

HIBERNACULA SEARCHES AND HARP TRAPPING SURVEYS ALONG THE PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN CRAIG, FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOKE COUNTIES, VIRGINIA

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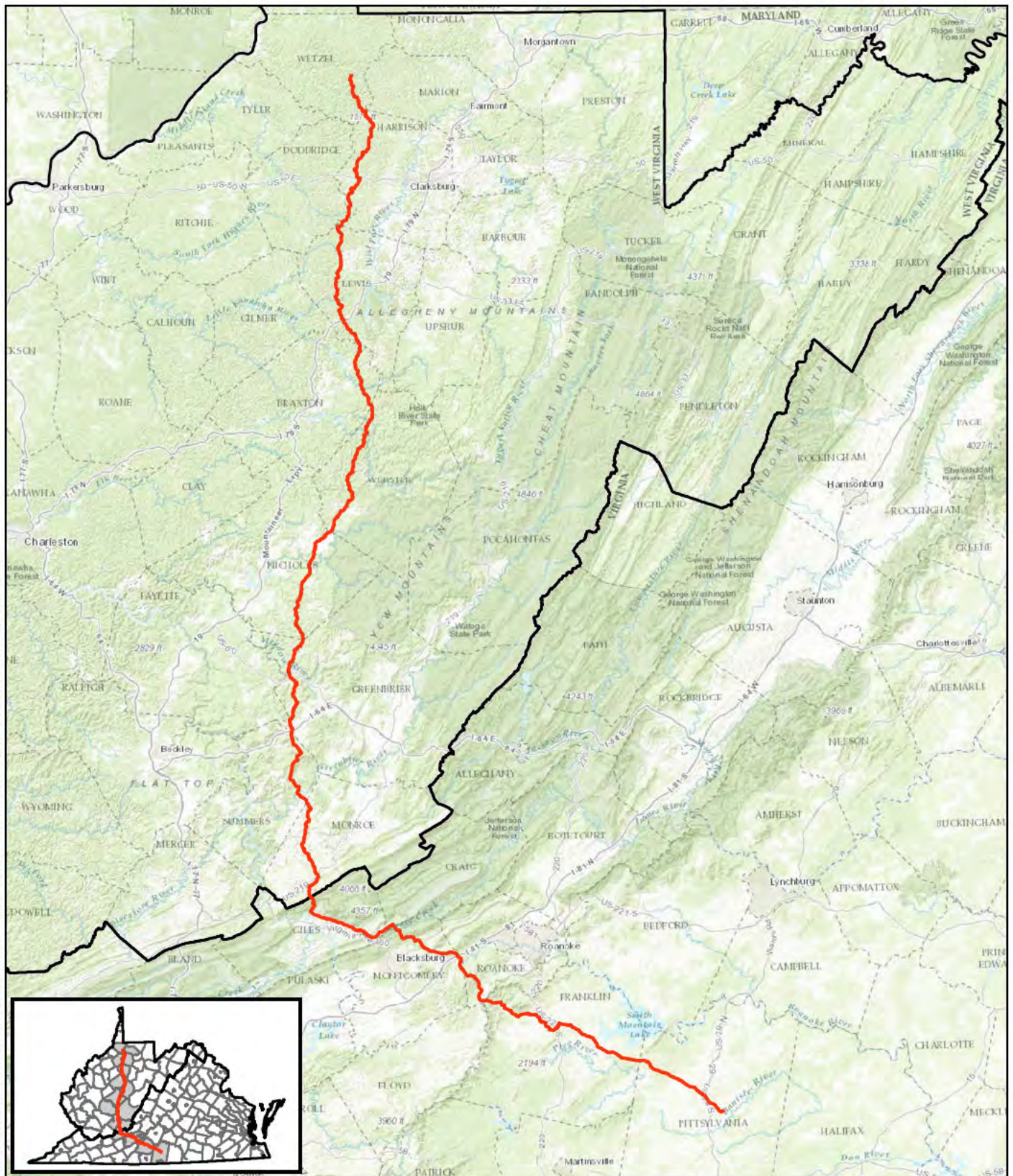
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1.0 Project Description

Mountain Valley Pipeline, LLC (MVP), a joint venture between EQT Midstream Partners, LP, NextEra Energy, Inc., WGL Holdings, Inc., Vega Energy Partners, Ltd., Con Edison Gas Midstream, LLC, and RGC Midstream, LLC, is seeking a Certificate of Public Convenience and Necessity from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act (NGA) authorizing it to construct and operate the proposed Mountain Valley Pipeline Project (Project) located in 17 counties in West Virginia and Virginia. MVP plans to construct an approximately 488.3-kilometer (303.4-mi), 106.7-centimeter (42-in) diameter natural gas pipeline to provide timely, cost-effective access to the growing demand for natural gas for use by local distribution companies (LDCs), industrial users and power generation in the Mid-Atlantic and southeastern markets, as well as potential markets in the Appalachian region.

The proposed pipeline will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to the existing Transcontinental Gas Pipe Line Company, LLC's (Transco) Zone 5 compressor station 165 in Pittsylvania County, Virginia (Figure 1). In addition to the pipeline, the Project will require approximately 171,600 horsepower (hp) of compression at three compressor stations currently planned along the route as well as measurement, regulation, and other ancillary facilities required for the safe operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day (MMDth/d) of natural gas.

The current route as proposed includes a permanent right-of-way (ROW) with a width of 50 feet. This encompasses a total of 481.57 hectares (1,190.0 ac) in West Virginia and 264.70 hectares (654.1 ac) in Virginia. The width of the construction ROW is 125 feet at its widest, which will temporarily impact an additional 687.88 hectares (1,699.8 ac) in West Virginia and 370.04 hectares (914.40 ac) in Virginia. The Project will require construction of three compressor stations (Bradshaw, Harris, and Stallworth Stations) and four meter (interconnect) stations to receive and move gas from the beginning of the pipeline at the existing Equitrans transmission system in Wetzel County, West Virginia to the terminus at the Transco Station 165 in Pittsylvania County, Virginia. Additional ancillary aboveground facilities include pig launcher and receiver sites at the compressor stations, meter stations, and beginning and end of the pipeline, along with mainline block valve sites within the pipeline ROW. Temporary and permanent access roads will be used to assist in the safe construction and operation of the Project. A detailed series of maps showing all Project permanent and temporary features is provided in Appendix A.



— October 2016 Proposed Route

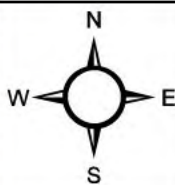


Figure 1. Location of the Mountain Valley Pipeline Project in West Virginia and Virginia.

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This report provides details regarding winter hibernacula searches and associated harp trap sampling efforts conducted in Giles, Craig, Montgomery, Roanoke, Franklin, and Pittsylvania counties, Virginia during 2016. Survey efforts in West Virginia are not included in this report, but are submitted to the West Virginia Elkins Field Office of the United States Fish and Wildlife Service (USFWS). A summary of the 2014 – 2015 hibernacula search and sampling efforts in Virginia is provided in Section 2.3 below, and a complete report was submitted for agency review on January 11, 2016.

2.0 Regulatory Setting

2.1 Endangered Species Act

The Federal Endangered Species Act (ESA) [16 U.S.C. 1531 et seq.] was codified into law in 1973. This law provides for the listing, conservation, and recovery of endangered and threatened species of plants and wildlife. Under the ESA, the USFWS is mandated to monitor and protect listed species.

Section 9 of the ESA prohibits the take of listed species unless otherwise specifically authorized by regulation. Take is defined by the ESA as, “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” [16 U.S.C. 1532(19)]. USFWS further defines harm to include significant habitat modification or degradation [50 CFR §17.3] to the point where it actually kills or injures an individual or significantly impairs essential behavioral patterns, including feeding, breeding, and sheltering. Harassment is an intentional or negligent act or omission that creates the likelihood of injury by annoying an individual to such an extent as to significantly disrupt formal behavior patterns, which include but are not limited to breeding, foraging, and sheltering. Harassment does not cover habitat disturbing activities.

Section 7(a)(2) of the ESA states that each federal agency shall insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of designated critical habitat. Federal actions include (1) expenditure of federal funds for roads, buildings, or other construction projects, and (2) approval of a permit or license, and the activities resulting from such permit or license. Compliance is required regardless of whether involvement is apparent, such as issuance of a federal permit, or less direct, such as federal oversight of a state-operated program.

Actions of federal agencies that do not result in jeopardy or adverse modification, but that could result in a take, must also be addressed under Section 7.

Take by a federal agency can be authorized through the Section 7 consultation process, culminating in an Incidental Take Statement (ITS) by the USFWS. The take must be incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

In 1982 amendments to the ESA, Congress established a provision in Section 10(a)(1)(B) that authorizes incidental take by nonfederal entities. To obtain an Incidental Take Permit (ITP), an applicant must submit a conservation plan specifying impacts that result in take and measures to minimize and mitigate those impacts. Regardless of whether incidental take might be covered under Section 7 or Section 10, it is the obligation of the project proponent to avoid and minimize impacts to listed species. If, through this process, take is avoided, then an ITS or ITP is not required. The initial step in avoidance and minimization is to determine whether suitable habitat and listed species are present.

2.2 Regional Occurrence of Listed Bats

The Project is within the ranges of the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*). The northern long-eared bat was recently listed as threatened under ESA in May 2015, and the Indiana bat was listed as endangered under ESA in March 1967. Detailed natural histories of Indiana and northern long-eared bats are provided in Appendix B.

2.2.1 Indiana Bat

The Indiana bat is known to hibernate in 18 caves in Greenbrier, Mercer, Monroe, Pendleton, Preston, Randolph, and Tucker counties, West Virginia. Approximately 9,000 Indiana bats over-winter in Hellhole Cave in Pendleton County (USFWS 2007), the largest wintering population in eastern United States. There are two Priority 3/4 winter hibernacula within 8-kilometers (5 mi) of the Project; Greenville Saltpeter Cave in Monroe County, West Virginia and Tawney's Cave in Giles County, Virginia. The maximum all-time population estimate for Indiana bats within the Greenville Saltpeter Cave is 300 (USFWS 2007), but unpublished data maintained by the West Virginia Division of Natural Resources (WVDNR) suggest the current winter population to be less than 10 individuals. The maximum all-time population estimate for Indiana bats within Tawney's Cave is 14 (USFWS 2007), but in-cave winter surveys conducted in 2009, 2011, and 2013 yielded zero hibernating Indiana bats (Powers et al. 2015), suggesting this cave is no longer occupied by this species during winter.

2.2.2 Northern Long-Eared Bat

Although this species is never abundant in winter intra-cave/hibernaculum surveys, it is one of the most common bats captured during summer mist net surveys in wooded areas of West Virginia and portions of nearby Ohio. It can also be common in the capture at cave entrances during autumn swarming, but more information is needed to understand where this species hibernates in West Virginia (Stihler 2013). There

are three known winter hibernacula within 8 kilometers (5 mi) of the Project; Greenville Saltpeter Cave in Monroe County, West Virginia, Canoe Cave in Giles County, Virginia, and Tawney's Cave in Giles County, Virginia. Comments received from the VDCR-DNH on January 4, 2016 indicate an historic record of a single northern long-eared bat hibernating in Canoe Cave in February 1982. In-cave winter surveys conducted at Tawney's Cave in 2009, 2011, and 2013 yielded zero hibernating northern long-eared bats (Powers et al. 2015).

2.3 Previous Studies

Searches for undocumented mine and cave openings occurred over multiple deployments from December 2014 through November 2015 within 78.09 hectares (192.97 ac) of the Project's current 1,734.05-hectare (4,284.94-ac) survey corridor in Virginia. The Project survey corridor includes a 45.7-meter (150-ft) buffer around the proposed centerline, a 7.6-meter (25-ft) buffer around access roads, and the construction footprints of non-linear features (i.e., additional temporary workspaces, staging areas, pipe yards, aboveground facilities, etc.). Five underground voids were identified and assessed during pedestrian searches, and three (Overlooked Cave, Canoe Cave, and Sinkhole) were determined to be potentially suitable for hibernating bats. Canoe Cave is considered a known, northern long-eared bat hibernaculum and was not sampled. Lack of land access prevented harp trap sampling from occurring at Overlooked Cave in 2015, but Sinkhole was sampled September 29, 2015 and October 20, 2015. No bats were captured. A final report was submitted to the USFWS Gloucester Field Office and the Virginia Department of Game and Inland Fisheries (VDGIF) on January 11, 2016.

