August 2, 2019

James Bolton
312 Perry Lane
Lovingston, VA 22949

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Motion to Intervene (Out of Time) in Docket No. CP15-554-000 Atlantic Coast Pipeline

Dear Ms. Bose

I write in my capacity as an intervenor in Docket No. CP15-554 to inform you of additional data that is currently being collected via a study by the Virginia Department of Mines, Minerals, and Energy, and that, even in its preliminary stages, suggests a significantly increased threat to public safety from the Atlantic Coast Pipeline (ACP) in Nelson County, VA. As you are aware, the current status of the ACP is that it has been voluntarily put on hold due to court decisions staying several of the permits required to be in place before construction can commence. As this current hiatus in construction should be viewed as an opportunity to further review any additional data that may have become apparent in the meantime--especially those that may affect any route changes that may become necessary as a result of future court action-- I request that you take the following information into consideration.

First, a little background: While the Environmental Impact Statement for this pipeline makes the claim that "…to minimize impacts on potentially ustable soil and debris flows resulting from Hurricane Camille, Atlantic incorporated a route alternative (the East of Lovingston Major Route Alternative) to avoid the debris flows and other features identified by the USGS (Morgan et al, 1999)"[3], the current route nonetheless continues to bisect the area of Nelson County characterized by the steep terrain that was most affected by these events.

Figure 1: Roberts Mountain. Double red line is proposed ACP Corridor; single red line is proposed access road. The route crosses Davis Creek at bottom center. (Map courtesy of the Dominion Pipeline Monitoring Coalition).

The Davis Creek watershed, which includes the southern slope of Roberts Mountain and its associated ridgeline in central Nelson County, was severely affected by the unprecedented rainfall resulting from the remnants of Hurricane Camille that passed over the area in August of 1969, causing devastating flooding accompanied and compounded by debris flows that swept away entire families in the area, as well as 120 miles of roads and 150 bridges, hampering relief efforts for months. The result was the loss of some 125 lives in Nelson. In the Davis Creek watershed alone, 53 people were swept away and killed, 28 of which were never found.

Subsequent to the event, the US Geological Survey conducted a study of the resulting slides, debris flows, and floods in Nelson County and created the following map charting their extent. This map (Figure 2)[2] is shown below in its entirety (the extent of the flow activity is shown in red).

