.5.2	The Forest Service understands that the project crosses lands administered by the Army Corps of Engineers in West Virginia. Since the project crosses Federal lands administered by two or more Federal agencies (Forest Service and Army Corps of Engineers), the Bureau of Land Management (BLM) has jurisdictional authority to grant or renew rights-of-way or permits through the Federal lands involved under the Mineral Leasing Act of 1920. Therefore, this section should state that a right-of-way grant application across National Forest System lands will be submitted through the BLM.
8	8-53	8.5.4	The format for describing each of the management area prescriptions is somewhat inconsistent. For example, some describe the ROS standard for the M.A. and others do not.
8	8-54	8.5.4 SMS Compliance	Generally, this report summarizes the USDA Forest Service's Scenery Management System (SMS) accurately. However, the part of the narrative pertaining to Scenic Classes is confusing. The SMS Handbook describes how inventoried scenic attractiveness, distance zones and concern levels are used to identify the relative value or importance of scenery for different areas using a range from Scenic Class 1 (highly valued) to Scenic Class 7 (low value, relative to other areas). This section of Resource Report 8 contains only Scenic Classes 1, 2 and 3. It should be stated whether areas of Scenic Classes 4 – 7 exist within the proposed project area. Furthermore, parentheticals contain the words "Very High, High, Moderate, Low". Clarification is needed about what these words represent. Are these the Scenic Integrity Objectives (SIOs) that exist within each of those Scenic Classes? If so, there is a discrepancy between the descriptions on page 8-53 (no Very High SIO in any management areas) and the description of Scenic Classes on page 8-54 (includes Very High for Scenic Classes 1 and 2). If these are references to the relative value of the landscape scenery that needs to be explained in the report and its source referenced (Final LRMP or inventory data of existing scenic integrity).
8	8-54	8.5.4 SMS Compliance	The same concluding statements are made under Scenic Class 1, Scenic Class 2 and Scenic Class 3 (all national forest lands through which the proposed pipeline will pass). These are: • The project elements, the landform, vegetation patterns, and cultural features would still combine to provide the ordinary/common or high scenic quality for the areas. • The landscape has the ability to absorb the visual change. Resource Report 8 has not adequately substantiated either of those statements and has not followed the USDA Forest Service's SMS protocols that it claims earlier in the report will be followed. To do so, the descriptions of the site specific landscapes for each of the management areas (page 8-53) must provide more detail regarding the type and level of landscape variety and patterns that exist, and inform about the current level of intactness of the landscape character. The proposed project elements (including any new or expanded access roads and ATWS), need to be described in terms of anticipated changes they would introduce to the existing landscape character and intactness. The latter should be phrased in terms of visible changes to color, line, form and texture in contrast to the existing condition, as provided in the SMS Handbook and described Resource Report 8 section 8.4.3 on page 8-32 ("Contrast is an important assessment criterion on the visual impact assessment to measure the degree of physical change in the landscape with regard to how the change is seen by viewers. Contrast in the landscape is determined by the differences in form, line, color, texture, and landscape juxtaposition between the existing condition and the Project… Factors such as visual

RR# Or Plan Name	Page #	Section #	Comment
			dominance, degree of deviation from existing landscape character, and intactness of the landscape were considered in this comparison"). Section 8.5.4 needs to provide details about this assessment of contrast and the degree of physical change in the landscape and provide a determination based on the level of deviation defined for each SIO. A broad statement that the project meets the SIOs for each Management Area is deficient. Geographically specific (site specific) determinations are needed. Views can and often do change with movement along a route within a single management area, and that should be described in a narrative and displayed graphically. Secondly, there is concern about the broad application of the SMS principle of visual absorption capability. There is not sufficient detail in the description of the landscape character to indicate that a suitable degree of variety and pattern exists to visually absorb the addition of the proposed pipeline corridor (including what patterns, lines, forms, textures and/or colors currently exist that are similar to those that would be introduced by the project).
8		Table 8D	The data displayed in this table indicates that MVP analyzed only the "nearest" potential view between project components and the viewing platform. The nearest location of a travelway or area may not be the part that would have the greatest impact on its scenery. Intervening geology or evergreen vegetation may block the view at the nearest location, but further out along that same travelway there could be a clear view to the project area. The table should be updated to include whether other portions of travelways listed, further from the proposed project area, may also have a view of the project area. A "seen area" analysis needs to be provided that displays where primary viewing routes and areas, on and off the national forest, may potentially view the proposed project components. Those that lie within five miles, per the MVP process (the FS definition of background is actually four miles to infinity), should be included in Table 8D. Since MVP states it will use the FS process for private lands (up to three miles), those sites that meet the definition of "primary travelway or area" captured in the "seen area" analysis should also be added to the table. Some travelways may have views to the project area from multiple distance zones (foreground, middleground, and/or background). This needs to be revealed in Table 8D.
8		Consistency Analysis with FLRMP document	This document is inserted into RR8, but it is not identified as an Appendix to that document. The page numbering starts at 1. It seems that it should either be a Section of Resource Report 8 with continued page numbering from Resource Report 8, or it should be identified as an Appendix to Resource Report 8.
8	18 & 19	Consistency Analysis with FLRMP	**Consistency with FW-154 and FW-158 for ANST.** – As provided in comment to Section 8.4.3 and Appendix 8F Visual Simulation related to the ANST, the claim that the proposed project meets the SIO has not been adequately substantiated. The narrative in this FLRMP consistency review document does not provide any additional information that would substantiate the claim that any of the standards for M.A. 4A are met including the SIO of High.
8	19	Consistency Analysis with FLRMP	**Consistency with FW-161, FW-162 and FW-163 Regarding ROS** - Resource Report 8 is deficient with regards to addressing the Recreation Opportunity Spectrum and the ROS standards for each management area. There is no analysis provided for ROS and no indication of potential impacts to not meeting the ROS, as stated in the Consistency Analysis document for FW-161. A narrative describing the impacts to the settings under the recreation opportunity spectrum, using the guidance provided in the USDA Forest Service's "1986 ROS Book" is needed in Resource Report 8. It should be accompanied by a map or table clearly depicting the ROS standards and anticipated outcome of ROS inventory changes as a result of this project.
8	21	Consistency Analysis with FLRMP	**Consistency with FW-183, FW-184 and FW-185 Regarding SIOs** – The MVP response to each of these standards is "Yes" and that a project level analysis ***will*** be conducted. However the Resource Report 8 narrative in Section 8.5.4 states that the SIO's will be met, implying that the project level SIO analysis is complete. There is a discrepancy between these two portions of Resource Report 8. If the project level analysis is complete, per Section 8.5.4, then it is deficient as described in response to other sections (above) and in my general comments provided below. The finding that the project

RR# Or Plan Name	Page #	Section #	Comment
			is consistent with the FLRMP by meeting SIOs has not yet been determined and the document should not indicate, at this point, "Yes".
8	21	Consistency Analysis with FLRMP	**Consistency with FW-186, Mitigations to Protect Scenery -** The MVP response is deficient in describing where and how the openings in the canopy created by the centerline corridor, ATWS, and road accesses will be shaped, oriented, and edges feathered to reduce the impacts to scenery. There is no indication from the description of the final centerline corridor of 50' that MVP is willing or able to shape the opening or feather the edges. If MVP does intend to incorporate this mitigation measure, a description of how and where they will employ this mitigation should be included.
8	21	Consistency Analysis with FLRMP	**Consistency with FW-189, Mitigation to Protect Scenery -** The MVP response demonstrates a misunderstanding or error in their interpretation of the intent of this standard. The intent is that the proponent must find a means to eliminate or minimize the height of slash after the removal of the trees. MPV needs to describe how they will meet this standard or change their determination regarding consistency with it.
8	22	Consistency Analysis with FLRMP	**Consistency with FW-193, Mitigation to Protect Scenery –** The MVP response addresses only the ANST, but the standard applies to locating bare mineral soil out of view from view of all concern level 1 and 2 travelways, where practical. This standard refers to log landings, roads, and bladed skid trails. It is not clear which of these features might be utilized during the removal of trees from the proposed pipeline corridor. The primary purpose of the standard is to make practical attempts to locate mineral soil out of view, therefore the focus should not be on the specific methods utilized.
8			Resource Report 8 lacks a clear map of the proposed route(s) for the MVP pipeline. This is needed to help readers ascertain the adequacy of the number and location of Key Observation Points, and whether the visual simulations in Appendix 8-F include the best direction of view or whether a different direction or multiple directions are needed. The Forest Service recommended that a visible or "seen area" analysis be prepared for a distance of five miles from the proposed pipeline centerline. There is no mention of the use of this important analysis tool in Resource Report 8. A "Seen Area Analysis" map for the pipeline crossing of national forest lands should be included in Resource Report 8 as a method used to select Key Observation Points. Resource Report 8 lacks a table of Key Observation Points, which should be included. A table should display all KOPs along with elevation, direction of view(s), a description of the view including predominant vegetation in the foreground and middleground (if visible during leaf off) and any distinguishable natural or cultural features, whether the KOP was within the "seen area", the line of sight direction to one or more pipeline segments, the line of sight distance to the pipeline segment(s), and whether photo or visual simulations were prepared. Forest Service trails, including the Appalachian National Scenic Trail, some Forest Service roads, and all public roads are open and used year round. Scenic Integrity Objectives need to be met during winter "leaf off" season. It is not clear whether the assessment for meeting SIOs considered this. Visual simulations in Appendix 8F only include summer, leaf-on season. Wherever MVP states in Resource Report 8 that there is vegetation that screens views of the pipeline, additional information is needed including whether the vegetation is evergreen or deciduous. If deciduous, a statement is needed with regards to the density of the vegetation and its capacity to block or screen views during leaf-off. Wherever MVP states in Resource Report 8 that viewing distance mitigates the visual impact, that distance should be specified.
8	32	Appendix 8-E	Consistency result regarding Riparian Corridors states "N/A. The Project will not cross this management prescription". This is not true; According to table 2.4-1 (Waterbodies crossed on the Jefferson National Forest) the project crosses 29 streams on the forest, and thus riparian corridors. A consistency review needs to be completed for all of the Standards in Management Prescription 11-riparian corridors. In addition, there is no discussion regarding the Federally Listed Fish and Mussel Conservation Plan, of which this project crosses several watersheds that are included in that plan.