2.4 Current Studies

Route adjustments and limited access to private properties precluded completion of portal surveys in 1,655.96 hectares (4,091.97 ac) of the 1,734.05-hectare (4,284.94-acre) survey corridor. A study plan outlining methods proposed for portal surveys and sampling was submitted to the USFWS Gloucester Field Office and the VDGIF on November 3, 2014. The study plan underwent several revisions, and site-specific authorization from the USFWS and VDGIF was received on May 8, 2015 and May 11, 2015, respectively. An updated study plan for portal surveys in 2016 was not submitted to the agencies, as the overall survey methods and qualified surveyor(s) did not differ from those originally proposed in 2015. Studies were carried out under current VDGIF Scientific Collection and Threatened and Endangered Species permits.

3.0 Methods

3.1 Desktop Analysis

Before initiating field studies, a GIS desktop analysis is completed to locate known underground features near (within 4.8 kilometers [3 mi] in VA) the Project that could potentially serve as winter hibernacula (mines and caves). Several resources are used to perform this analysis including data from:

- Virginia Department of Mines, Minerals, and Energy (<http://www.dmme.virginia.gov/>) that details the locations of karst features, sinkholes, and abandoned mines
- GIS data provided by the Virginia Speleological Society
- USGS topographic maps and current aerial imagery (to search for any indication of past and current mining related activity such as evidence of mine test pits or non-maintained access roads).

When land access is granted, any underground features identified near the Project are visited by permitted bat biologists to confirm the presence and determine potential suitability.

Desktop analyses of available databases confirmed the presence of mining activities and karst geology within 4.8 kilometer (3 mi) of the Project (Appendix C).

3.2 Field Searches for Cave and Mine Features

Field searches to locate portals were completed between January and October 2016. A pedestrian search was conducted within a 91.4-meter (300-ft) wide environmental survey corridor. In general, it is not possible for biologists to gain land access beyond the limits of the designated environmental survey corridor; however, in some instances (i.e., mist-netting) biologists do gain access to areas farther away from the centerline (generally up to 0.5 kilometer [0.3 mi]). As such, following the *Northern Long-eared Bat Interim Conference and Planning Guidance*, ESI biologists search for and evaluate any underground features encountered incidental to other field surveys up to 0.5 kilometer (0.3 mi) to either side of the Project centerline. Searches along the Project ROW, access roads, and aboveground and ancillary facilities are completed by walking along the proposed path; biologists search not only for holes in the ground, but also tailings, slag, benches, high-walls, seams, vents, drainage, abandoned structures, and areas of auger activity that could indicate the potential presence of open mine portals. To the degree that property access is provided, mine or cave features on the ROW are followed until they end, to locate any void openings near the proposed Project.

If voids are found, biologists record locations using a GPS unit, complete a potential hibernacula description data sheet, and take photographs. All voids are assessed for their potential to serve as suitable bat hibernacula based on the West Virginia USFWS's *Draft Protocol for Assessing Abandoned Mines/Caves for Bat Use* (Updated June 2011). In general, portals will be deemed unsuitable for bat use and not require subsequent sampling when:

- Only one opening can be found and it is < 15.2 centimeters (6 in) in diameter with little to no outward air flow
- Vertical shafts are < 0.3 meter(1 ft) in diameter
- Passage continues < 15.2 meters (50 ft) and terminates with no fissures available for bats to access
- Openings are prone to flooding, collapse, heavy predation, or otherwise inaccessible to bats
- The opening(s) has occurred recently due to creation or subsidence

Biologists also note the presence/absence of guano, outside temperature at void, temperature inside the void, percent canopy closure at void, approximate distance to nearest water source, and if the void is obstructed by vegetation or spider webs.

3.3 Hibernacula Survey/Trapping

A harp trap survey is completed at portals determined suitable for bat use. Portal trapping follows guidelines contained in the USFWS 2011 *Draft Protocol for Assessing Abandoned Mines/Caves for Bat Use* and Appendix B of the USFWS 2014 *Northern Long-eared Bat Interim Conference and Planning Guidance*. In Virginia, trapping is conducted prior to any tree clearing from 1 to 21 April or 1 September to 31 October, beginning one-half hour before sunset and continuing for at least 5 hours. Weather conditions include temperatures above 10° Celsius (50° F) for the first two hours, and temperatures remaining above 1.6° Celsius (35° F) until midnight. Sampling is not completed during precipitation, including rain and/or fog that does not stop within 30 minutes or continues intermittently during the survey period. Sampling will also cease if high winds occur and become strong enough to move equipment more than 50 percent of the time. A harp trap is positioned at the portal entrance, and bird netting is hung to block the space surrounding the entrance. Traps are checked at 10-minute intervals. For fall harp trapping, a minimum of two evenings of sampling is completed at each suitable entrance. For spring harp trapping, one night of sampling per week from 1 to 21 April is completed at each suitable entrance.

Concurrent with harp trapping, an acoustic detector is placed near the portal entrance. Bat passes are monitored and tallied for at least one hour after 10:00 PM. All files recorded are passed through a noise filter previously provided by the USFWS. A qualified biologist reviews files that pass the filter to eliminate any that were not produced by bats and to note the number of files that contain multiple bats.

4.0 Results

4.1 Field Searches

Three previously undocumented portals and four known caves were identified and assessed during pedestrian field searches in 2016. A detailed description of each potential hibernacula is provided below. Table 1 summarizes all potential hibernacula documented in West Virginia since surveys began in December 2014. Maps showing portal locations are provided in Appendix D, photographs are provided in Appendix E, and portal description data sheets are provided in Appendix F.

4.1.1 Old Mill Cave

Old Mill Cave was assessed on June 22, 2016. The cave is a horizontal opening located along an existing road (Mill Creek Road) in Montgomery County, Virginia. The cave entrance is approximately 1 meter (3.3 ft) high and 1.5 meters (4.9 ft) wide with an estimated internal height and width of 5 meters (16.4 ft) by 10 meters (32.8 ft). The cave extends approximately 15.2 meters (50 ft) from the entrance before it becomes too narrow for further investigation. Biologists noted the presence of a spring and evidence of a ceiling collapse within the cave. No evidence of use by bats was observed, but the cave was recommended for a subsequent harp trap survey.

4.1.2 Crooks Crevice

Crooks Crevice was assessed on June 22, 2016. The cave has two vertical openings located along an existing road (Buffalo Anklets Drive) in Giles County, Virginia. The main entrance is approximately 0.9 meter (3 ft) wide with estimated internal height and width of 0.4 meter (1.5 ft) by 0.9 meter (3 ft). The entrance and ceiling of the cave appeared stable, and the depth of the cave is estimated to be greater than 15.2 meters (50 ft) from the entrance. No evidence of use by bats was observed, but the cave was determined to be potentially suitable and recommended for a subsequent harp trap survey.

4.1.3 Homer Williams Cave

Homer Williams Cave was assessed on June 22, 2016. The cave is a horizontal opening in Giles County, Virginia along a 10-degree slope with 35 percent canopy cover at the entrance. The opening is approximately 1 meter (3.3 ft) high and 2 meters (6.6 ft) wide with an estimate internal height and width of 3.2 meters (10.5 ft) by 5 meters (16.4 ft). The shaft extends over 36.6 meters (120 ft) from the entrance. The entrance and ceiling appeared stable, and no evidence of a recent collapse was observed. The cave was determined to be potentially suitable for hibernating bats and was recommended for a subsequent harp trap survey.

Table 1. Portals identified along the Mountain Valley Pipeline Project in Virginia.

Portal Opening ID	County	Milepost	Date Assessed	# of Openings	Potentially Suitable?	Date(s) Surveyed	Comments	Distance to Construction Workspace (Meters)
PS-VA2-A-P1	Giles	201.0	4/10/2015	1	No	n/a		19.23
Small Hole	Giles	202.0	6/22/2016	1	No	n/a		0.00
Crooks Crevice	Giles	202.0	6/22/2016	2	Yes	9/27/2016, 9/30/2016	No bats captured	0.00
MLM-PO-0004	Giles	209.9	10/12/2016	1	Yes	10/16/2016, 10/17/2016	No bats captured	40.00
Homer Williams Cave	Giles	209.9	6/22/2016	1	Yes	10/12/2016, 10/13/2016	No bats captured	40.30
██████████	Giles	████	9/18/2015	3	Yes	n/a	Known Indiana bat hibernaculum; considered occupied by Indiana and northern long-eared bats for this Project	39.80
██████████	Giles	████	9/18/2015	1	Yes	4/17-21/2016, 10/14/2016, 10/15/2016	No bats captured during spring or fall sampling, but tri-colored bat observed within the cave during fall 2016	14.31
Sinkhole	Giles	213.0	9/18/2015	2	Yes	9/29/2015, 10/20/2015	No bats captured	79.20
██████████	Giles	████	9/17/2015	1	Yes	n/a	Known northern long-eared bat hibernaculum; considered occupied by Indiana and northern long-eared bats for this Project	397.88
PS-VA7-M-P1	Craig	218.1	4/13/2016	1	No	n/a		19.05
Fred Bulls Cave	Montgomery	221.7	7/14/2016	2	Yes	n/a	Not surveyed due to feature occurrence well outside of the Project's survey corridor	654.63
P-DG-001	Montgomery	225.9	8/11/2016	1	No	n/a		0.00
P-DG-002	Montgomery	225.9	8/11/2016	1	Yes	10/03/2016, 10/04/2016	No bats captured	7.02
Old Mill Cave	Montgomery	226.5	6/22/2016	1	Yes	10/01/2016, 10/02/2016	No bats captured	1,426.39

4.1.4 Small Hole

Small Hole was assessed on June 22, 2016. The portal is a vertical opening located in Giles County, Virginia along a 50-degree slope with approximately 90 percent canopy cover at the entrance. The portal is approximately 0.3 meter (1 ft) high and 0.6 meter (2 ft) wide at the entrance with an estimated internal height and width of 20.3 centimeters (8 in) high by 43.2 centimeters (17 in). The shaft extends approximately 1.8 meters (6 ft) from the entrance. The portal entrance appears stable and no evidence of collapse was observed. No evidence of use by bats was observed, and the portal was determined to not be suitable for hibernating bats. A harp trap survey at Small Hole was not recommended.

4.1.5 Portal P-DG-001

Portal P-DG-001 was assessed on August 11, 2016. This portal is a vertical opening located in Montgomery County, Virginia along a 0-degree slope with approximately 85 percent canopy cover at the entrance. The portal is approximately 45.7 centimeters (18 in) high and 45.7 centimeters (18 in) wide at the entrance with an estimated internal height and width of 60.9 centimeters (24 in) by 60.9 centimeters (24 in). The shaft extends approximately 6 meters (20 ft) from the entrance. The entrance did not appear stable, and no evidence of use by bats was observed. This portal opening was reported as not suitable for use by bats, and was not recommended for a subsequent harp trap survey.

4.1.6 Portal P-DG-002

Portal P-DG-002 was assessed on August 11, 2016. This portal is a vertical opening in Montgomery County, Virginia along a 5-degree slope with approximately 90 percent canopy cover at the entrance. The portal is approximately 0.9 meter (3 ft) high and 3 meters (10 ft) wide at the entrance with an estimated internal height and width of 1.8 meters (6 ft) by 3 meters (10 ft). The shaft extends approximately 24.4 meters (80 ft) from the entrance. The entrance appeared stable and no evidence of recent use by bats was noted. This portal was reported as suitable for use by bats, and was recommended for a subsequent harp trap survey.