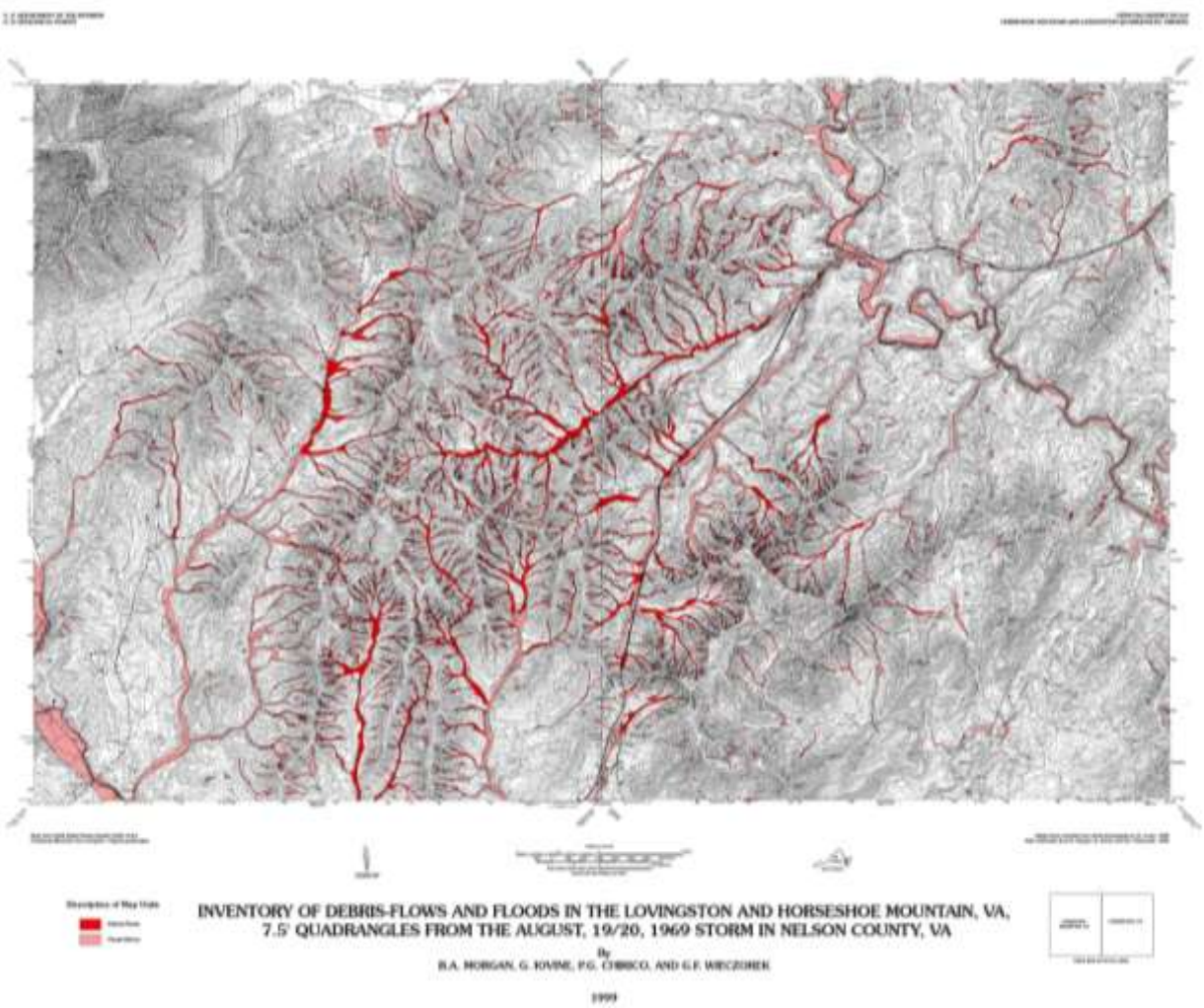

Figure 2: USGS Debris Flows in Nelson County, VA due to Hurricane Camille

For clarity, Figure 3 shows an enlarged portion of the above image including Roberts Mountain and the lower portions of the Davis Creek watershed on which the ACP route has been superimposed (in blue).