RR# Or Plan Name	Page #	Section #	Comment
8	General		A portion of the route on NFS lands is within the Chesapeake Bay watershed. MVP should determine how this project impacts the U.S. EPA's Chesapeake Bay Total Maximum Daily Load (TMDL) pollution limits in the cumulative effects analysis.
10	10-9	10.5.1	The report states that one of MVP's primary objectives with respect to pipeline routing was to avoid (if possible) or minimize crossings of national forest. The report, however, does not identify or discuss any routes that avoid National Forest System lands. MVP should identify and discuss one of the early route(s) in their routing process that avoided NFS lands and reasons why that alternative(s) was not considered. As discussed in a previous comment, Forest Service Manual 2700, Special Uses Management (FSM 2700), §2703.2 describes Forest Service policy relating to the use of National Forest System lands (NFS). §2703.2(2) states to authorize use of NFS lands only if: a) the proposed use is consistent with the mission of the Forest Service to manage NFS lands and resources in a manner that will best meet the present and future needs of the American people; b) the proposed use cannot reasonably be accommodated on non-NFS lands. §2703.2(3) goes on to state not to authorize the use of NFS lands solely because it affords the applicant a lower cost or less restrictive location when compared to non-NFS lands. Therefore, in MVP's discussion of alternatives, they should clearly articulate why the project cannot reasonably be accommodated off NFS lands. This discussion should not cite lower costs or less restrictive locations as the sole purpose of crossing NFS lands.
10	10-9	10.5.1	The report is deficient in displaying an alternative that avoids the Jefferson NF or in providing information about why an alternative that avoids the Jefferson NF is not possible. In Section 10.5.1, a primary MVP objective is identified as avoiding (if possible) the national forests. There is a description of an initial attempt to avoid all cities and towns, the NFs, the NPS, and the ANST, which resulted in a corridor 2,362 miles long. There is no description of any additional attempts to develop a specific alternative or alternative modification that avoids the Jefferson NF.
10	First= 10-12	Multiple	Errors in earlier Resource Reports are duplicated here – the proposed route appears to impact some NFS lands between MP 169.9 and MP 180, so total mileage is larger than 3.4 miles.
10	10-28	10.6.4	There is no Brush Mountain West Wilderness. There is a Brush Mountain Wilderness, and a Brush Mountain East Wilderness.
10	10-54	10.6.16	One example of improper references. Figure 10.6.16 does not appear in Resource Report-10, but rather in Resource Report-10, Appendix 10-B. Better references would facilitate review.
10	10-56	10.6.17.1	Per earlier comments, a much more detailed description of a much more detailed analysis must be conducted and documented. Forest Service field review, including a very basic visual analysis, in October 2015 found that the proposed ANST crossing will result in a significant visual impact to users of the Appalachian National Scenic Trail. This unsupported statement raises questions about other weakly-supported statements in the Resource Reports package.
10	10-56	10.6.17.1	The proposed crossing of the ANST is a horizontal bore beneath the trail. MVP needs to provide alternatives and/or a contingency plan in the event the bore is not successful.
10, App 10-B	---	---	This entire appendix needs significant reworking and addition of detailed notes. For example, the sheet with 4 pictures labelled "Appalachian National Scenic Trail at Proposed Route Crossing Location" should be geo-referenced, dated, with directions shown and locations of proposed bore pits identified. The half-sheet satellite views and map views need vicinity mapping, and need to show federal land boundaries, and Wilderness boundaries, and include a legend. For example, the sheet titled "Columbia Gas of Virginia Peters Mountain Variation Appalachian Trail Crossing" does not provide enough context for this reviewer to identify where it actually is located.
10, App. 10-D	Table 10-D-2	---	Significant additional explanation of this table is needed. Calling a shift of "east up to 1300 feet" between MP 194.3 – 197.0 a "minor route modification" needs explanation. It may, in fact, shift the pipeline into a federal Wilderness, or shift the proposed pipeline crossing of the ANST to include some NPS-acquired lands. Similarly, a statement that a "shift northeast up to 14,441 feet" between MP 213.1 – 221.8 could impact entirely different areas of NFS lands, including a difference federal Wilderness. It is impossible for this reviewer to understand what is meant by this entire table. It appears that it may significantly change the area of NFS lands potentially impacted, necessitating completely different field surveys and review.

RR# Or Plan Name	Page #	Section #	Comment
10		App 10A	**Alternative Routes Maps:** The pages containing maps in this Appendix do not have page numbers. Ability to reference specific maps would be improved by the addition of page numbers for the entire Appendix. Most of the maps do not graphically indicate lands owned by the national forest. For people interested in potential impacts to the Jefferson NF, these maps are not very informative. NF ownership should be delineated or displayed graphically on the maps at (in the .pdf document as page # of 151) pages 87-90, 92, 96, 116-117.
10		Tables	**General Comment:** The tables for the different alternatives are confusing. The data for the proposed route varies from alt to alt and when compared to different alt modifications when it seems to the average reader that the proposed route data would remain constant in each table. At a minimum, MVP should add a note to each table describing the segment of the pipeline involved. However, the big picture for the entire pipeline gets lost to the reader who is trying to compare one alternative to another if the pipeline is broken down by segment. For improved clarity about the alternatives, it would be helpful if MVP adds a table that includes all of the alternatives and the data for the entire pipeline proposal.
10	General		FERC regulations at § 380.12(l)(1)(2)(ii) requires identification and consideration of route alternatives that avoid impact on sensitive environmental areas and presentation of sufficient comparable data to justify the selection of the proposed route. The report consistently cites a one-to-one relationship of mileage to environmental impact as the primary comparable data. This approach does not measure the environmental effects of different alternatives sufficient for the Forest Service to make an informed decision on whether or not the proposed route would result in the least amount of impacts to National Forest System lands when compared with other alternatives. We understand that MVP remains in process of conducting environmental surveys and look forward to additional comparable data being provided for review.

Mountain Valley Pipeline Sediment Modeling Methodology

Prepared for Appalachian Mountain Advocates

Jason Clingerman
Evan Hansen

Downstream Strategies
295 High Street, Suite 3
Morgantown, WV 26505
www.downstreamstrategies.com

Overview

Downstream Strategies performed a high-level analysis of the expected sedimentation impact expected from the Mountain Valley Pipeline (MVP). This analysis focused on two watersheds: one expected to have a lower risk of sedimentation and one expected to have a higher risk of sedimentation from pipeline construction. For each scenario, pre-construction, construction, and post-construction sedimentation loads were estimated.

The risk factor used to select watersheds was determined by assessing the slope and soil erosion category of the pipeline corridor for each crossing. The sedimentation analysis was performed utilizing the Generalized Watershed Loading Functions – Enhanced (GWLF-E) and Wikiwatershed tools. The desktop GWLF-E tool utilized for this analysis was provided directly by Barry Evans, from Pennsylvania State University. It provides a similar analysis with increased functionality as compared to the related tools hosted on www.wikiwatershed.org. Both tools provide watershed-level estimates of nutrient and sediment loading rates based on soils, land cover, slope, and a host of other factors. For analyzing sedimentation, the GWLF-E tool utilizes many of the standardized factors from the Universal Soil Loss Equation (USLE).