4.1.7 Portal MLM-PO-0004

Portal MLM-PO-0004 was assessed on October 12, 2016. This portal is a horizontal opening in Giles County, Virginia along a 5-degree slope with approximately 90 percent canopy cover at the entrance. The portal is approximately 60.9 centimeters (24 in) high and 1.5 meters (5 ft) wide at the entrance with an estimated internal height and width of 0.45 meter (1.5 ft) by 0.9 meter (3 ft). The shaft extends approximately 4.87 meters (16 ft) from the entrance. The entrance and internal ceiling appeared stable, and no evidence of recent use by bats was noted. This portal was reported as suitable for use by bats, and was recommended for a subsequent harp trap survey.

4.2 Hibernacula Survey/Trapping

Five potential hibernacula documented during pedestrian searches in 2016 within Virginia were determined to be suitable for hibernating bats and were recommended for survey. Of the four potentially suitable portals located during searches in 2014-2015, one (Overlooked Cave) remained to be surveyed via harp trapping in 2016. Capture and habitat data sheets are provided in Appendix G.

4.2.1 Overlooked Cave

Overlooked Cave was surveyed from April 17 to 21, October 14, and October 15, 2016. General habitat surrounding the cave was characterized as a young, upland deciduous forest dominated by tulip poplar (*Liriodendron tulipifera*). A closed canopy, moderately cluttered understory, and the lack of large live or dead trees provided low tree roosting potential for bats in the vicinity of the cave. No bats were captured in the harp trap, nor were bats observed flying in the vicinity of the cave sampling efforts. However, one tri-colored bat (*Perimyotis subflavus*) was observed roosting within the cave during harp trap efforts in October 2016.

4.2.2 Crooks Crevice

Crooks Crevice was surveyed from September 27 to 30, 2016, but inclement weather precluded five hours of harp trap efforts on September 28 and 29, 2016. General habitat surrounding the cave was characterized as a young, lowland deciduous forest dominated by tulip poplar, black walnut (*Juglans nigra*), and black locust (*Robinia pseudoacacia*). An open canopy, moderately cluttered understory, and relatively few large live or dead trees provided low tree roosting potential for bats in the vicinity of the cave. No bats were captured in the harp trap, nor were bats observed flying within the vicinity of the cave during sampling efforts.

4.2.3 Old Mill Cave

Old Mill Cave was surveyed on October 1 and 2, 2016. General habitat surrounding the cave was characterized as a mature, lowland deciduous forest dominated by American sycamore (*Platanus occidentalis*) and black walnut. A moderately closed canopy, moderately cluttered understory, and presence of several large live and dead trees provided moderate tree roosting potential for bats in the vicinity of the cave. No bats were captured in the harp trap, nor were bats observed flying in the vicinity of the cave during sampling efforts.

4.2.4 Portal P-DG-002

Portal P-DG-002 was surveyed on October 3 and 4, 2016. General habitat surrounding the portal was characterized as a mature, upland deciduous forest dominated by white oak (*Quercus alba*) and mockernut hickory (*Carya tomentosa*). A closed canopy, open understory, and presence of several large live and dead trees provided high tree roosting potential for bats in the vicinity of the portal.

No bats were captured in the harp trap, nor were bats observed flying in the vicinity of the portal during sampling efforts.

4.2.5 Homer Williams Cave

Homer Williams Cave was surveyed on October 12 and 13, 2016. General habitat surrounding the cave was characterized as a mature, upland deciduous forest dominated by American sycamore, white oak, and red oak (*Quercus rubra*). A moderately closed canopy, moderately cluttered understory, and presence of large live and dead trees provided moderate roost tree potential for bats in the vicinity of the cave. No bats were captured in the harp trap, nor were bats observed flying in the vicinity of the portal during sampling efforts.

4.2.6 Portal MLM-PO-004

Portal MLM-PO-004 was surveyed on October 16 and 17, 2016. General habitat surrounding the portal was characterized as a young, lowland deciduous forest dominated by red oak, American sycamore, and sugar maple (*Acer saccharum*). A moderately closed canopy, moderately cluttered understory, and presence of large live and dead trees provided moderate tree roosting potential for bats in the vicinity of the portal. No bats were captured in the harp trap, nor were bats observed flying in the vicinity of the portal during sampling efforts.

5.0 Discussion and Conclusion

Biologists searched for portals within approximately 1,644.5 hectares (4,063.65 ac) of the Project's survey corridor during 2016 in Virginia. Nine portals were documented in 2016, of which six were determined potentially suitable hibernacula for bats and five were subsequently surveyed via harp traps. One suitable portal (Overlooked Cave) documented in 2015 was surveyed via harp trap in October 2016. No bats were captured during harp trap sampling efforts, but one tri-colored bat was observed roosting within Overlooked Cave.

In summary, pedestrian searches in Virginia for cave and mine openings from December 2014 through November 2016 resulted in documentation of 10 potentially suitable and 4 unsuitable portals within the Project's survey corridor. Seven potentially suitable portals were sampled via harp traps, but no bats were captured. Two caves (Tawney's Cave and Canoe Cave) were not sampled because the features are considered by state and federal agencies as known hibernaculum for one or more federally listed bat species. Fred Bulls Cave was not sampled because the cave is no longer considered part of the Project area.

Two unsuitable and one potentially suitable (Crooks Crevice) are with the Project's proposed construction workspace. Crooks Crevice was sampled in September 2016, but no bats were captured and the feature is considered unoccupied. Furthermore, MVP will reduce the width of the proposed access road workspace and fence off the area around Crooks Crevice in order to avoid directly impacting the cave entrance. One potentially suitable (P-DG-002) portal is within 10 meters (32.8 ft) of the Project's construction workspace limits, but the feature is considered unoccupied by bats based on the 2016 harp trap sampling efforts.

Due to lack of access, approximately 11.5 hectares (28.3 ac) of the survey corridor remain to be surveyed for undocumented mine or cave openings in Virginia. Once permission is granted, searches will continue and results will be submitted to the agencies in an addendum report.

6.0 Literature Cited

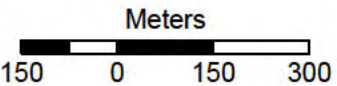
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APPENDIX A
PROJECT FEATURES AND PORTAL SURVEY STATUS, MAPS 1-47



- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
"wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm"
accessed - 12/2/2016



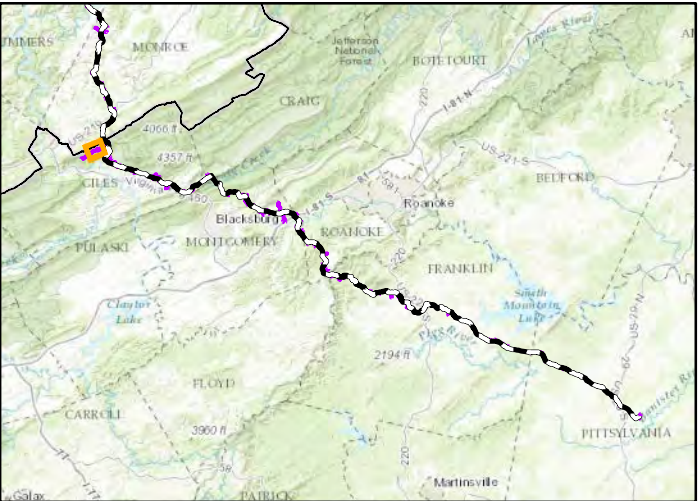
ENVIRONMENTAL SOLUTIONS
& INNOVATIONS, INC.
Project No. 593.06

Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 2 of 47

- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service - "wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm" accessed - 12/2/2016

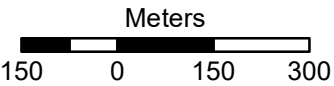
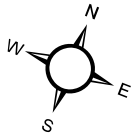
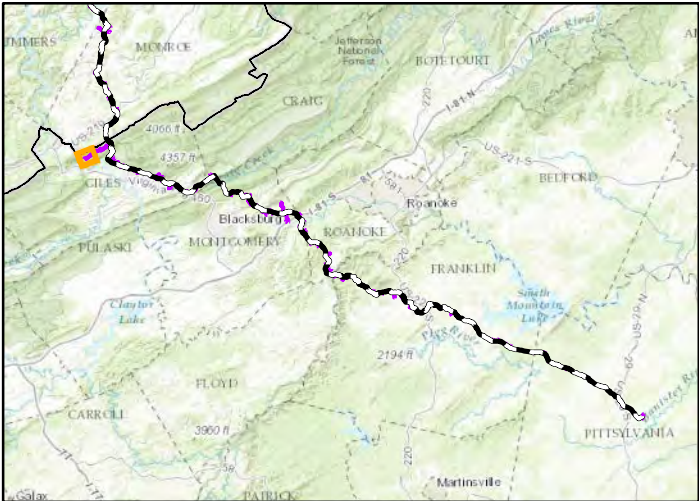


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 3 of 47

- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



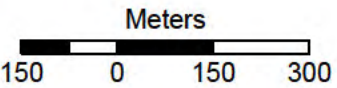
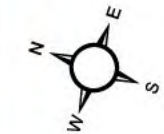
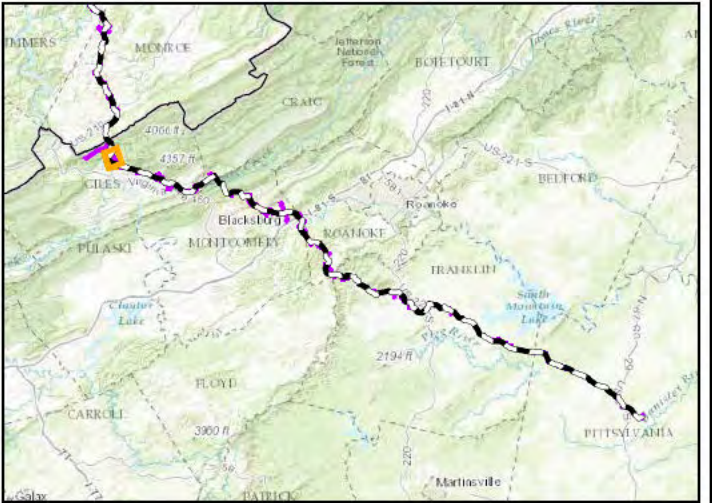
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accessed - 12/2/2016



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- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
"wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm"
accessed - 12/2/2016



ENVIRONMENTAL SOLUTIONS
& INNOVATIONS, INC.
Project No. 593.06

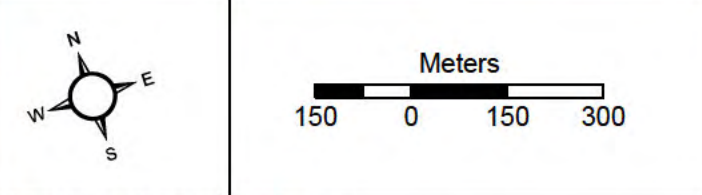
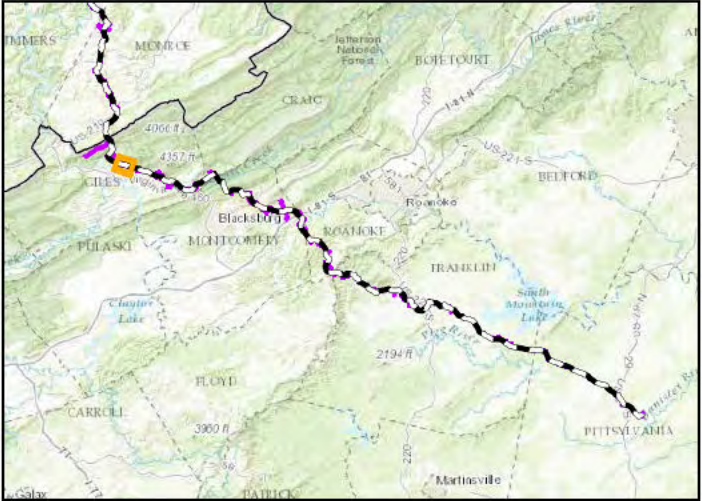