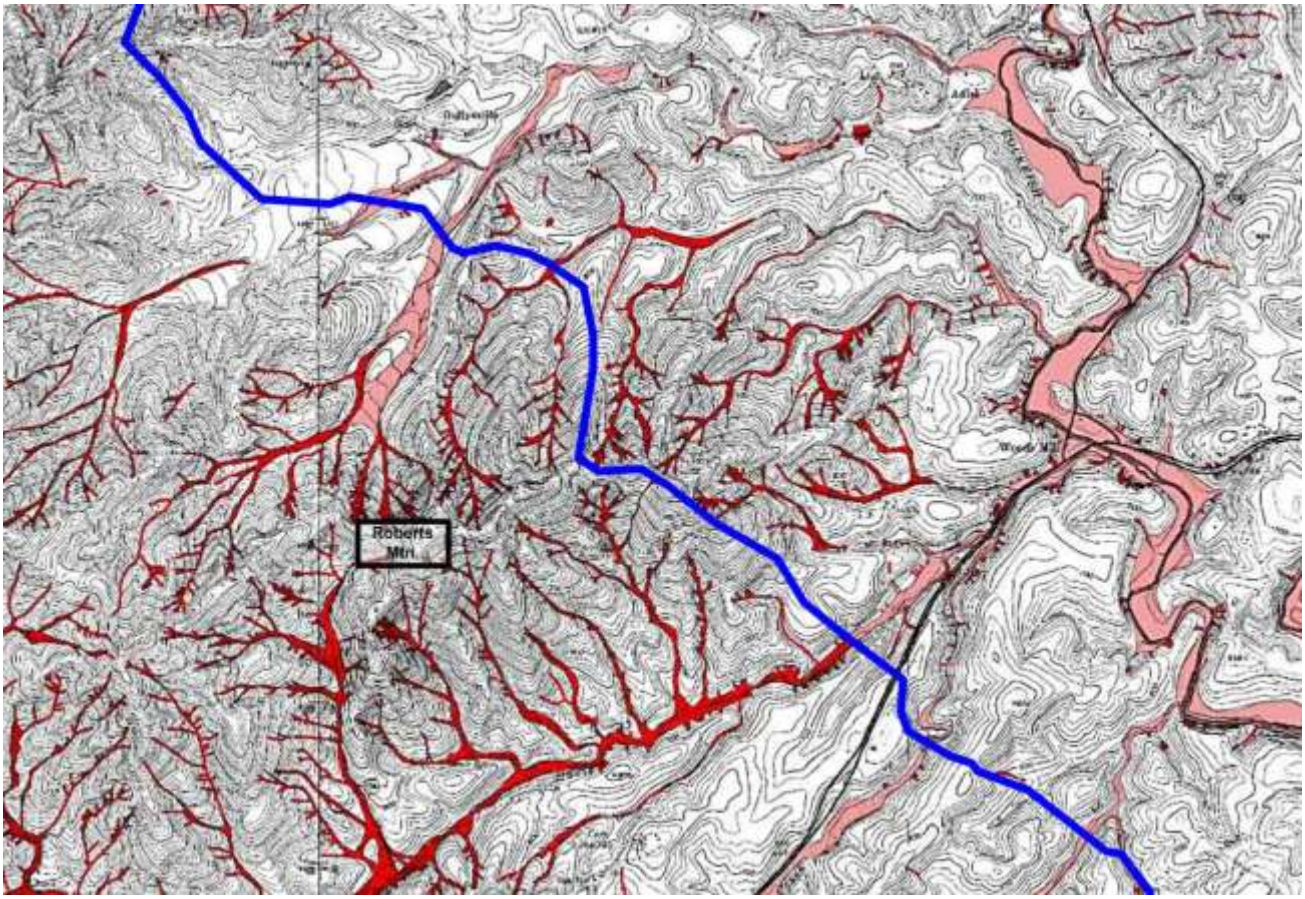

Figure 3: Debris Flows associated with Roberts Mountain and immediate vicinity

(By way of additional reference, a link to the full USGS report, "Erosional and Depositional Aspects of Hurricane Camille in Virginia", 1969"[3], that further analyzes and documents several representative debris flows that occurred in the area has been provided in the References. In addition, a copy of the section of the Commonwealth of Virginia Hazard Mitigation Plan[4] having to do with risks associated with the occurrence of landslides, including the risk to Energy Pipelines, has also been linked). Finally, please also find the attached representative photos taken in the Davis Creek watershed in 1969 once people were able to access the area, that provide additional "on-the-ground" documentation of some of the destructive landslides and resulting debris flows and fans.)

Among its findings, the above-mentioned USGS report indicates that "Steep hillslopes provided excellent conditions for mass wasting." [5], and also notes that, "…the hillside depressions where avalanches tend to occur are themselves the scars of former avalanches or of similar rapid erosional processes." [6], as well as that "…all the fresh fan deposits here were formed on old alluvial fans; so the 1969 storm was only one in a chain of similar major events in the geographic history of the area." [7] It would seem apparent from these conclusions that not only have these events been recurrent in nature, but that their recurrence is in fact made more likely due to the history of past occurrence. Recognition of this factor must function to amplify concern regarding the effects of a construction project in terrain that has been shown to be already conducive to debris-flow events. The recent history of Nelson County and the area draining the slopes of Roberts Mountain (as well as other steep terrain in the area) can thus only bring these concerns into sharper focus, i.e., that the construction of a 42 inch diameter pipeline through an area such as this will only compound the existing propensity for soil slippage due to the additional deforestation, land disturbance, and potential difficulties involved with the re-establishment of vegetative cover.