Risk Analysis

Each stream crossing (as defined by an intersection of 100K National Hydrography Dataset flowlines and the proposed MVP pipeline) was analyzed for risk of sedimentation due to the construction of the MVP. Soil erosion was obtained from the Soil Survey Geographic Database (SSURGO), and the forest erosion variable was classified into four categories (not rated, slight, moderate, and severe). Slope was created from Digital Elevation Model data and was also categorized into four categories (0-7%, 7-25%, 25-40%, and 40%+). We then analyzed the slope and erosion factors within the impact corridor, and utilized the CA3TV2 tool (Horizon Systems, 2016) to allocate and accumulate areas of each slope and erosion category. We then used percentage of upstream area within impact corridor that contains severely erodible soil and percentage of upstream area within impact corridor that contains high slopes (>40%) to rank each crossing's overall risk to

increased sedimentation. This was used solely as a screening tool to select crossings with higher and lower projected sedimentation impacts.

After analyzing the rankings, we selected two 1:100K NHD+ catchments to analyze in more detail. The lower-risk crossing is Turtletree Fork of Tenmile Creek of West Fork River in Harrison County. The higher-risk crossing is an unnamed tributary to Laurel Creek of the Little Kanawha River in Braxton County.

Sedimentation Analysis

The sedimentation analysis began by delineating the watersheds on www.wikiwatershed.org (Stroud Water Research Center, 2016), using the "Model My Watershed Application." Within that application, using the built-in topographic basemaps, we delineated the watershed using the "Free Draw" functionality. The delineated watershed matched the corresponding 1:100K NHD+ catchment. We then used the "Model" functionality to produce a GMS file and information on flow characteristics. The GMS file is the input data for the GWLF-E tool. We ran the GWLF-E tool for the GMS files exported from the website to calculate a baseline estimate of the sedimentation expected given current conditions before construction.

Next we utilized the raster calculator and tabulate area tools within ArcGIS Desktop to quantify landcover types within the temporary and permanent impact corridors. This provides an estimate of which landcover types would be impacted by pipeline construction, and ultimately which landcover types would need to be reclassified to create the scenarios modeling construction and post-construction conditions.

There are five types of land disturbances associated with construction of the MVP. The first, "temporary impact pipeline corridor," is the 125 foot-wide corridor that will be impacted during active construction. The second, "temporary workspaces," are additional staging areas nearby and proximal to the temporary impact pipeline corridor that will be utilized during active construction. The third, "access roads," refers to access roads delineated for pipeline construction, and these appear in both the temporary and permanent scenarios. The fifth, "permanent impact corridor," is the 50 foot-wide pipeline corridor that will be maintained permanently post-construction. The fourth, "ancillary sites," refers collectively to the Harris Compressor Station and the WB Xpress Pipeline interconnection sites.

To create the construction scenario, we reclassified temporary impact pipeline corridor and the temporary workspace as "disturbed" land and reclassified access roads as "unpaved roads" within the GWLF-E input data. We then ran the GWLF-E tool to estimate the sedimentation level anticipated during peak construction.

Finally, to create the post-construction scenario, we reclassified the permanent impact corridor as "pasture/hay," reclassified access roads as "unpaved roads" and ancillary sites as "Highly Developed."

The analyses performed for the construction scenario assumes no best management practices (BMPs) were implemented; however; we did provide estimates with BMP implementation by allowing the client to dictate the percent effectiveness of BMPs. 100% effective BMPs would result in the same sedimentation level as pre-construction, and 0% effective BMPs would result in the sedimentation level estimated from the construction scenario model. BMP efficiencies are difficult estimate and vary by soil type, slope, and level of effort. Allowing the client to vary the effectiveness of BMPs will provide for more defensible comments, because it will not be necessary to choose a single number for the construction scenario.

Instream Sedimentation Analysis

To estimate increased sedimentation from instream construction work, we used data from Wikiwatershed. Wikiwatershed also provides estimates for mean annual flow for the watershed and a mean annual sedimentation level. These were used as the basis for calculation of the increased instream sedimentation.

We assume that the crossing method would be dam and pump, isolated open cut method, because that method is frequently used for small streams (those less than 10 meters wetted width). With dam and pump methods, researchers found that in 90% of crossings, total suspended solids (TSS) typically increased no more than 25 mg/L over baseline levels (Reid et al. 2004), and that crossings typically were completed in 24 hours (Reid and Anderson 1999). We utilized the increase of 25 mg/L TSS for 24 hours to calculate the total increase in sedimentation for both of the watersheds assessed.

Results Summary

These results indicate the annual sedimentation level expected before, during, and after construction. They are based on soils, slope, land cover, and actual precipitation data averaged across a 30-year period from 1961-1990. If reclamation and revegetation occurs quickly (i.e., in less than one year), estimates of construction sedimentation could be reduced, although this could be accounted for by increasing the expected BMP efficiency or further analyzing pipeline construction timing and expected monthly sediment inputs.

TABLE 1. SUMMARY RESULTS

	Unit	UNT Laurel Run	Turtletree Fork
Baseline sedimentation	kg/year	46,600	44,500
Construction sedimentation with no BMPs	kg/year	2,909,600	118,200
Construction sedimentation with BMPs	kg/year	762,350	62,925
Additional sedimentation from instream work	kg	130	108
Construction sedimentation total	kg/year	762,480	63,033
Construction sedimentation increase	percent	1,536%	42%
Post-construction sedimentation	kg/year	53,400	44,500
Post-construction sedimentation increase	kg/year	15%	0%

NOTE: Estimates of construction sedimentation with BMPs assume 75% BMP efficiency and 24 hours of increased sedimentation due to instream work.

Details of GWLF-E Model Inputs

The GMS files that were output from Wikiwatershed contained reasonable estimates for all components necessary to run the GWLF-E model, but for more accurate estimates of sedimentation, it was necessary to adjust the values of the some of the factors affecting sediment transport. These factors come from the USLE routines within GWLF-E tool.

K Factor

The K factor is a numeric value that indicates inherent soil erodibility. The K factor is nationally available within the gSSURGO data available from the Natural Resources Conservation Service (NRCS). We utilized the soil erodibility GIS data (NRCS, 2014) to confirm that the K values for each watershed were accurate. For all

land cover classifications within the analyzed watersheds (with the exception of bare rock which has a near-zero erodibility value), we used the minimum K factor value within the watershed. This method may result in sedimentation from some land cover types being slightly underestimated. The K factor used for UNT Laurel Run was 0.31, and the K factor used for Turtletree Fork was 0.32.

LS Factor

The LS factor is the slope-length factor, which indicates the topographic nature of the area in question. Longer and steeper slopes increase flow velocities, and subsequently increase erosion and sedimentation. The Wikiwatershed tool populates the LS factor automatically for each land cover classification within the GMS file, and the default value was utilized for all land cover types that were present in the watershed. When creating scenarios that required new land cover categories (disturbed and unpaved roads), we needed to assign LS factors. To find appropriate LS values, we needed to know the average percent slope and the slope lengths. We measured slope lengths and gradients within ArcGIS Desktop for the appropriate areas and then used the lookup table for freshly disturbed areas (Renard et al. 1997 to find the appropriate LS value for each scenario. Exact slope lengths were somewhat difficult to ascertain, but estimates used for LS values were typically conservative.

TABLE 2. LS VALUES UTILIZED FOR DISTURBED AREAS AND UNPAVED ROADS

Watershed	Land Cover Type	Slope Length (ft)	Slope Gradient (%)	LS Value
UNT Laurel Run	Disturbed	400	25%	**13.53**
UNT Laurel Run	Unpaved Roads	100	5%	**0.68**
Turtletree Fork	Disturbed	800	6%	**2.43**

C Factor

The C Factor is also known as the cover factor and deals with effect that plants, mulch, or other soil components have on reducing soil loss. The C Factor for native, undisturbed vegetation is 0.01, which correlates to a 99% percent reduction in soil loss from cover. On the other hand, freshly disturbed, fallow ground has a C factor value of 1.0, indicating that soil cover does not reduce soil loss at all. The C Factor for disturbed land in each construction scenario was set to 1.0. To follow the guidance in Stewart (1975), and reiterated in the MapShed/GWLF-E manual (Evans and Corradini 2012), we adjusted the C Factor to 0.03 for hay/pasture and to 0.42 for cropland.

P Factor

The P Factor is an indication of the support practice management or conservation practice, and how those activities can speed or slow the flow of surface runoff and the resulting erosion. The P Factor is 0.9 for construction sites with track-walked up and down slope, punched straw, and rough/irregular surface (5C Program, 2012), and any of one of these situations seem likely to fit most stages and areas of the construction scenario.