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 5 of 47

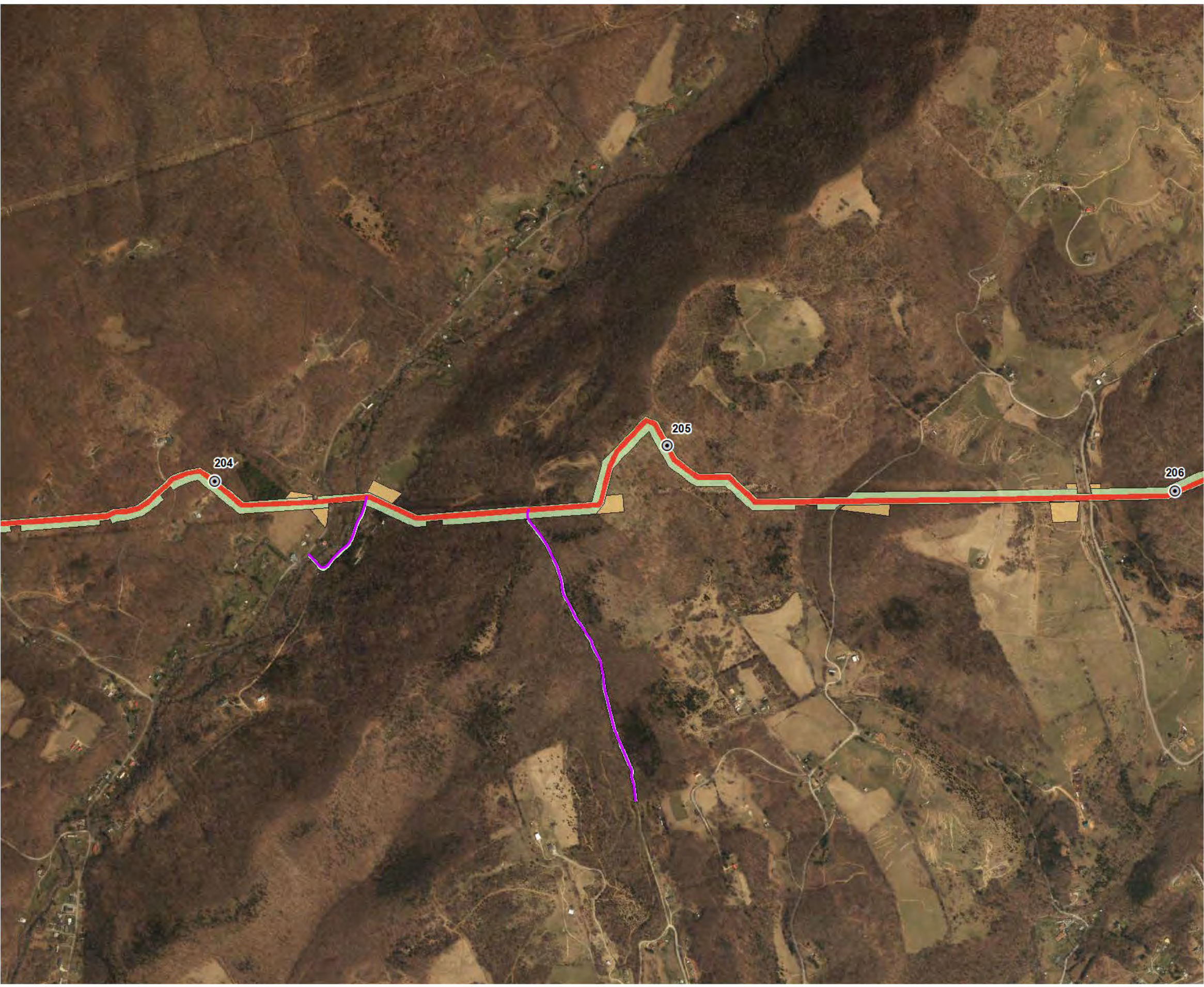
- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted

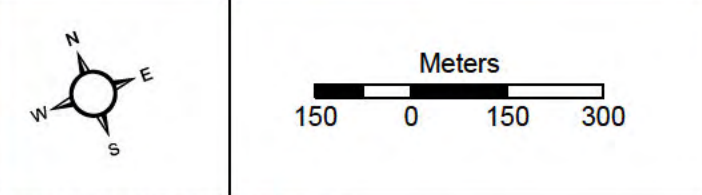
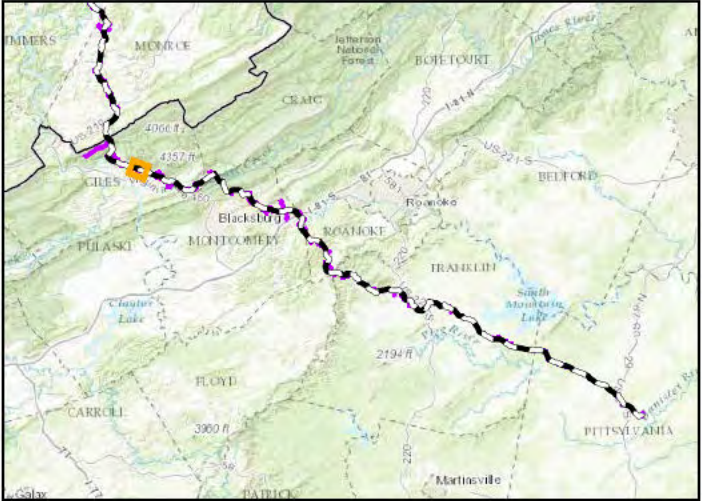


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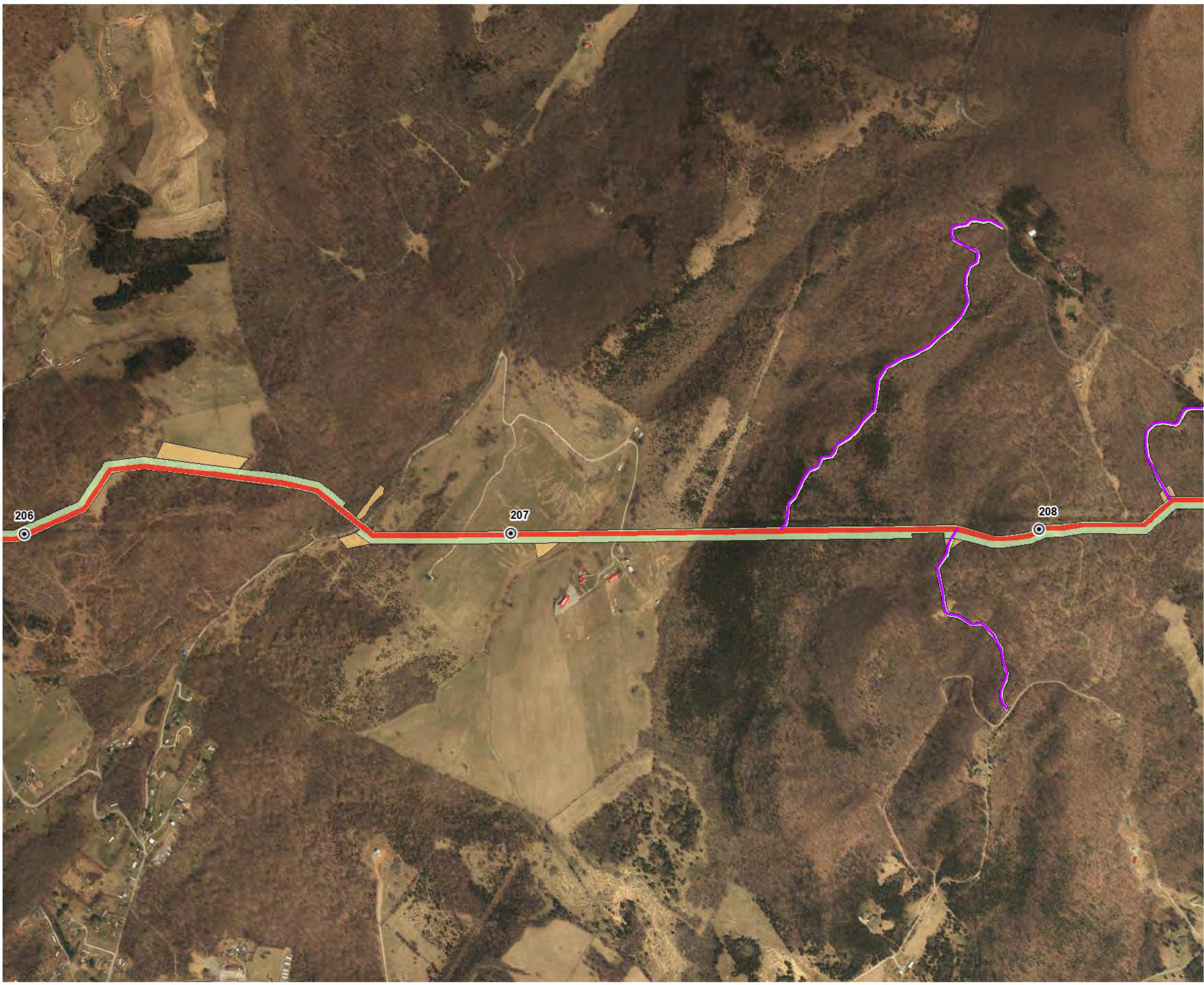
- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional



*Surveys complete for Project features except where noted



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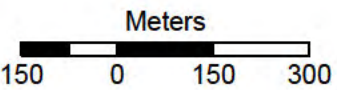
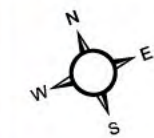
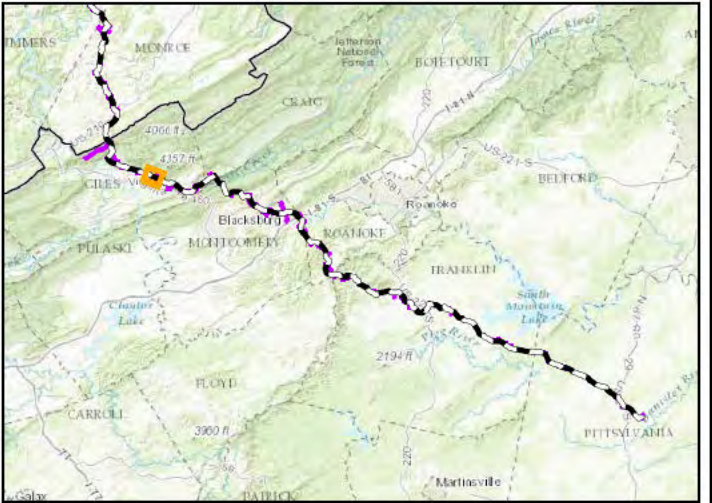


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 7 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