As might be expected, the project developer has maintained that such concerns are basically groundless and that so-called "best-in-class" mitigation measures will suffice to prevent the recurrence of an event similar to what happened in 1969. (If the record compiled during the construction of the Mountain Valley Pipeline, another FERC-approved project currently under construction through similar terrain, is any indication, such claims may be viewed as highly suspect at best.) Furthermore, as FERC, in its EIS, has now apparently lent its agreement to the opinion that these measures will be sufficient, it may well turn out that it will ultimately be up to your agency to do the analysis and permitting required to ensure that the construction in these areas will not result in further serious water quality issues, as well as the potential for additional destruction of both public and private property and loss of life.

Furthermore, in 2017, an independent study was subsequently undertaken that specifically focused on Nelson County's steep terrain, including the previously-mentioned Roberts Mountain area (as well as the HDD exit near the entrance to the Wintergreen Resort and the pipeline's ascent up adjacent Piney Mountain) and provides an independently-derived summary of the relevant issues specific to the construction the project through the area. This study, the Nelson County Report, "Report Analysis and Field Verification of Soil and Geologic Concerns with the Atlantic Coast Pipeline" by nationally-recognized geotechnical consulting firm, Blackburn Consulting Services, LLC, includes, among others, the summary statement, "Our conclusion from this work is that the potential for debris flows in the very steep mountainous portions of Nelson County are underestimated by the reports submitted to FERC by Dominion"[8], and goes on to state that, "Dominion has not adequately identified those soils and landforms that are prone to debris flows/landslides, nor have they adequately addressed how they plan to mitigate those *site-specific hazards that can put people, property and water quality at extreme risk*." [9] (Emphasis mine.)

Recognition of this fact can only function to amplify concern regarding the effects of a construction project in terrain that has been shown to be already conducive to repetitive debris-flow events, while the recent history of Nelson County and the specific area draining the slopes of Roberts Mountain can only bring these concerns into yet sharper focus. The construction of a 42-inch diameter pipeline through an area such as this will only compound the existing propensity for soil slippage resulting in vastly increased downstream siltation due to the additional land disturbance, deforestation, as well as ACP-acknowledged difficulties regarding the re-establishment of vegetative cover on the disturbed areas. Indeed, as Licensed Professional Geologist Pam Dodds has expressed in a separate analysis, this overall process may be sequentially summarized as follows.

> *"There will be deforestation, soil compaction, and dewatering during construction of the proposed ACP gas pipeline installation. When rainwater is intercepted by trees on forested ridges, the rainfall gently penetrates the ground surface and migrates downward through the soil to bedrock. The water then flows through bedrock fractures and along bedding planes to continue migrating downward or to form seeps and springs where the fractures or bedding planes intercept the ground surface. Deforestation results in increased stormwater runoff and decreased groundwater recharge. Deforestation facilitates greater rainfall impact, causing erosion. The increased stormwater discharge transports sediment to receiving streams. Where sediment is released to receiving streams during construction activities, the sediment accumulates in the stream beds, increasing embeddedness, which remains in the stream bed after construction has been completed. The increased stormwater discharge in the streams also results in downstream stream bank erosion, releasing additional sediment to the streams. Increased embeddedness, resulting from sediment accumulation in streams, fills in the spaces between cobbles and boulders on the stream bed, thereby destroying the aquatic habitats for benthic macroinvertebrates and also destroying protective areas for juvenile fish and small fish.*
>
> *Soil compaction from heavy equipment in the construction corridor, and also from stockpiled soil in the sediment underlying the stockpiled soil, results in increased stormwater runoff and decreased groundwater recharge.*

Dewatering of the pipeline trench intercepts groundwater and directs the groundwater through pipes and/or French drains onto the ground surface. Trench dewatering thereby increases surface runoff while decreasing groundwater. The pipes and/or French drains remain in place after completion of construction, causing continual interception of groundwater and directing of the groundwater onto the ground surface. Again, the increased surface runoff transports sediment to receiving streams and increases stormwater discharge, causing downstream stream bank erosion."[10]