Curve Number (CN)

Curve numbers describe the ratio of infiltration to surface runoff and are typically assigned based on the combination of soil type and land cover. Using Table 2-2a or 2-2b within this NRCS (1986) , we find that for either fallow agricultural ground or newly graded developing areas, the CN values are dependent on soil

hydrologic group. The curve numbers are 77, 86, 91, and 94 for hydrologic groups A, B, C, and D, respectively. We utilized these numbers to assign curve numbers to disturbed land for both watersheds. UNT Laurel Run's disturbed area CN was 91, because that watershed was entirely covered with Type C soils. Turtletree Fork's disturbed area CN was 88, because the watershed is split relatively evenly between Type B and C soils, and we rounded down to be conservative. The curve number for unpaved roads was also needed for the UNT Laurel Run watershed, and utilizing Table 2-2a, we find that the curve number for gravel roads in Type C soil is 89.

Citations

5C Program. 2012. Understanding Erosion with the Revised Universal Soil Loss Equation. http://www.5counties.org/docs/roadedu/2012_5c_roads/rusle.pdf accessed December 7, 2016.

Evans, B. M. and K. J. Corradini. 2012. Mapshed Version 1.5 Users Guide. Penn State Institutes of Energy and the Environment, The Pennsylvania State University, University Park, PA 16802.

Horizon Systems. 2016. NHDPlusV2 Catchment Attribute Allocation and Accumulation Tool (CA3TV2). Accessed December 9, 2016.

Natural Resource Conservation Service (NRCS). 1986. Urban Hydrology for Small Watersheds. Technical Release 55.

Natural Resource Conservation Service (NRCS). 2014. USA Soils Erodibility Factor. Environmental Research System Institute.

Reid, S. M. and P. G. Anderson. 1999. Effects of sediment released during open-cut pipeline water crossings. Canadian Water Resources Journal. 24(3):235-251.

Reid, S. M., Ade, F. and S. Metikosh. 2004. Sediment entrainment during pipeline water crossing construction: predictive models and crossing method comparison. Journal of Environmental Engineering and Science. 3(2): 81-88.

Renard, K. G., Foster, G. R., Weesies, G. A., McCool, D. K., and D. C. Yoder, coordinators. 1997. Predicting soil erosion by water: a guide to conservation planning with the revised universal soil loss equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook No. 703, 404pp.

Stewart, B.A, et al., 1975. Control of pollution from cropland. U.S. EPA Report NO. 600/2-75- 026, Washington, DC.

Stroud Water Research Center. 2016. Wikiwatershed: Model My Watershed. www.wikiwatershed.org

December 9, 2016

To: Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

SUBJ: Mountain Valley Pipeline LLC
Docket No. CP16-10-000
Draft Environmental Impact Statement review comments
Virginia Chapter, Sierra Club

To Whom This Concerns:

We offer our review comments for the Mountain Valley Pipeline Draft EIS. The conclusion at the end of the comments indicates an unsatisfactory rating due to lack of adequate information for project review. The following specific sections were submitted in the Draft EIS. Each section below was reviewed for accuracy and completeness of information in our evaluation and review comments.

I. Page ES-4:

"The project would traverse a variety of soil types and conditions. Permanent impacts on soils would occur only at the aboveground facilities, where the sites would be covered with gravel and converted to industrial use. Construction of the MVP would disturb about ***4,189 acres of soils that are classified as having the potential for severe water erosion*****.** Construction of the EEP would affect about 126 acres of soils rated as being prone to erosion by water."

Page 2-49:

Section 2.4.2.16 Rugged Topography

"The MVP would cross **18.5 miles of slopes between 15 and 30 percent grade, and 72.6 miles of slopes greater than 30 percent**. The Applicants stated that in rugged terrain, temporary sediment barriers would be installed, including silt socks and reinforced "super" silt fence, to keep soils and rolling rocks within the construction right-of-way. Temporary slope breakers would be installed during grading, to divert water into off-right-of-way vegetated areas, through hay bales, or aggregate (all aggregate would be removed during removal of the temporary slope breaker). Temporary slope breakers would remain in place until permanent erosion controls were installed. Sand trench breakers would be installed in the trench to prevent the movement of water."

December 9, 2016

Comments on page ES-4 and page 2-49:

The Mountain Valley Pipeline proposes to construct a large diameter pipeline across terrain that is not suitable by nature for a pipeline. The MVP is attempting to modify steep slopes to conform to its proposed interests in building a pipeline through rugged terrain.

Steep slopes are generally defined as land with a slope angle of 20% or greater. Steep slopes are prone to natural disasters. Rain falling on steep slopes runs off much faster than rain that falls on flat land surfaces. The steeper the slope, the greater the potential for erosion, and increased risk of land slides both during and after construction.

Extreme erosion causes grave problems such as water pollution, increased flood hazard, loss of fish populations, degradation of habitat, and the general impairment of the stream ecosystem. Eroded material accumulates in streams where it buries spawning areas, makes water unsuitable for human use, and reduces channel capacity. Grading practices, vegetation removal and other construction and development activities can increase sediment yields as much as 40,000 times. Over the course of a year, a ten-acre construction site can generate and send as much as 2,000 tons of sediment downstream, the equivalent of 200 dump truck loads of earth.

Soil texture is a primary factor affecting soil erodibility which is reflected in the soil erodibility factor, K. The K value is an indication of the susceptibility of different soils to erosive forces. The soils listed in Appendix N-2, Soils in Virginia, show a listing of soils that have erosive factors exceeding 0.32, which indicates highly sensitive soils to water erosion. Soil types with K values over 0.32 include:

Giles County – MP 195.5 to MP 215.4 - Carbo-rock complex, Faywood silt loam, Braddock sandy loam, Frederick silt loam, Sequoia silt loam, Poplimento silt loam, and Timberville silt;

Montgomery County – MP 221 to MP 236.1 - Caneyville-Opequan rock complex, Groseclose silt, Gilpin silt loam, Weikert stony silt loam, Lowell silt, Duffield silt, Ernest silt, Vertrees silt, Guernsey silt loam, McGrary silt loam, and Purdy silt.

These two counties have more than 35 miles of highly sensitive soils with high K values indicating a high degree of susceptibility to erosion by rainfall. The impacted areas have more than 40 inches of rainfall during a year, with a high probability of intense rainfall events during the spring and summer.

Despite efforts to revegetate steep, mountainous slopes after construction, slopes between 33% and 50% have a poor chance of revegetating, and slopes over 50% have an improbable chance of revegetating[1]. Steep slopes will make it difficult to properly install erosion control devices during construction.

Steep slope analysis requires submission of the following reports, prepared by professionals in their respective fields:
1. Hydrology and Geology Report. This report should include information on the hydrological activities of the area, the effect of hydrologic conditions on the proposed development, and any hydrological or erosion hazards. This report shall also include geological characteristics of the site, its suitability for development, its carrying capacity, and any geological hazard that might present a hazard to life and property.
2. Soils Report. This report shall include information on the nature, distribution and strength of existing soils, the adequacy of the site for development purposes, and an assessment of grading procedures required to impose the minimum disturbance to the natural state.

In areas of steep slopes, the ability of construction equipment to maneuver safely and with dexterity is hampered. Tasks that would normally be routine on gentle slopes become extreme challenges to the capabilities of equipment and operators. The ability to operate equipment safely becomes a major focus of the construction operation.

It is highly doubtful that the erosion control devices on steep slopes will be maintained on a daily basis as required by the erosion control plan narrative, unless there is constant monitoring of the job site by erosion control inspectors. Contractors often try to save time and money by cutting corners or taking shortcuts when no one is monitoring the construction. It is more difficult to maintain waterbars or trench breakers on steep slopes. The waterbars and trench breakers are an impediment to construction and get in the way of the construction operation. There are numerous reported cases of contractors not installing or maintaining erosion control devices.

A case Study for a 12 inch pipeline constructed in Giles County, VA demonstrates one case of a pipeline construction with severe erosion control problems. The pipeline was built in 2014 and the pipeline corridor is still not vegetated. The contractor did not install an adequate number of erosion control devices or maintain the erosion control devices that were in place. An intense rain event occurred when the pipeline corridor was bare and the erosion control measures were not adequate to prevent soil from eroding downslope. Mud flowed down the mountain side into streams at the bottom of the slope.

[1] Prevent soil erosion on your property, A Homeowner's Guide to Erosion Control, NRCS, www.ca.nrcs.usda.gov.

Additional work was required to restore the impacted streams. Contractor negligence and inadequate erosion control devices on steep slopes was a cause for the failure.