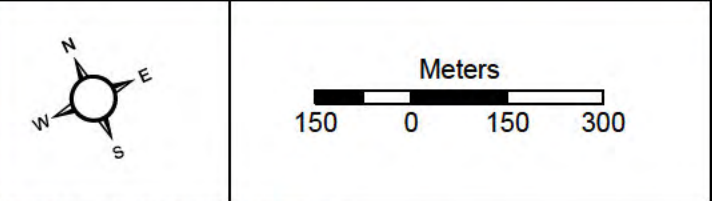
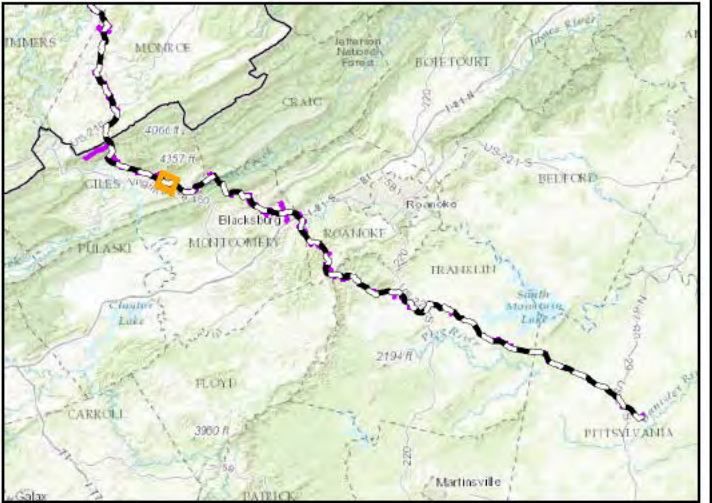
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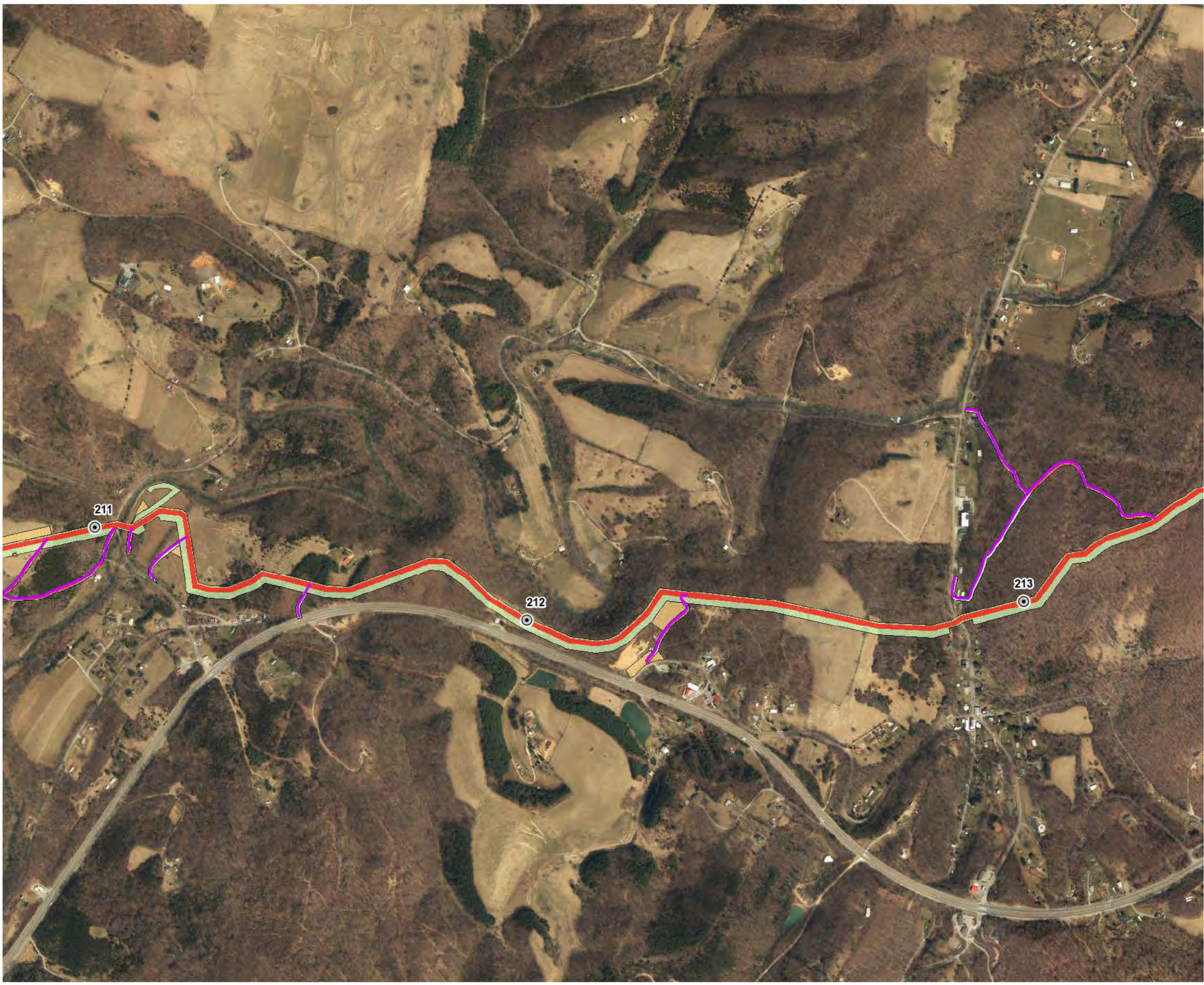
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Project No. 593.06

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
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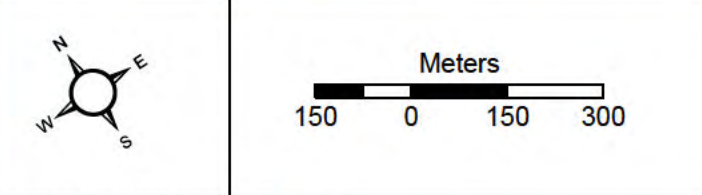


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 9 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

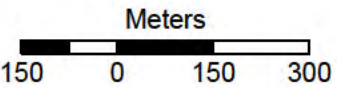
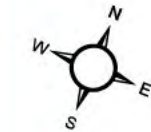
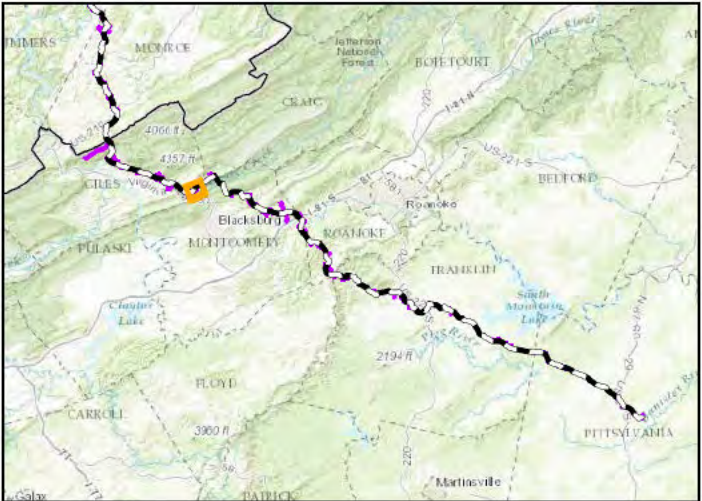
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accessed - 12/2/2016

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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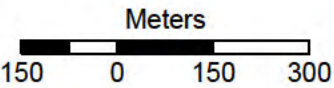
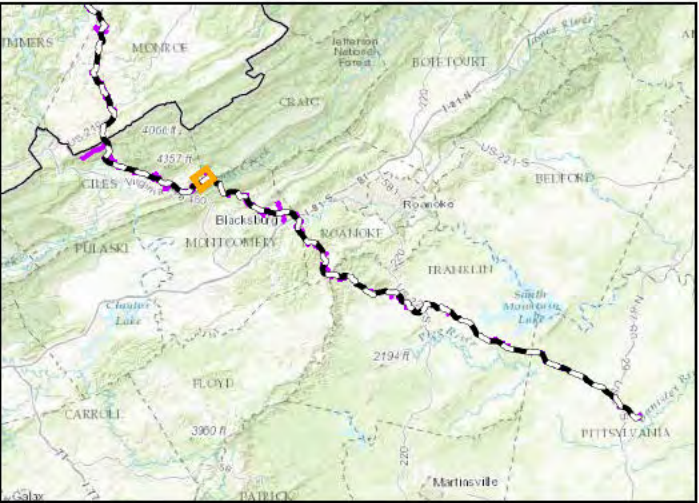


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Project No. 593.06

Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
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ENVIRONMENTAL SOLUTIONS
& INNOVATIONS, INC.
Project No. 593.06

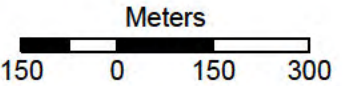
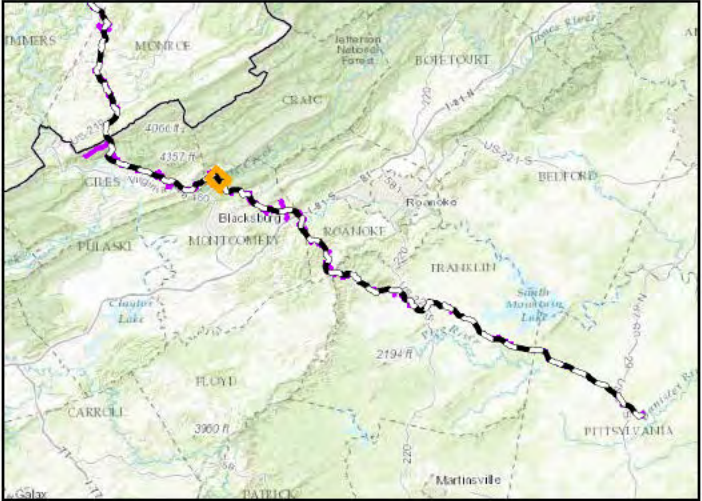


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 12 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
"wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm"
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& INNOVATIONS, INC.
Project No. 593.06

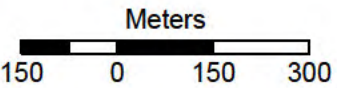
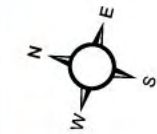
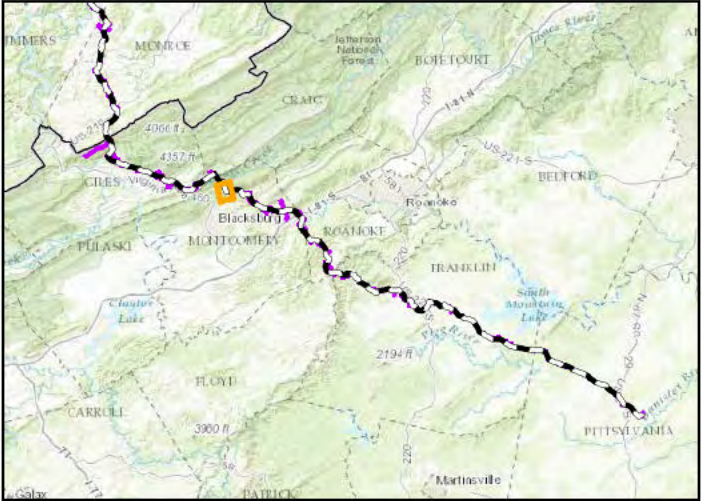


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 13 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



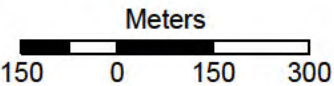
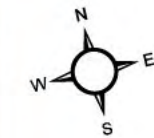
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ENVIRONMENTAL SOLUTIONS
& INNOVATIONS, INC.
Project No. 593.06