With the foregoing background in mind (much of which has been submitted previously to FERC during the comment process, but was apparently disregarded in the production of the EIS), a completely new study with the capability of adding a wealth of new data re: the number and extent of soil slippage events that occurred in Nelson in 1969 has now been undertaken. This current study by the Virginia Department of Mines, Minerals, and Energy (DMME), under the direction of Dr. Ann Witt, geohazards specialist, is currently in the process of surveying the same area using aerial Light Detecting and Ranging (LiDAR) technology that is capable of imaging the geography that is otherwise hidden in aerial photography by the forest canopy and other vegetation.[11] The resulting detailed 3-dimensional images of the ground surface make possible the identification of the remnants of debris flows and slides that would otherwise not be visible, resulting in a significantly enhanced accounting of the prevalence and extent of such events. While the study is still in its preliminary stages, the data gathered so far provide a first indication that the sheer number of soil slippage events is dramatically greater than previously supposed, and only reinforces the argument that the propensity for soil slippage in the affected areas is far greater than it was made out to be in the FEIS for the ACP.

The following representative images of a neighboring area in the cluster of mountains immediately to the south of Roberts Mountain give an idea of the potential for LiDar technology to shed additional light on the results of the 1969 event.

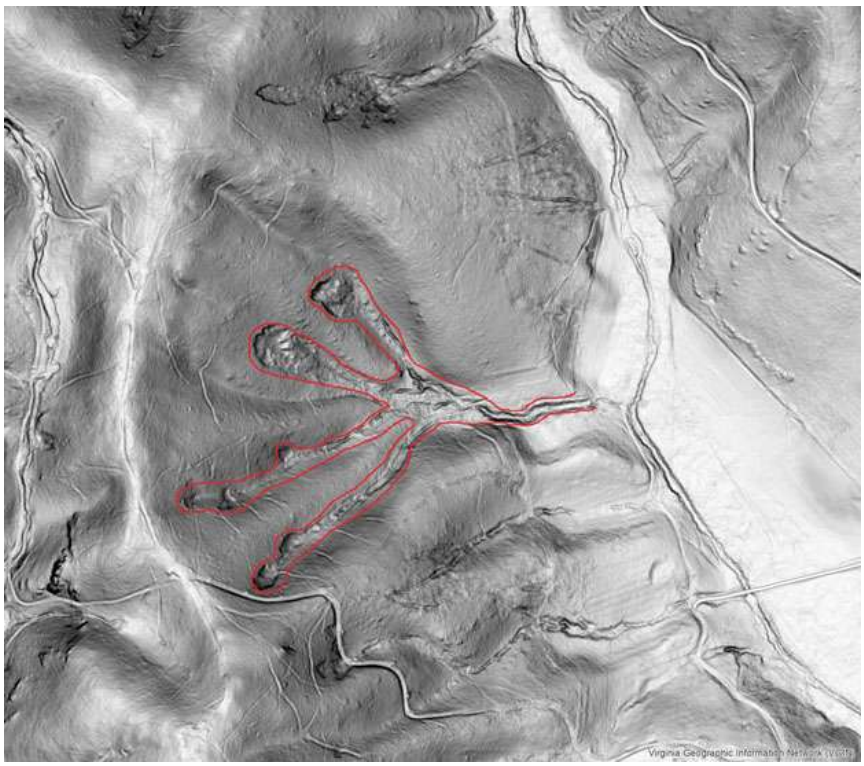

Figure 4: Landslide features are outlined in red in this LiDAR-derived slope-shade basemap. These features are at Fortune's Cove in Nelson County, Virginia.