These photos were taken during construction of the 12 inch pipeline in Giles County, VA, near the proposed route of the Mountain Valley Pipeline. This case is focused on a section of the pipeline that crosses Peters Mountain in the Jefferson National Forest. The agencies with primary regulatory responsibility for this part of this pipeline project are the Forest Service and the VA DEQ. It would be reasonable to expect that the highest standards of performance and regulatory oversight would apply to a pipeline construction project on national forest land. Instead, this case study provides substantial evidence of both careless construction practices and regulatory system failure.

II. Review of Appendix T, Draft Erosion and Sediment Control Plan:

Comments:

Sheet 18.01 –

1. Station 0+00 to Station 9+40 is on an average slope of 39%. Soil loss in this section is 63 tons per year per acre. This increases the sediment loading in this area to 170 tons per year after construction.
2. Waterbar/slope breakers - Sediment Removal Efficiency: very low. They are not recommended for active access roads or skid trails due to the difficulty of moving equipment over them as well as the need for continual maintenance due to damage from traffic. Provide reinforcement of the berm with a log, steel pipe, etc. to maintain the integrity of the waterbar between maintenance operations.[2]
3. The temporary waterbars/slope breakers do not show outlet protection at the ends of the waterbars. Show all slope breakers with outlet protection and conveyance channels to adequate outfalls. Conveyance channels are required to convey runoff and sediment downslope to an adequate outfall with outlet protection. None of this is shown on the plan sheet.

Sheet 18.02 –

[2] PA DEP erosion and sediment pollution control program manual, March 2012, page 21.

4. The average slope from Station 13+00 – 23+00 is 32%. Soil loss after construction will be 44 tons per acre per year. Increased sediment loading for this section is 127 tons per year.
5. The temporary waterbars/slope breakers do not show outlet protection at the ends of the waterbars. Show all slope breakers with outlet protection and conveyance channels to adequate outfalls. Conveyance channels are required to convey runoff and sediment downslope to an adequate outfall with outlet protection.
6. Show diversions on either side of SS3 stream crossing at Station 31+00. The compost filter socks shown below the timber matting is not adequate for erosion control because the slope lengths above the socks are too long. Slope lengths exceed the maximum allowable for use of compost socks at the stream crossing.

Sheet 18.03 –

7. Station 40+00 to Station 46+00 has slopes over 30% which require slope breaker spacing of 50 foot intervals. The plan shows spacing of 100 feet and 150 feet. Revise the plan and profile to show slope breakers at 50 foot intervals.
8. Revise the plan to include a diversion berm on the upslope side of the construction limits of disturbance from Station 52+00 to Station 66+00. The drainage area above the limits of disturbance exceeds the maximum drainage area for use of a temporary right or way diversion on the downslope side of the construction limits. A diversion above the construction area is needed or divert runoff around the construction area.
9. Show the appropriate number of waterbars from Station 59+00 to Station 66+00. There are two shown in this section which does not meet the criteria for temporary and permanent waterbar installation.
10. Correct the text at Station 68+00 to read: Matchline Sheet 18.04.

Sheet 18.04:

11. The section from Station 90+00 to Station 10402+00 is very steep, over 30% gradient. This section will be very difficult to construct due to the steep slopes.

Sheets 18.01 thru 18.04 are the only sheets submitted as a site specific erosion control plan for public review. During research of MVP submittals, the erosion control plans for the remainder of the project were not submitted and available for public review. There is a distinct need for detailed, site-specific plans to handle runoff volume, erosion and sediment discharges, habitat disruptions, and other factors affecting waterbodies for public review, while there is time for agencies and citizens to comment and affect

decisions. The lack of available erosion control plans for public review indicates an uncooperative attitude by FERC and MVP to comply with NEPA requirements for public involvement and transparency.

See Attachment 1 for soil loss modeling results for these sections of the pipeline corridor.

III. Section 2.8.2 Permanent Slope Breakers

Recommended spacing and materials for permanent slope breakers shows spacing in the table for slopes exceeding 30% at 100 feet.

Comment:

Other sections in the DEIS show slope spacing at 50 feet. Revise the spacing to 50 feet, instead of 100 feet on slopes over 30%.

Waterbar/slope breakers have very low Sediment Removal Efficiency. On slopes over 30%, and due to lack of proper maintenance, sediment removal is not effective by slope breakers on steep slopes.

IV. Page 2-45:

Wet Open-Cut Construction Method
The wet open-cut construction method involves trench excavation, pipeline installation, and backfilling in a waterbody without controlling or diverting streamflow (i.e., the stream flows through the work area throughout the construction period). With the wet open-cut method, the trench is excavated across the stream using trackhoes or draglines working within the waterbody, on equipment bridges, and/or from the streambanks.

Page 5- 6:

In-stream pipeline construction across waterbodies could have both direct and indirect effects on aquatic species and their habitats, including increased sedimentation and turbidity, alteration or removal of aquatic habitat cover, stream bank erosion, impingement or entrainment of fish and other biota associated with the use of water pumps, downstream scouring, and the potential for fuel and chemical spills.

Page 4-176:

Section 4.6.2.1 Sedimentation and Turbidity

"Increased sedimentation and turbidity resulting from in-stream and adjacent construction activities would displace and impact fisheries and aquatic resources. Sedimentation could smother fish eggs and other benthic biota and alter stream bottom characteristics, such as converting sand, gravel, or rock substrate to silt or mud. These habitat alterations could reduce juvenile fish survival, spawning habitat, and benthic community diversity and health. Increased turbidity could also temporarily reduce dissolved oxygen levels in the water column and reduce respiratory functions in stream biota. Turbid conditions could also reduce the ability for biota to find food sources or avoid prey. The extent of impacts from sedimentation and turbidity would depend on sediment loads, stream flows, stream bank and stream bed composition, sediment particle size, and the duration of the disturbances.

To address concerns regarding the Elk, Gauley, and Greenbrier Rivers, Mountain Valley commissioned a quantitative modeling assessment to estimate the amount of turbidity and sediment that would occur as a result of the proposed wet open-cut crossings. *Sediment loads downstream of the crossings were estimated to increase by 49 to 81 percent, 15 to 26 percent, and 19 to 52 percent for the Elk River, Gauley River, and Greenbrier Rivers, respectively, over monthly baseline loads based on a crossing duration of 2 days.* Mountain Valley would attempt to minimize downstream sedimentation and turbidity, and subsequent impacts on aquatic biota in these waterbodies, by conducting the wet open-cut crossings during low-flow periods within the applicable time-of-year work windows for protection of fisheries of special concern, installing turbidity curtains that have buoyant booms and weighted bottoms to promote settling of sediment, and following Mountain Valley's Procedures and *Erosion and Sediment Control Plan* relative to construction on the streambanks. However, as we note in section 4.3.2.2, although sediment loads are related to downstream turbidity and sedimentation, they are different measurements with distinct values. *Mountain Valley's analysis does not quantify the duration, extent, or magnitude of estimated turbidity levels. Therefore, based on these estimates, conclusions cannot be drawn regarding the effects of sedimentation and turbidity on fisheries and aquatic resources due to the wet open-cut crossings.* We have included a recommendation in section 4.3.2.2 for additional quantitative modeling of turbidity and sedimentation associated with the proposed open-cut crossings for major waterbodies."

Comments on pages 2-45, page 5-6 and page 4-176:

It is noted from the discussion above that there would be significant increases in sediment loading to the Elk, Gauley and Greenbrier Rivers as calculated in the modeling assessment commissioned by MVP. However, the modeling assessments did "not quantify the duration, extent, or magnitude of estimated turbidity levels. Therefore, based on these estimates, conclusions cannot be drawn regarding the effects of sedimentation and turbidity on fisheries and aquatic resources due to the wet open-cut crossings." The lack of conclusions shows a flagrant admission of negligence on the part of MVP in performing the modeling assessment. The modeling is not complete and an accurate assessment of sedimentation impacts on these rivers cannot be determined. Additional information is required for review of the Draft EIS.

The effectiveness of wet open cut crossings is dependent on proper design and application. The probability of construction related difficulties is high. Reported difficulties include: (1) pump failure or insufficient capacity, (2) dam or flume failure, (3) poor dam seal, (4) poor containment of pumped ditch water, and (5) poor maintenance of erosion control measures. Larger water crossings require longer periods of instream activity and the control of larger volumes of streamflow and trench water. Both characteristics increase the risk of sediment being released into a watercourse. Construction problems result in large increases in downstream Total Suspended Solids impacting aquatic habitat and fish populations. These problems are not uncommon.