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

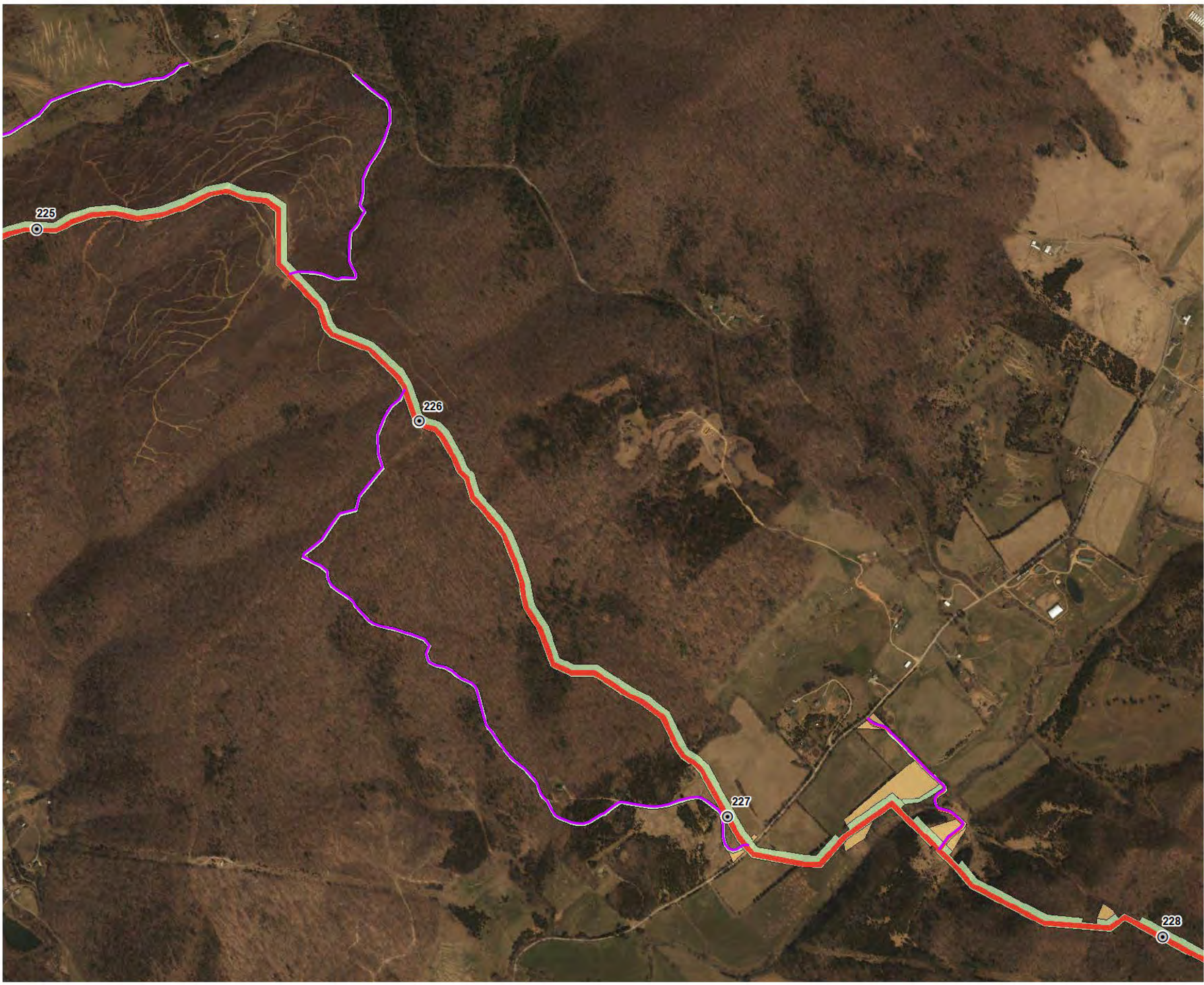
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& INNOVATIONS, INC.
Project No. 593.06

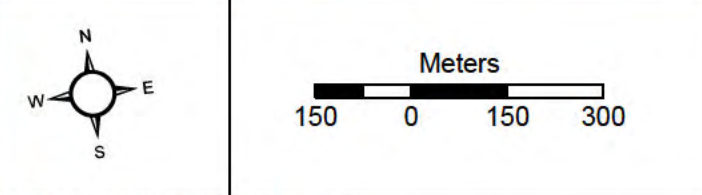
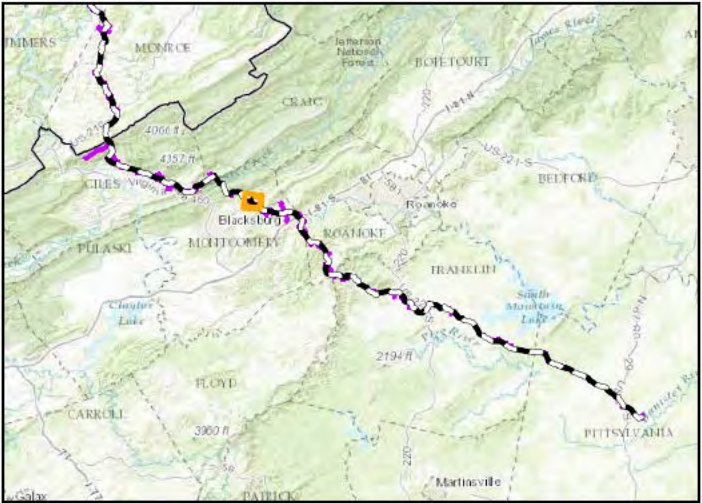


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 15 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

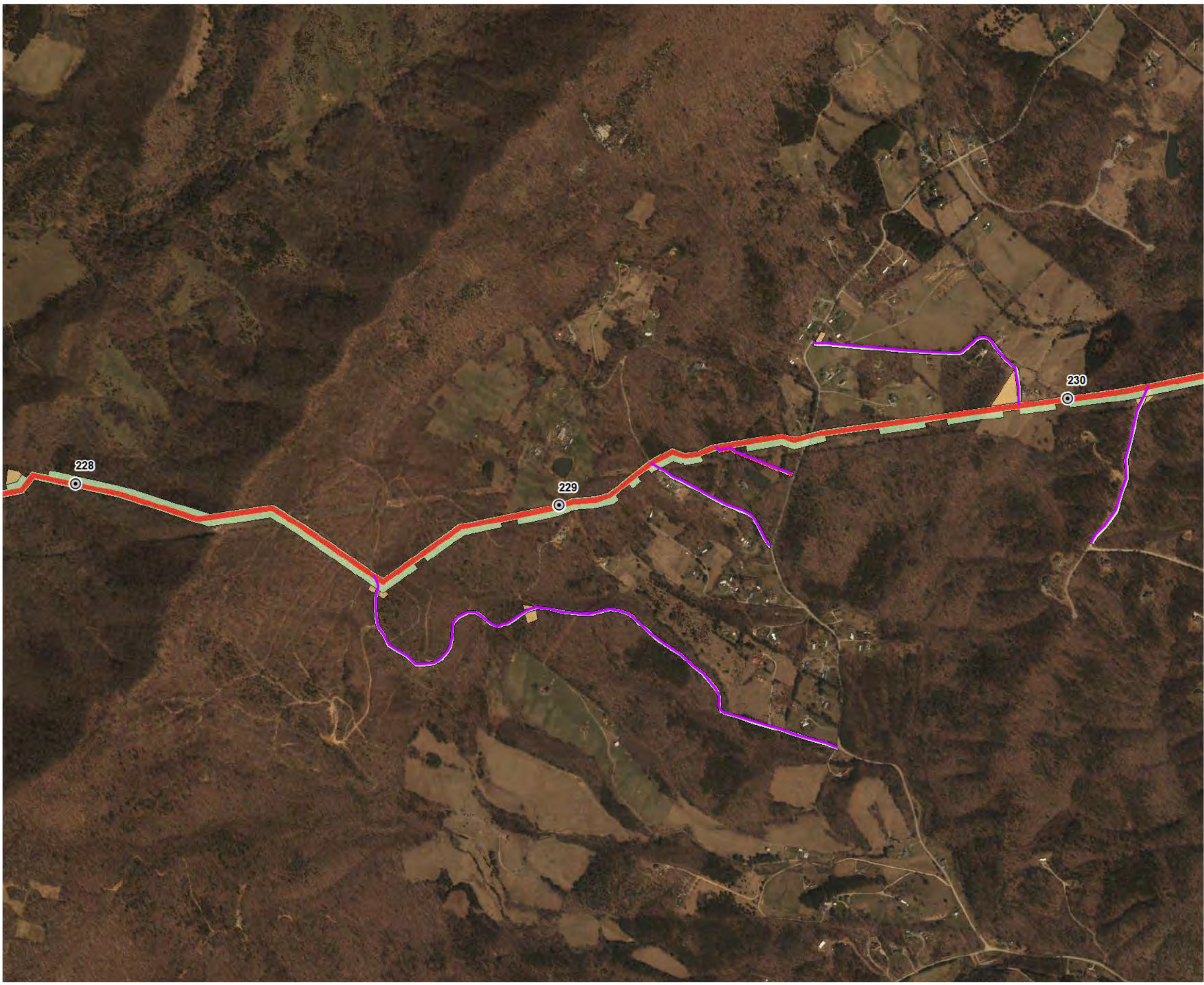
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Project No. 593.06

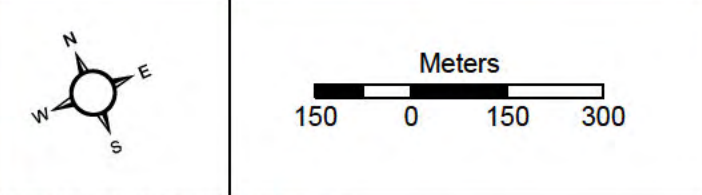


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

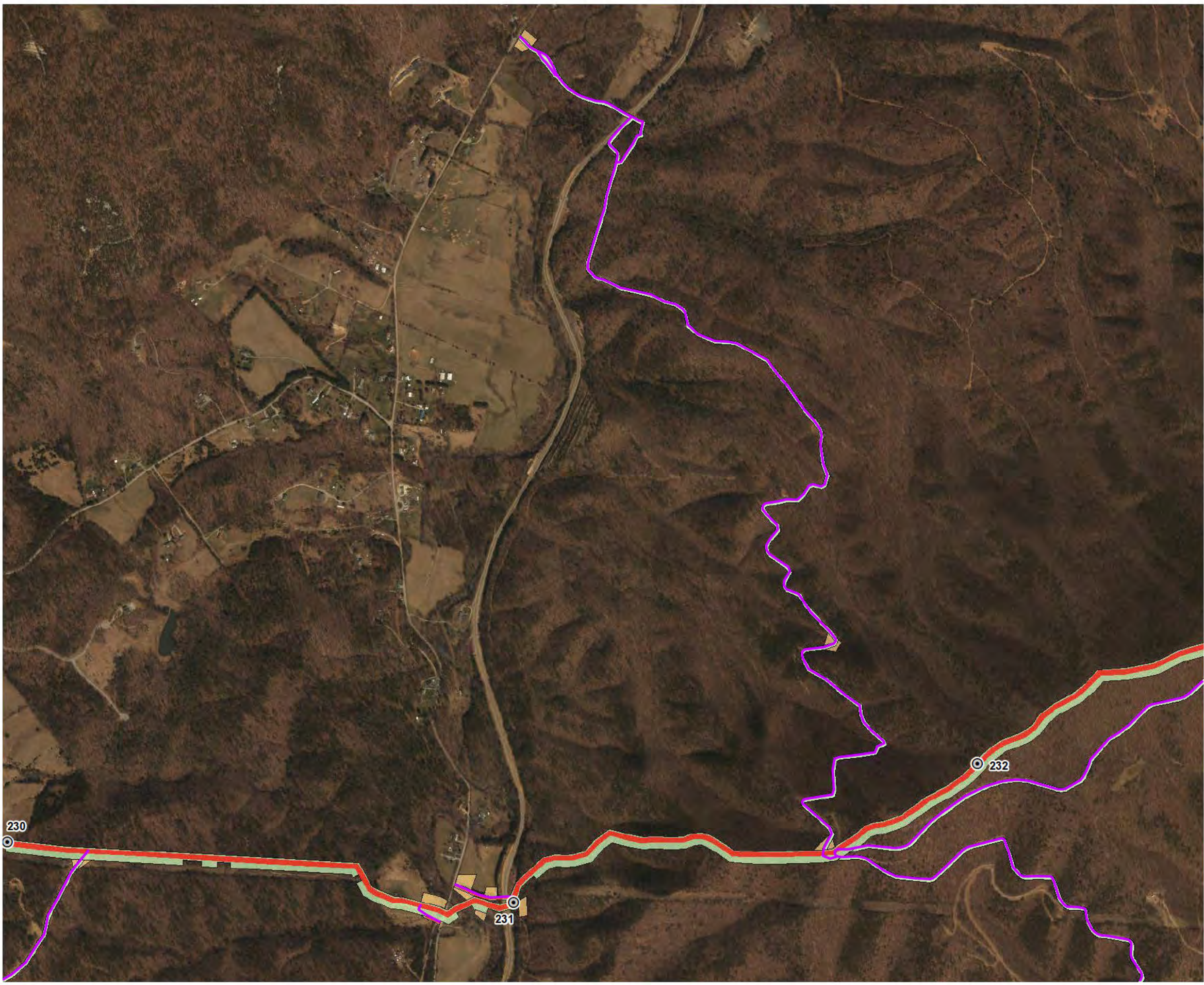
Map 16 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
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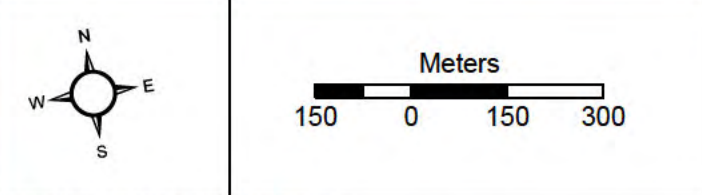
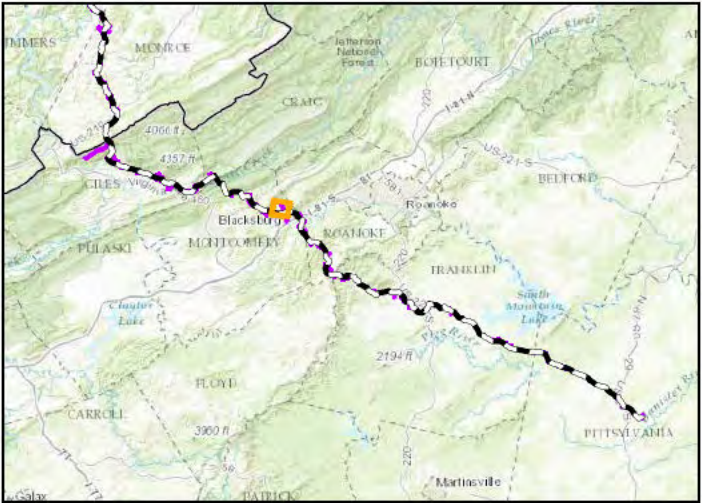