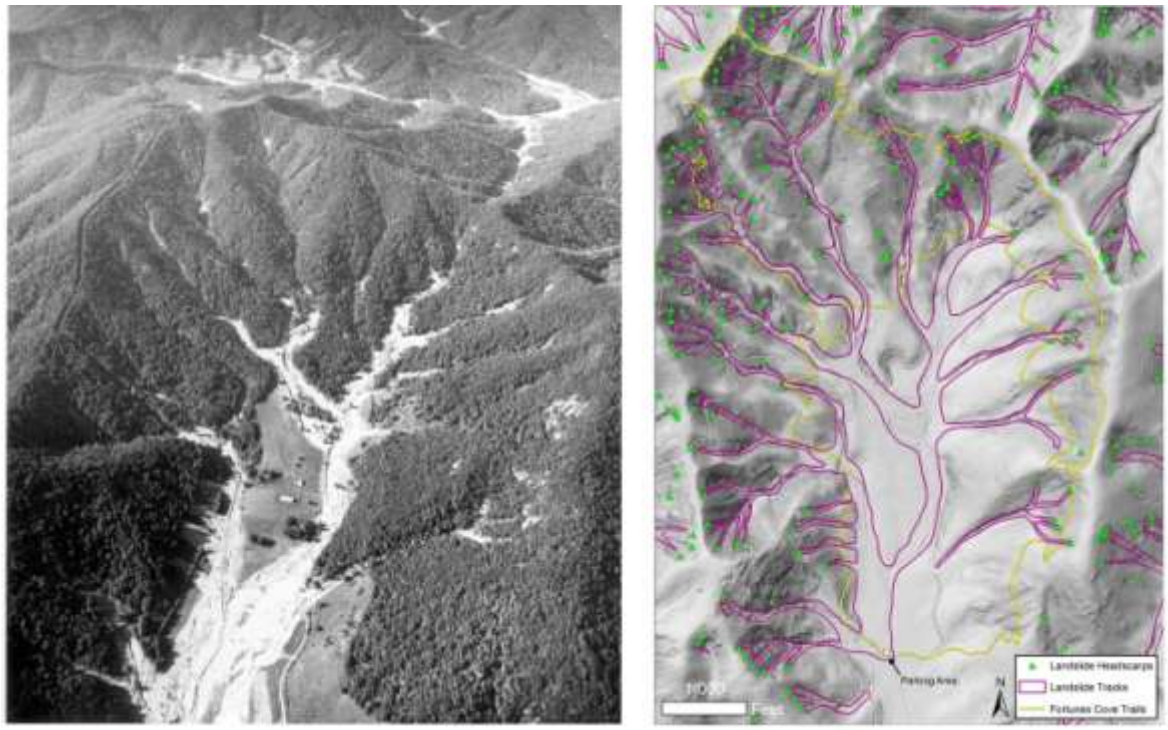

Figure 5: Left: An aerial view of Fortune's Cove taken days after Hurricane Camille. View to the north. Right: Landslide features in Fortune's Cove, as they appear on the 2016 LiDAR basemap.[12]

The following map summarizes what the study has found so far in terms of the sheer number and extent of soil slippage during the 1969 event, and illustrates the number that occurred on, or immediately adjacent to the current ACP route.