Additional assessment is required for the three river crossings. The modeling assessment is not complete and conclusions were not provided. This is another example where bases for the choice of crossing methods were not explained or justified by technical assessments or impact analyses.

In 2014, the Pennsylvania DEP filed a $4.5 million civil penalty against EQT, the MVP developer, for environmental violations. Its complaint, filed with the Pennsylvania Environmental Hearing Board, stated that settlement negotiations broke down and the company failed to cooperate with its investigation.

The dispute was over an incident that began in April 2012 in north-central Pennsylvania's Tioga County. Monitoring wells at a centralized impoundment serving EQT's Phoenix Pad S revealed elevated levels of chloride. A month later, DEP said it discovered a release of flowback water from a transfer line serving the impoundment and in a separate incident EQT reported that the impoundment was leaking, which affected a cold water fishery, a stream, an unnamed tributary, vegetation and groundwater.

Eventually, the impoundment was emptied, according to DEP, revealing between 75 and 100 holes in the liner. It remains unclear exactly how much waste leaked from the impoundment, but DEP said it was likely “significant.”

"EQT fails to recognize the ongoing environmental harm from the significant amount of waste released by its leaking six million gallon impoundment," Acting DEP Secretary Dana Aunkst said of the agency's proposed fines. "This action was necessary because the company has not been cooperative during our investigation. The department does not tolerate this unacceptable attitude toward compliance and proper protection of Pennsylvania's environment."

Even after discovering two seeps near the impoundment during its investigation of the leaking transfer line and elevated chloride levels, DEP maintained that the company's lack of cooperation was evident in its alleged decision to continue dumping flowback water in the pit.[3]

EQT was issued 92 violations in West Virginia between 2009 and 2013, more than any other operator. According to the West Virginia Department of Environmental Protection’s database, EQT’s violations include water pollution, working without permits, and failure to properly construct pads to prevent leakage. Explosions on EQT sites have also killed or severely injured workers.[4]

V. Page 2-53:

Section 2.4.4.3 Post-Construction Monitoring

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.

The Applicants would conduct follow-up inspections and monitor disturbed areas for at least the first and second growing seasons, including until revegetation thresholds are met and temporary erosion control devices are removed. The Applicants would submit

[3] NGI’s Shale Daily, October 7, 2014, http://www.naturalgasintel.com/articles/99962-eqt-fights-escalating-penalties-for-water-violations.

[4] NRDC issue paper, Fracking’s Most Wanted: Lifting the Veil on Oil and Gas Company Spills and Violations, April 2015, page 9.

quarterly monitoring reports for at least 2 years following construction. Restoration is deemed complete when the density and cover of non-nuisance vegetation are similar in density and cover to adjacent, undisturbed areas.

The FERC staff would conduct post-construction restoration inspections to monitor for vegetation cover, invasive species, soil settling, soil compaction, excessively rocky soils, drainage problems, and erosion. Those inspections would continue until the problems are corrected and the right-of-way is stable and revegetated.[5]

Comments on page 2-53:

Establishment of 70 percent vegetative within 2 years is not a realistic projection for growing vegetation on severely steep slopes. The probability of growing vegetation on slopes exceeding 50% is low within a 2 year time period. This will leave many areas along the corridor with bare soils and rocky outcrops in places where the depth to rock is less than 12 inches. The denuded areas will cause increased stormwater runoff and erosion downslope of the problem areas that are rocky or not vegetated.

Soil compaction in the surface layer increases stormwater runoff, thus increasing soil losses. Soil compaction occurs when soil particles are pressed together, reducing pore space between them. Heavily compacted soils contain few large pores and have a reduced rate of both water infiltration and drainage from the compacted layer. Soil compaction changes pore space size, distribution, and soil strength. As the pore space is decreased within a soil, the bulk density is increased. Excessive soil compaction impedes root growth and therefore limits the amount of soil explored by roots. This, in turn, can decrease the plant's ability to take up nutrients and water. From the standpoint of erosion and soil loss on steep slopes, the adverse effect of soil compaction on water flow and storage is very serious.

There is no objective analysis of the impacts of these areas on downslope erosion that will occur. Until there is recognition of the long term impacts of grading on steep slopes, and a thorough analysis of those impacts, the Draft EIS is not adequate for review and should be rejected until a thorough analysis is performed.

VI. Page 4-78:

If disturbed by construction, wells completed in near-surface aquifers would typically quickly re-establish equilibrium, and turbidity levels would rapidly subside, such that

[5] *Mountain Valley Pipeline Project Erosion and Sediment Control Plan, February 2016, page 19.*

impacts would be localized and temporary. Upon completion of construction, the Applicants would restore the ground surface as closely as practicable to original contours, and re-establish vegetation to facilitate restoration of pre-construction overland water flows and recharge patterns.

Dewatering of the pipeline trench may require pumping of groundwater in areas where there is a near-surface water table. *Construction activities may affect shallow aquifers and could cause minor temporary fluctuations in groundwater levels and/or increased turbidity. However, pipeline trenches and operational pipelines do not provide a barrier to groundwater flow where the pipeline intersects water-table aquifers, nor do they provide for a permanent reduction to infiltration of recharge waters where the pipeline lies above local and regional groundwater.* The Applicants would minimize impacts by implementation of the construction practices and operational erosion controls outlined in the FERC Plan (for the MVP), Equitrans' Plan (for the EEP), and both Applicants' Procedures and their project-specific *Erosion and Sediment Control Plans* for West Virginia and Virginia. Trench spoils would be used to backfill the trench, and the ground surface would be re-contoured to pre-construction conditions. The completed and maintained rights-of-way for the operational pipelines would not constitute an impermeable cover for infiltration of surface water.

Comments on page 4-178:

The section above ignores the presence of karst terrain in numerous areas along the pipeline corridor. Without performing soil test borings to determine underground soil structure and water flow patterns, the assertion that *wells completed in near-surface aquifers would typically quickly re-establish equilibrium, and turbidity levels would rapidly subside, such that impacts would be localized and temporary* is a baseless claim. It is standard engineering practice to conduct soil borings under the supervision of a Licensed geologist at frequent intervals along construction corridors to determine if there are impacts on underground caverns and water flow network. None of this was done for analysis of construction impacts to underground terrain.

The statement *pipeline trenches and operational pipelines do not provide a barrier to groundwater flow* ignores trench backfill compaction requirements. Standard project specifications require soil density or degree of compaction that must be achieved is a minimum of 85% density for modified proctor testing. Compaction of soils from backfilling operations and construction traffic during the backfill operation creates an underground dam or dike that impedes the flow of underground aquifers. Flow patterns are disrupted during the trench excavation and the compaction of soils during backfill disrupts the flow regime permanently. Analysis of the impacts is substantially

incomplete. Soil borings are required before project approval to determine the extent of impacts to underground aquifer flow patterns.

VII. Page 4-113:

We identified an additional location at which the pipeline route would parallel a waterbody within 15 feet. This waterbody crossing has been added to table 4.3.2-12. We also identified several locations (S-H36 [unnamed tributary to Jacks Creek] at MP 275.0; S-H24 [unnamed tributary to Little Jacks Creek] at MP 277.2; and AR-SU-200 along Lick Run) at which the proposed pipeline's permanent easement or an access road appears to travel within a waterbody's channel.

Therefore, we recommend that:
Prior to the end of the draft EIS comment period, Mountain Valley should file with the Secretary a complete list of any locations not already found acceptable by FERC staff where the pipeline route or access road parallels a waterbody within 15 feet or travels linearly within the waterbody channel. Mountain Valley should either re-align the route/road to avoid locating the pipeline trench and/or access roads along or within a waterbody channel; or, provide site-specific justifications and proposed mitigation for locations Mountain Valley believes cannot be realigned.

Additionally, the FERC Procedures specify that ATWS should be located at least 50 feet from waterbodies and wetlands. Appendix D lists the 366 ATWS that Mountain Valley has proposed within 50 feet of a waterbody and wetland.

Comments on page 4-113:

The statement that *Prior to the end of the draft EIS comment period* indicates that information required for project review was omitted and incomplete. This is another instance of lack of adequate information submitted for the Draft EIS review. Four additional locations at which the pipeline route would parallel a waterbody within 15 feet were not included in the Draft EIS submittal for review. This is a continuing trend throughout the Draft EIS which indicates careless and negligent preparation of project material for submission. Until all information is submitted, the Draft EIS does not have adequate information for permit approval.

The fifteen foot riparian buffer, where the pipeline route or access road parallels a waterbody within 15 feet, is not an adequate buffer for stream protection. The total combined buffer width should be no less than 50 feet. Where excess nutrients,

sediments, etc. are a concern, buffers more 100 feet wide or more are required to provide the most fish and wildlife habitat value. Design all buffers to meet or exceed the minimum requirements of local species of concern.