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 17 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

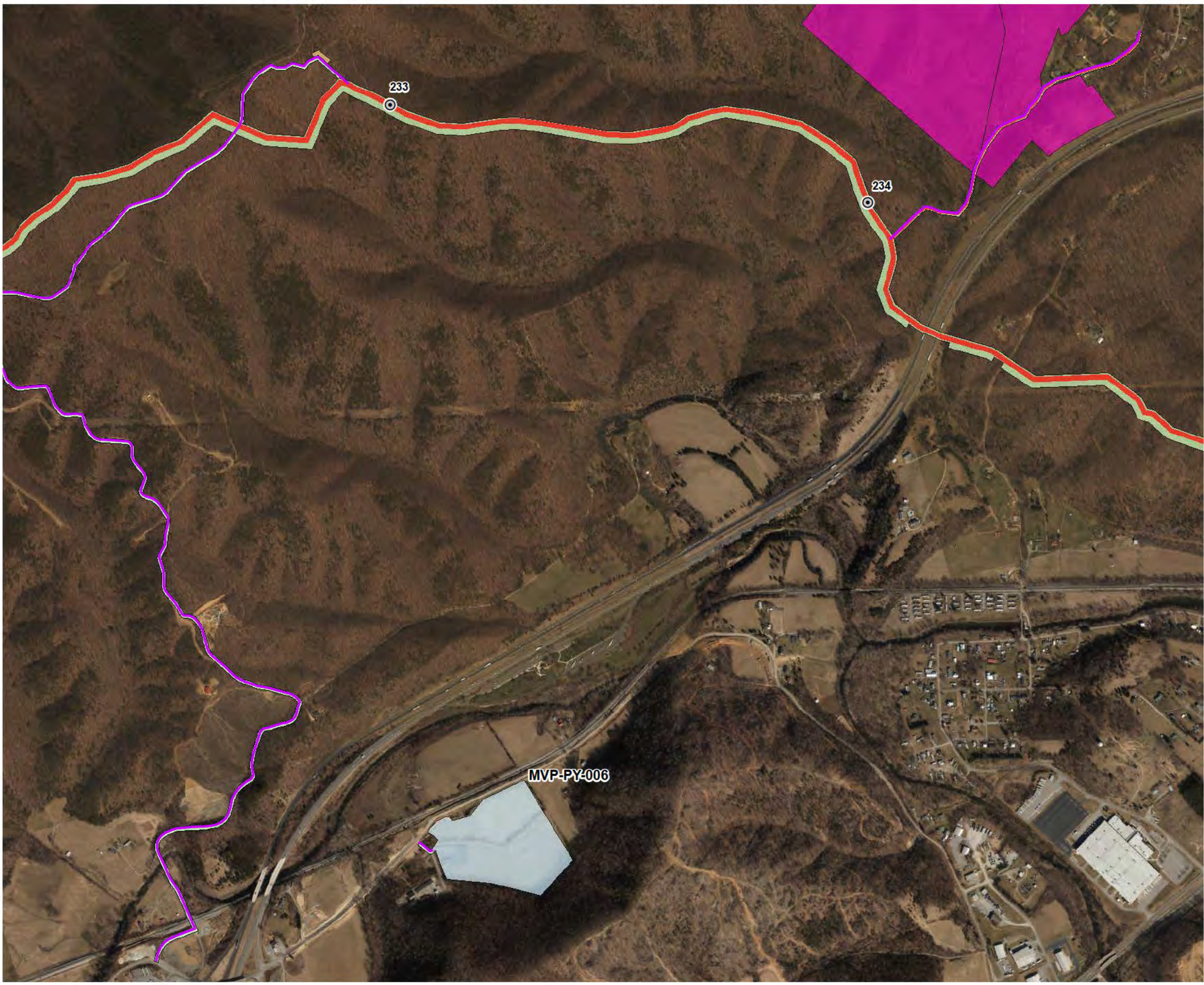
*Surveys complete for Project features except where noted



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Project No. 593.06

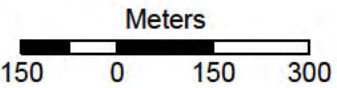
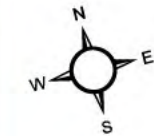
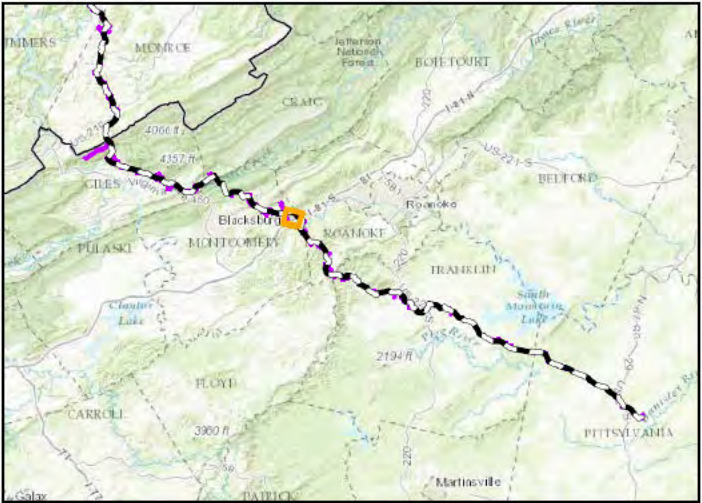


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 18 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional
- Temporary Ancillary Site
- Area Proposed for Survey in 2017

*Surveys complete for Project features except where noted



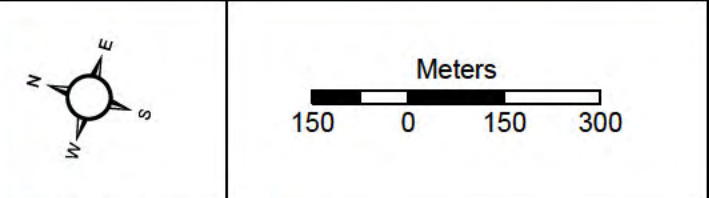
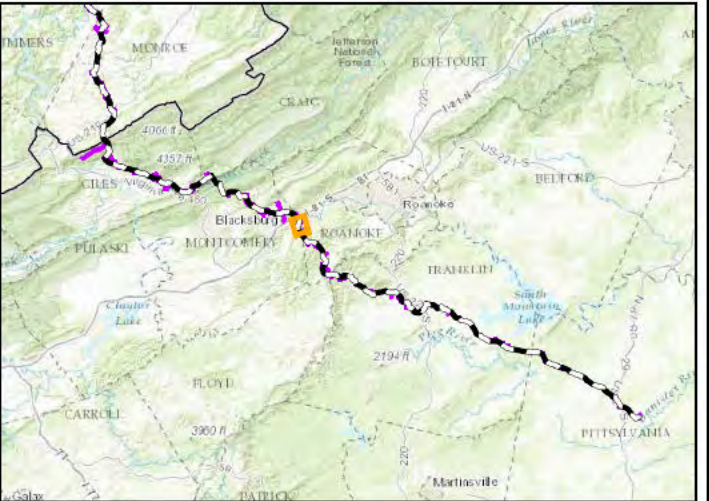
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ENVIRONMENTAL SOLUTIONS
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Project No. 593.06

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

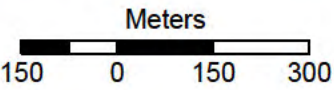
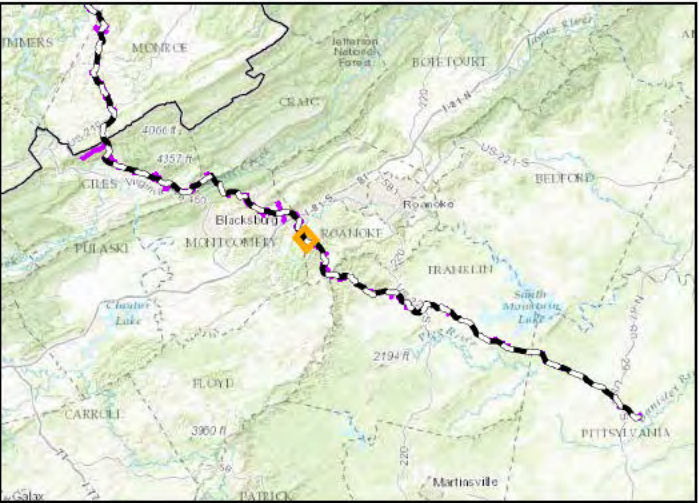
*Surveys complete for Project features except where noted



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- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