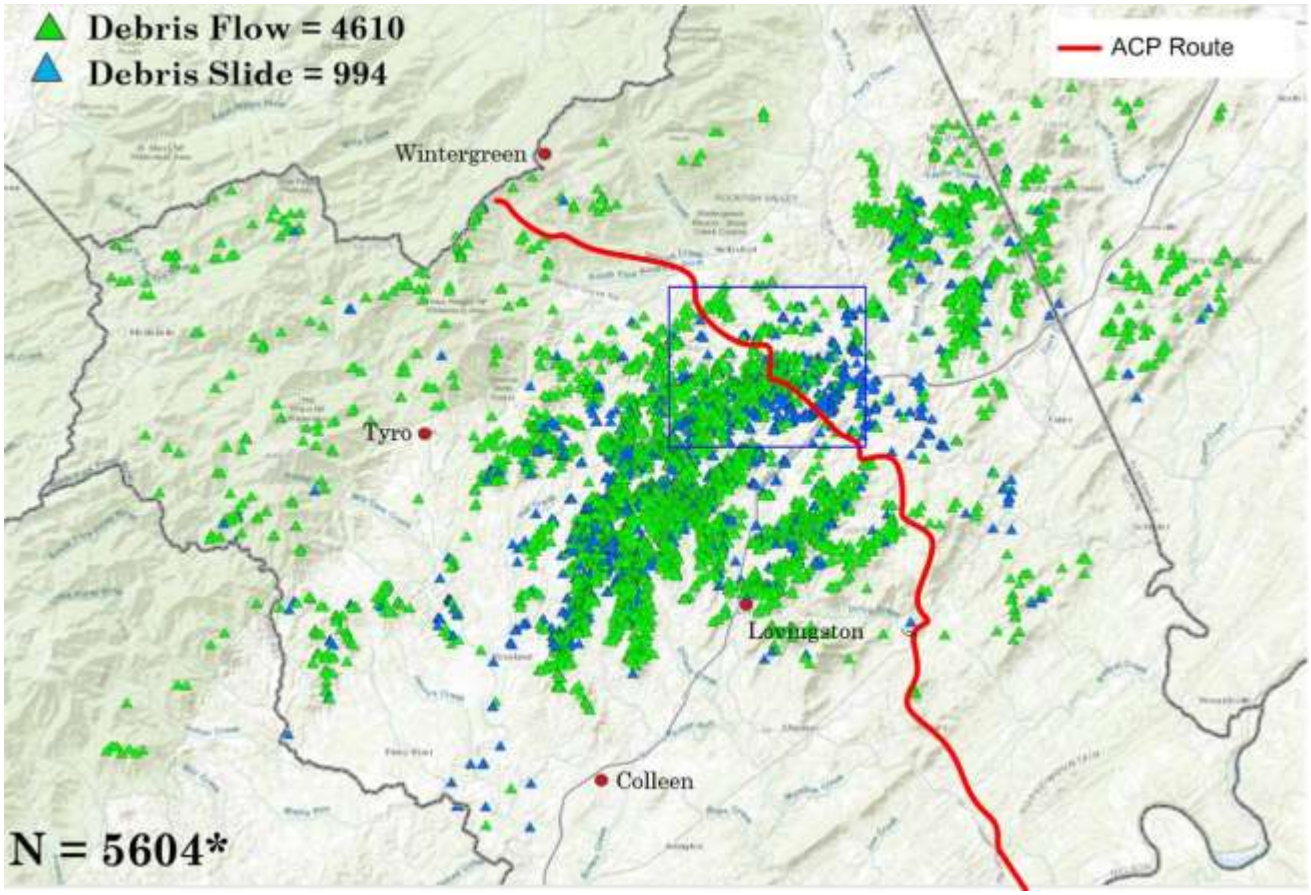

Figure 6: Soil slippage events in Nelson County, VA as revealed by DMME LIDAR study. (The ACP route is overlaid in red and the area focused on in Figure 3 is outlined in blue.)

Clearly, these new data render the claim made in the FEIS, that "Atlantic incorporated a route alternative (the East of Lovingston Major Route Alternative) to avoid the debris flows and other features identified by the USGS", substantially less accurate (and potentially more misleading) than previously thought, and in fact, function to reinforce the already convincing evidence summarized above that the conclusions of the EIS are flawed, and that rather than avoiding them, the current route cuts directly through some of the areas of heighest density of debis slides and flows. In fact, as shown in Figure 5 above, these features are revealed to be not only more numerous, but *frequently located much closer to the ridgelines along which the pipeline is typically slated to be routed than has been previously been apparent*.