Existing wooded buffers should be protected when allowing minimal modifications to the extent that they do not diminish the ability of the buffer to perform its water quality functions. Effective vegetation must be established and woody buffer plantings are required, where no vegetation exists in a buffer, or the existing vegetation is insufficient to accomplish the three functions of retarding runoff, preventing erosion and filtering non-point pollution.

Scientific studies have noted that, on first, second and third-order streams (headwater streams and those less than approximately sixty feet wide), the twenty-five feet closest to the stream provide functions critical to the stream health. The ability of this portion of the buffer to moderate water temperature, provide bank stabilization and supply organic debris for aquatic organisms makes it especially sensitive to potentially harmful activity such as excessive removal of vegetation and construction operations.[6]

VIII. Page 4-114:

The MVP would cross Craig Creek four times. Craig Creek is an NRI-listed waterbody than contains threatened and endangered species habitat.

Mountain Valley conducted an analysis to determine the amount of sedimentation that could occur in the Jefferson National Forest as a result of **instream** construction. The analysis used the Revised Universal Soil Loss Equation to yield annual estimates of erosion rates and sediment loads at the subwatershed level (i.e., HUC-12) based on soil type, climate, land use and management factors, and topography. The project crosses three HUC-12 watersheds in the Jefferson National Forest: Trout Creek–Craig Creek, Stony Creek, and Clendennin Creek–Bluestone Lake. The Trout Creek–Craig Creek subwatershed is part of the Upper James River HUC-8 watershed, and the Stony Creek and Clendennin Creek–Bluestone Lake subwatersheds are in the Middle New HUC-8 watershed. The results indicate that these three subwatersheds would exhibit *temporarily* increased sediment loads and yield due to project construction. Although sedimentation is *unavoidable* during instream construction, associated impacts would be controlled by the use of temporary and permanent sediment and erosion controls designed to avoid the movement of upstream sediments into downstream portions of waterbodies.

[6] Riparian Buffers Modification & Mitigation Guidance manual, Virginia Department of Conservation and Recreation, Chesapeake Bay Local Assistance, September 2003 - Reprinted 2006, page iv.

Page 4-179:

The FS expressed concern regarding the potential for increased sedimentation caused by erosion of exposed soil in the pipeline corridor to affect the priority HUC12 subwatersheds (Stony Creek and Upper Craig Creek) that the MVP would cross within the Jefferson National Forest. Mountain Valley commissioned a sedimentation model to assess the extent of sedimentation that could occur within these priority subwatersheds during construction. Details of the methods and results are included in the Biological Evaluation (BE) provided to the FS on June 24, 2016. *The results of the model indicate that construction would increase sedimentation,* when accounting for Mountain Valley erosion and sediment control methods, by 10 percent in the Stony Creek subwatershed and less than 3 percent in the Upper Craig Creek subwatershed. However, the model calculates annual increases in sedimentation and, therefore, makes the assumption that the construction corridor within the watersheds would exist as bare soil for the full year in which construction would occur. This would be a substantial overestimation of the duration that bare soil would be exposed during construction (section 2.4 details the construction chronology that would be used for the MVP). Consequently, *we would expect any actual increases in sedimentation within the priority subwatersheds to be substantially lower than the values provided by the sedimentation model.*

Comments on pages Page 4-114 and page 4-179:

Stated above, “the results indicate that these three subwatersheds would exhibit *temporarily* increased sediment loads and yield due to project construction. Although sedimentation is *unavoidable* during instream construction…”. The construction standards stated in this DEIS call for two years of re-vegetation monitoring and a minimum threshold of 70% re-vegetation for disturbed areas before the project is deemed to have adequate ground cover for construction areas. Two years is not temporary. Two years of continued sediment loads and soil loss into stream channels is significant. Exposed rocky soils and rock outcrops on steep slopes in the construction corridor will persist for years after construction, leading to increased runoff and increased sediment loss.

The statement that “sedimentation is *unavoidable* during instream construction” is an acknowledgement of increased sediment loading during instream construction. Erosion control methods for instream construction have low efficiency ratings primarily due to difficulties during construction.

As stated above, “the results of the model indicate that construction would increase sedimentation…” is another acknowledgment of increased sediment loading in stream crossings.

The assertion that “*we would expect any actual increases in sedimentation within the priority subwatersheds to be substantially lower than the values provided by the sedimentation model…”* is false. On steep slopes with poor probability of re-vegetation, and with a minimum of two years for acceptance of revegetation, the use of annual parameters for soil loss is appropriate. Soil loss modeling can use different parameters to determine soil loss from different conditions. The analysis should be modeled to reflect those changing conditions over time. None of this analysis was submitted for review in the Draft EIS. The evaluation of impacts on waterbodies is not complete and a decision on permitting cannot be made without further information and evaluation.

IX. **Page 3** - **3.0 SLOPE EVALUATIONS - Landslide Mitigation Plan (February 2016)**

As mentioned in Section 1.0, the geologic and geotechnical characteristics of the region contribute to slope instability. Landslides along the project route will occur primarily in weathered bedrock or loose colluvial soil and within old landslide debris located on steep slopes. Exposed sedimentary rock formations can erode rapidly and create soils prone to landslides. Most landslides along the route are expected to be thin earth-flow type slabs rather than deep-seated circular failures. Rockfalls are also a potential hazard below bedrock outcroppings at or near the top of steep slopes associated with the cliff-forming formations such as sandstones, granite, and gneiss. These outcrops may be weathered by wind or rainfall and become loosened, leading to a violent cascade downhill, often triggering a larger landslide. Landslides also commonly recur in the same areas, thus evidence of previous events is important to the slope evaluations.

Page 4-46:

Section 4.1.2.4 Slopes and Landslide Potential

Several steep slopes along Mountain Valley’s proposed pipeline route have experienced landslide activity in the past. Additionally, there are areas along the pipeline route that are characterized by both steep slopes and red shale bedrock, which as discussed in section 4.1.1.5 are prone to landslides. As discussed above, *construction and operation of Mountain Valley’s proposed pipeline could result in unstable slopes including cut slope failures and fill slope failures. The potential for landslides or slope failure could be triggered by seismicity from the GCSZ or from intense and/or prolonged rainfall events. The USGS identified a clustering of landslides*

near the GCSZ suggesting that recent seismic shaking may have triggered these landslides, and that topographic effects on seismic shaking may have been amplified on mountain crests by a factor of 1.7 to 3.4 (Schultz and Southworth, 1989).

As discussed above, calculations by D.G. Honegger Consulting indicate that potential hazards exist for triggered slope displacement should the length of soil displacement over the pipeline exceed 1,580 feet for parallel slopes. One slope, at MPs 161.9 to 162.5, was identified to exceed the 1,580 feet length. In this area, Mountain Valley would increase the pipe wall thickness to that of Class 2 pipe in order to mitigate hazards to the pipeline from any potential triggered slope movement.

Comments on Slope Failure and Landslide Mitigation:

Several areas along the pipeline corridor are shown as prone to landslide or have recent landslides. See Table 2 in Landslide Mitigation plan.

Factors such as failure to properly handle surface and ground water; oversteepening of slopes by placing of fills and/or removing lateral support; failure to recognize geologic formations with low shear strengths; failure to recognize inherent weakness, such as linears, fractures, and joints, in otherwise competent bedrock; and improper blasting techniques can, and often do, lead to costly slope failures. These and other potential problems should be identified up front, during site design, to avoid huge remediation expenditures as well as environmental damage and threats to public safety.

Areas of high groundwater table and surface drainage paths contribute to the instability of slopes. Drainage paths or streams can over-steepen slopes from erosion. Human activities are a common contributor to landslide events. Large excavations located in mountainous areas related to rural development increase the number of and potential for landslides. Development of this type tends to create over-steepened slopes and drainage alteration that leads to the potential for many landslides. The removal of surface vegetation during land development can affect slope stability through increased infiltration of rainfall.

It is incumbent upon any pipeline developer to employ due diligence in regard to the potential for slope failure resulting from the construction of a proposed project and take whatever steps are necessary to minimize or prevent slope failures, especially where this would endanger public safety or result in environmental or property damage.
For projects where significant potential for dangerous slope failures exists, appropriate steps should be taken to ascertain the probable nature of the failure, such as a geotechnical study, and all appropriate measures should be taken to alleviate the

potential dangers. For sites with greater potential risk, the actual construction should be done under the supervision of an independent geotechnical engineer or geologist. While these measures can significantly increase initial costs for a project, they are small in comparison to remediation costs, not to mention collateral costs incurred by others who may be affected by large-scale slope failures. Sites with great potential for public risk or property damage should be avoided, if at all possible.

Slope stability modeling analyses are required by engineering practices for slopes exceeding 2:1, or 50% gradient. It is recommended that slope stability analysis be performed for slopes exceeding 3:1, or 33% gradient. There are numerous areas of slopes over 30% along the pipeline corridor. A complete analysis cannot be done without the slope stability modeling results for steep slopes and areas with sensitive soils. The Draft EIS is not complete for public review and should be re-issued after complete submittal of information on slope stability.

X. STORMWATER MANAGEMENT REQUIREMENTS

In addition to the approved Erosion and Sedimentation Control Plans, MVP will be required to demonstrate compliance with Guidance Memo No. 15-2003 and MS-19 in regards to post construction stormwater management requirements. Calculations will be performed using DEQ standard excel spreadsheets discussed in Guidance Memo No. 16-2001 and submitted to the DEQ for their review and approval.
There are two components to stormwater management, quantity and quality. In order to achieve compliance of the quantity component, MVP will need to demonstrate a negligible increase (if any) in stormwater quantity.

In order to achieve compliance of the quality component, MVP will need to demonstrate that the total phosphorous for post construction is less than 0.41 lbs/acre or equal to the pre-construction condition, whichever is greater.

WATER QUALITY

The standard DEQ Spreadsheet (v3.0) was used to comply with water quality requirements of the VSMP. The DEQ Spreadsheet for the project is located in Appendix-A. Per the regulations, there are only three (3) potential land cover options (managed turf, forested/open space, and impervious).

SITE CONDITIONS (INPUT):
All post-vegetated areas will *not* be routinely maintained. Therefore all revegetated areas were considered “open space,” since they would not be considered “managed turf”. This resulted in 52.2-acres of “Open Space” and 2.2-acres of “Imperious” area for the access roads. For time consideration the project assumed a HSG of C throughout.

CONCLUSION:
Per the standard DEQ Spreadsheet (v3.0), "Total Phosphorus Load Reduction Not Required" and the "target TP reduction is exceeded by -12.78-lb/yr." *Therefore the project is compliant for TP and TN.*

WATER QUANTITY

The standard DEQ Spreadsheet (v3.0) and the HydroCAD computer program were used to model and comply with water quantity requirements of the VSMP. The 1, 2, 10, and 100-year storms were analyzed. The entire project inside of Roanoke County (54.4-acres of total disturbance) was used as the watershed/project area. For time consideration the project assumed a HSG of C throughout.

SITE CONDITIONS

Pre-Development Conditions:
To remain conservative in the design the entire disturbed area (54.4-acres) was assumed to be "Woods, in good condition", having a CN value of 70.

Post-Development Conditions: Because the disturbed area will not be routinely maintained (i.e. brush hogged every few years) *"Brush, brush/weed/grass mix, in good condition" was used, having a CN value of 65.* This resulted in 52.2-acres of "brush" and 2.2-acres of "Imperious" area, having a CN value of 98.

Stormwater Management Comments:

In the Draft Stormwater POST- Construction Report dated June 2016, the engineer used a runoff coefficient, $r_{v,}$ of 0.04 assuming that all revegetated areas were considered "open space" within the pipeline corridor. However, as defined by the Virginia Department of Environmental Quality, forested/wooded areas, stream buffers, or areas designated as "conserved" open space should be designated on the plans as **undisturbed**; be **protected** during construction with some form of barrier or fencing; and be protected after construction with a protective covenant or easement, and signage where applicable.[7] None of the criteria above applies to the pipeline corridor post-construction conditions.

Managed Turf/Disturbed Soil: Numerous studies have documented the impact of grading and construction on the compaction of soils as (OCSCD et al, 2001; Pitt et al, 2002; Schueler and Holland, 2000): Increase in bulk density, Decline in soil permeability, and Increases in the runoff coefficient. These areas of compacted soil, even when proposed to remain as pervious cover, e.g., lawn or managed open space,

[7] DEQ, Plan Review Course Module 4. The Virginia Runoff Reduction Method | Page 6.

have a much greater hydrologic response to rainfall than undisturbed areas, e.g., forest, meadow, or pasture.

The engineer's assumption of forested condition for the pipeline corridor is Not an accurate assessment of the post-construction site conditions. The runoff coefficient for disturbed soil is 0.22, which will increase the site runoff coefficient significantly. The calculations as submitted are incorrect and do not meet State and Federal standards for phosphorus reduction calculations.

In the stormwater water quantity calculations for Roanoke County, the engineer assumed Post-Development Conditions of *"Brush, brush/weed/grass mix, in good condition" having a CN value of 65,* which is lower than the Pre-Developed curve number for "Woods, in good condition", having a CN value of 70. Again, the engineer ignored the impact of grading and construction on the compaction of soils. It is not possible for the post-developed condition to be lower that the pre-developed curve number without using low impact methods or environmental site design considerations for project planning and construction. The correct curve number for use in calculating the CN value is 81 for herbaceous areas with grass, weeds and low growing bushes in fair condition. The calculations as submitted are incorrect and do not meet state and Federal standards for runoff rate calculations.

Conclusions:

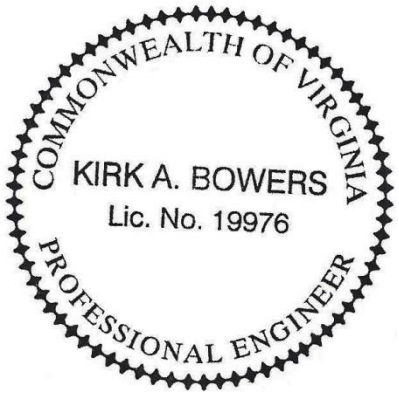
The DEIS lacks critical environmental information – NEPA requires agencies to take a "hard look" at the environmental impacts of a proposed project and to make that information available to the public. In this case, FERC released the DEIS despite the absence of information necessary to assess the impacts of the project on a wide range of resources, including streams, steep slopes, landslide potential, stormwater management and numerous other issues. These are just a few of the most glaring deficiencies in the DEIS that FERC must rectify in order to comply with NEPA. FERC stated that MVP can submit the missing information before construction begins. This prevents meaningful public participation in the decision making process that is required by NEPA. A thorough analysis subject to public scrutiny is particularly necessary here because a pipeline of this size has never been built through the type of steep terrain and karst geology that MVP would cross. Past experience with adverse effects from construction of much smaller pipelines in the region—such as the Celanese and Stonewall Gathering lines—shows that the public cannot rely on assurances that such impacts will be successfully mitigated without adequate information to back up those assurances.

December 9, 2016

Respectfully,

Kate Addleson, Director

Kirk A. Bowers, PE
Virginia Chapter Sierra Club



Attachment 1

RUSLE2 Soil Loss Worksheets

RUSLE2 Worksheet Erosion Calculation Record

Info:

Inputs:
Key Number: **Tract number**
Project Name: MVP DEIS review
STA. Start to STA. End: **Field number**0+00 to 9+40

Outputs:

Hillslope	*Climate*	*Management*	*Soil*	*Soil loss erod. portion, t/ac/yr*	*Sediment delivery, t/ac/yr*
temp\Giles county	Virginia\Alleghany county average (Covington)	Highly disturbed land\Construction With Permanent Practices\Giles MVP	SSURGO\Giles County, Virginia\11F Faywood silt loam, 30 to 65 percent slopes\Faywood Silt loam 90	63	63

RUSLE2 Worksheet Erosion Calculation Record

Info:

Inputs:
Key Number: **Tract number**
Project Name: MVP DEIS review
STA. Start to STA. End: **Field number**13+00 to 23+00

Outputs:

Hillslope	*Climate*	*Management*	*Soil*	*Soil loss erod. portion, t/ac/yr*	*Sediment delivery, t/ac/yr*
temp\Giles county	Virginia\Alleghany county average (Covington)	Highly disturbed land\Construction With Permanent Practices\Giles MVP	SSURGO\Giles County, Virginia\11F Faywood silt loam, 30 to 65 percent slopes\Faywood Silt loam 90	44	44

RUSLE2 Worksheet Erosion Calculation Record

Info:

Inputs:
Key Number: **Tract number**
Project Name: MVP DEIS review
STA. Start to STA. End: **Field number**23+00 to 30+00

Outputs:

Hillslope	*Climate*	*Management*	*Soil*	*Soil loss erod. portion, t/ac/yr*	*Sediment delivery, t/ac/yr*
temp\Giles county	Virginia\Alleghany county average (Covington)	Highly disturbed land\Construction With Permanent Practices\Giles MVP	SSURGO\Giles County, Virginia\11D Faywood silt loam, 10 to 30 percent slopes\Faywood Silt loam 90	25	25