One of the chief problems with constructing pipelines through areas with high propensity for soil slippage, landslides, and debris flows is, of course, the increased potential for pipe rupture, and resulting explosion, when the soils that surround the pipe shift, effectively removing the support and protection that they would normally provide, and potentially subjecting the pipe to lateral and other forces that it has not been designed to withstand. Indeed, such scenarios have recently played out under real-world cirumstances. For example, on June 7, 2018 the TransCanada "Leach Express", a 36" natural gas pipeline, exploded near the town of Moundsville, WV destroying at least one family's home. It had been in service for only five months. The cause was attributed to a landslide, or "soil slippage".[13] More recently, on Sept. 10 of the same year, another new pipeline exploded in Beaver County, PA following heavy rainfall. It had had been in service for one week. An early assessment of the explosion site showed there had been "earth movement in the vicinity of the pipeline".[14] (Additionally, in the longer term, shifting soil may function to abrade the protective coating on the pipe and impacts to the pipe by larger rocks may also damage it, resulting in increased corrosion rates, leaks, and explosions.)

Clearly, the risk to public safety is significantly exacerbated when pipeline projects are constructed through areas of steep slopes, especially those that have historically experienced major soil slippage, and it is increasingly apparent that the analysis of the evidence in the EIS regarding the threat for increased debris flow activity along the ACP's route through Nelson County, and other areas of similar terrain, is both incomplete and seriously flawed. Furthermore, the appearance of new data showing that the pre-existing disturbance of soils covering the steep terrain of Nelson County may actually be even more prevalent than thought previously, must amount to additional grounds for reconsideration of the ACP's permit of public necessity and convenience. The Commission is therefore called upon not only to take any time that may be required to thoroughly revisit this situation, but also to review, on an ongoing basis, any emerging data that are relevant, and to take them, and their implications for public safety, into account in any subsequent decisions that may become appropriate and/or necessary in the future, and especially in any consideration of alternate routing that may be made necessary by subsequent court decisions.

I trust this information will function to lend a broader perspective to issues stemming from the potential construction of the ACP in the steep terrain of Nelson County, as well as, by extension, through other areas of similar terrain in the Commonwealth, and trust that they will contribute to both the further evaluation of these issues and the development of permitting requirements that will ensure the future protection of our Commonwealth's water quality, infrastructure, private property, and public safety.

Respectfully Submitted by,

James Bolton

Cc: Pipeline and Hazardous Materials Safety Administration (PHMSA)

Links and References:

1 Atlantic Coast Pipeline and Supply Header Project Draft Environmental Impact Statement, Volume I, Section 4.1.4.2 (Environmental Analysis, Slope Stability), p.4-26. Published by FERC, December 30, 2016.
2 https://pubs.usgs.gov/of/1999/ofr-99-0518/map/nel_map.pdf
3 Williams, Garnett P. and Guy. Harold P., Erosional and Depositional Aspects of Hurricane Camille in Virginia, 1969,Geological Survey professional Paper 804, https://pubs.usgs.gov/pp/0804/report.pdf
4 Commonwealth of Virginia Hazard Mitigation Plan, Chapter 3, Hazard Identification and Risk Assessment (HIRA), Section 3.12 Landslides, http://www.vaemergency.gov/wp-content/uploads/drupal/Section3-12-Landslide.pdf
5 https://pubs.usgs.gov/pp/0804/report.pdf , p.7.
6 Ibid., p. 28.
7 Ibid., pp.48-49.
8 Blackburn Consulting Services, Nelson County Report, Report Analysis and Field Verification of Soil and Geologic Concerns with the Atlantic Coast Pipeline in Nelson County, VA, 2017, http://friendsofnelson.com/wp-content/uploads/2017/03/Final-Steep-Slope-Report-March-2017.pdf, p.1.
9 Ibid., p.2.
10 Dodds, Pam (Ph.D.), Licensed Professional Geologist (304-823-1095, pamelart@hughes.net), Hydrogeology Reports for Buckingham County, April 12, 2018.
11 https://www.dmme.virginia.gov/DGMR/lidar.shtml
12 https://www.dmme.virginia.gov/dgmr/FEMA_Landslide.shtml
13 https://www.post-gazette.com/local/region/2018/06/07/Pipeline-explosion-moundsville-west-virginia/stories/201806070129
14 https://triblive.com/local/regional/14064921-74/early-morning-pipeline-blast-forces-evacuations-in-beaver-county

Photos taken in 1969 in the Davis Creek watershed (bordered to the north by Roberts Mountain):