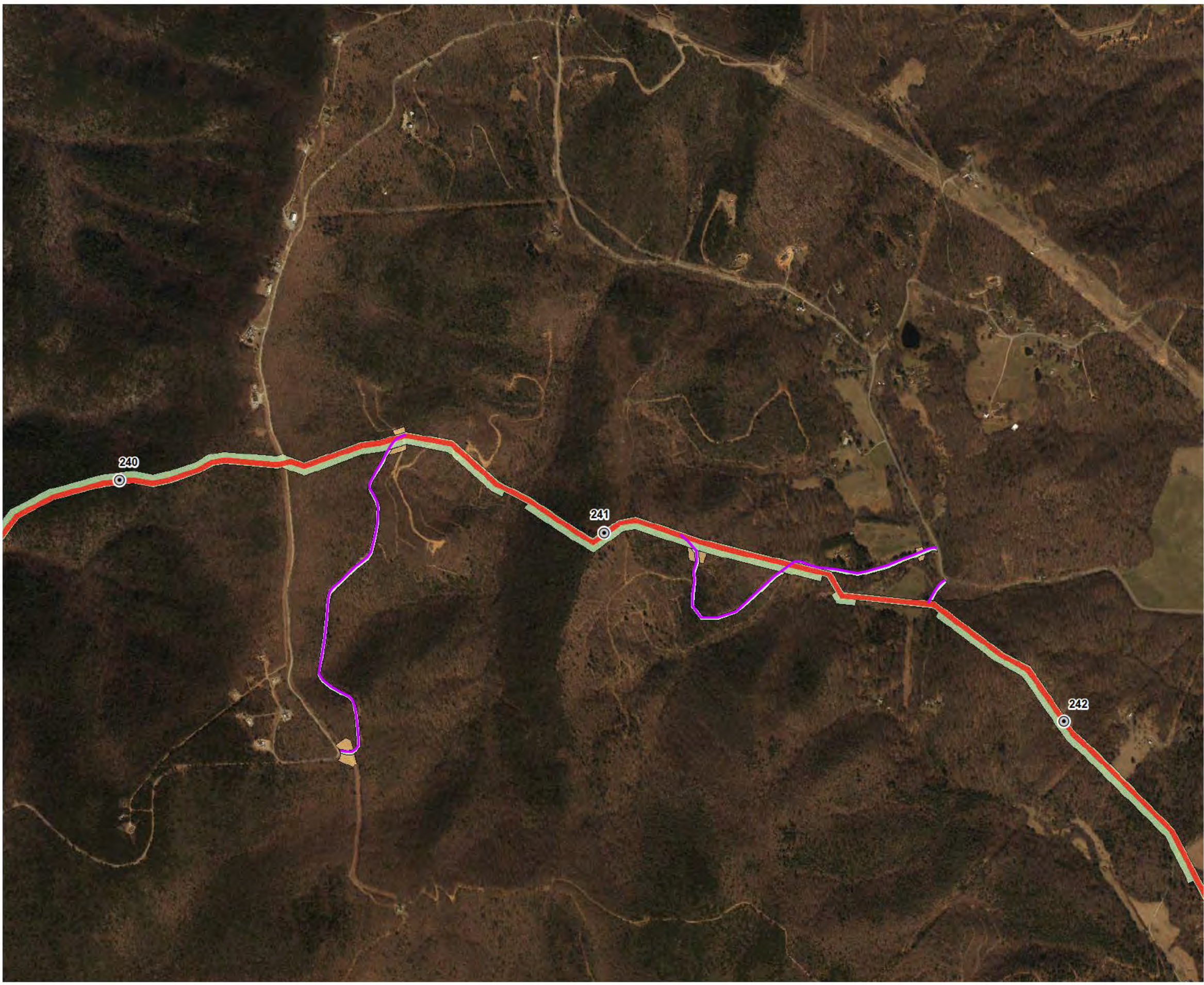
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& INNOVATIONS, INC.
Project No. 593.06

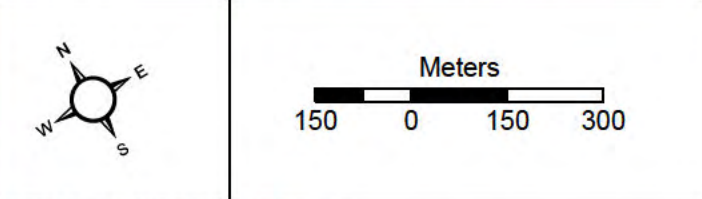


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 21 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

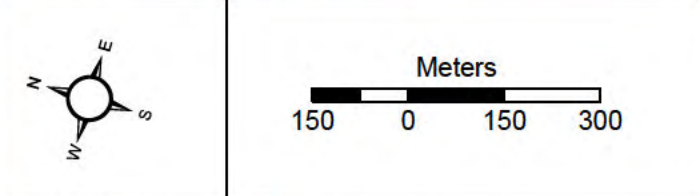
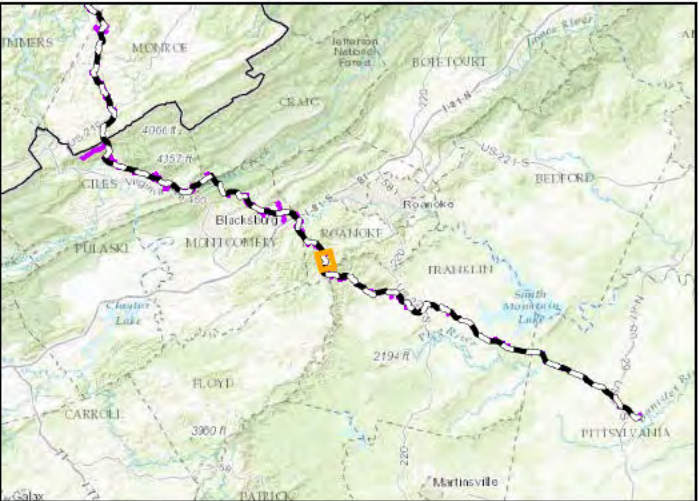
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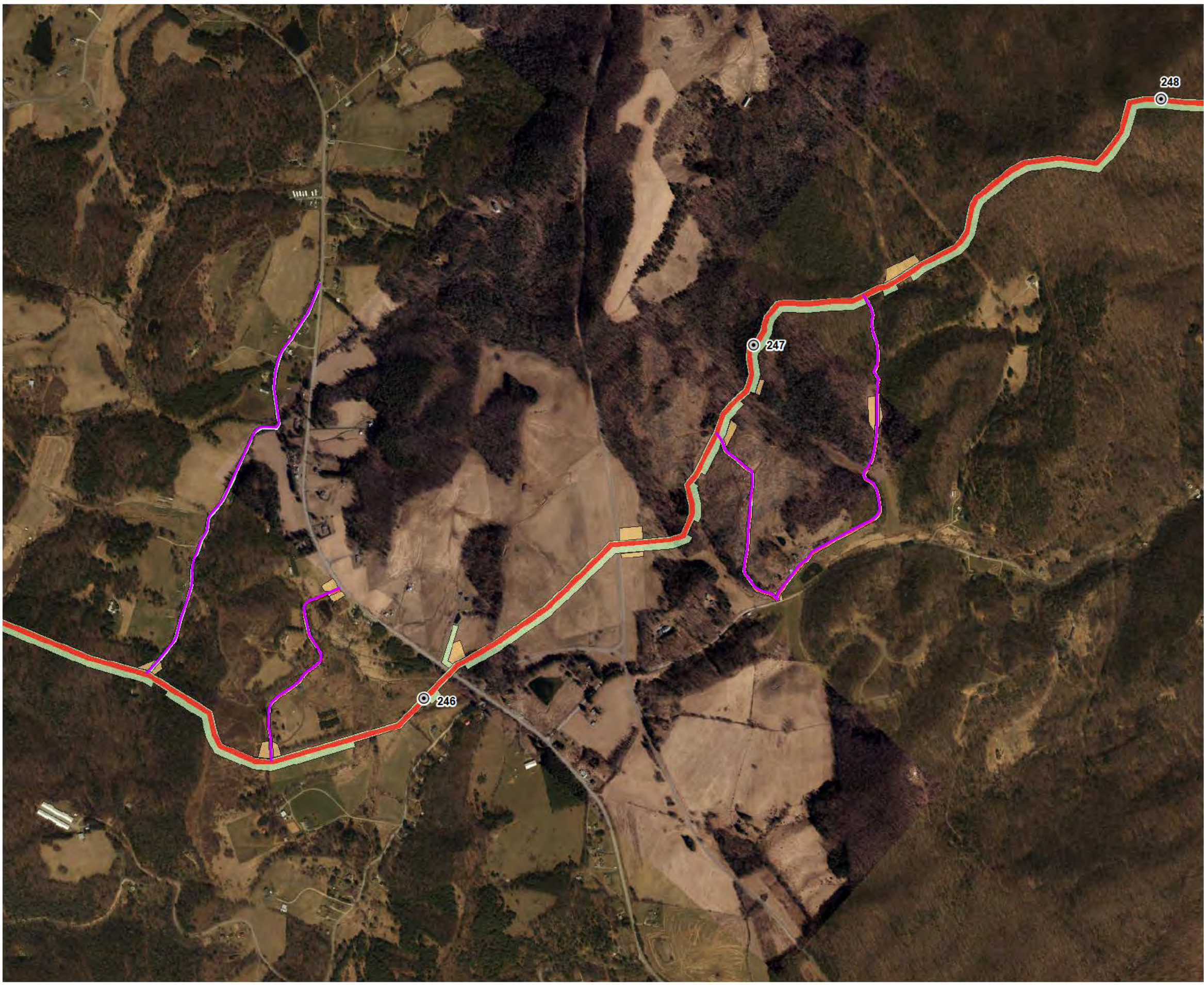
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accessed - 12/2/2016

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional
- Area Proposed for Survey in 2017

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
"wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm"
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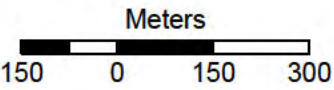
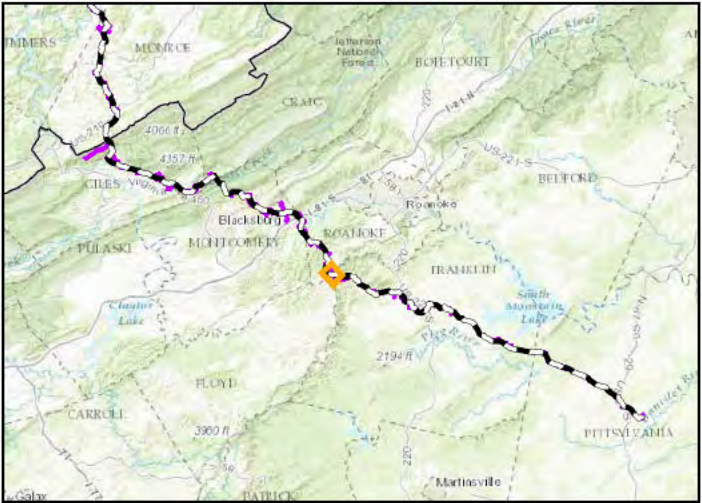


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 23 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



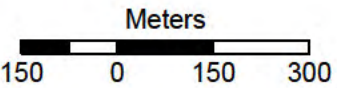
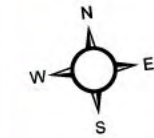
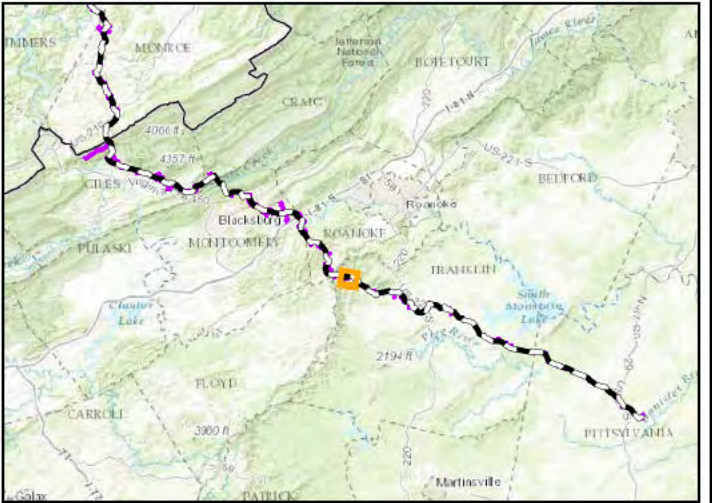
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accessed - 12/2/2016



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Project No. 593.06

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



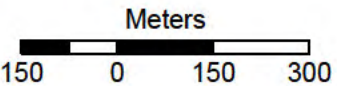
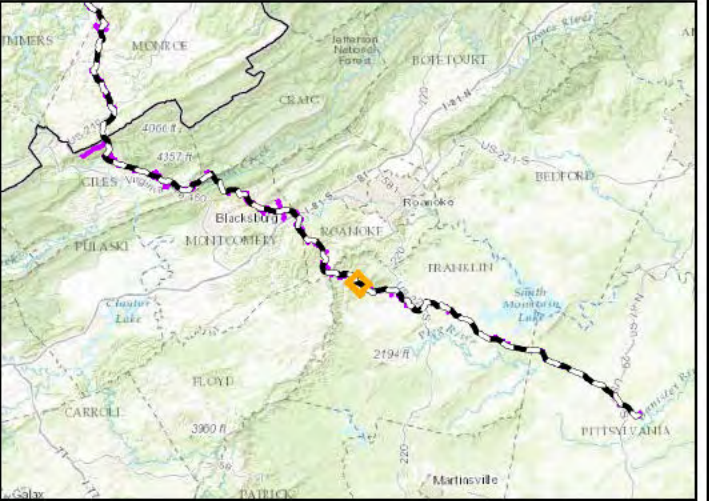
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- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

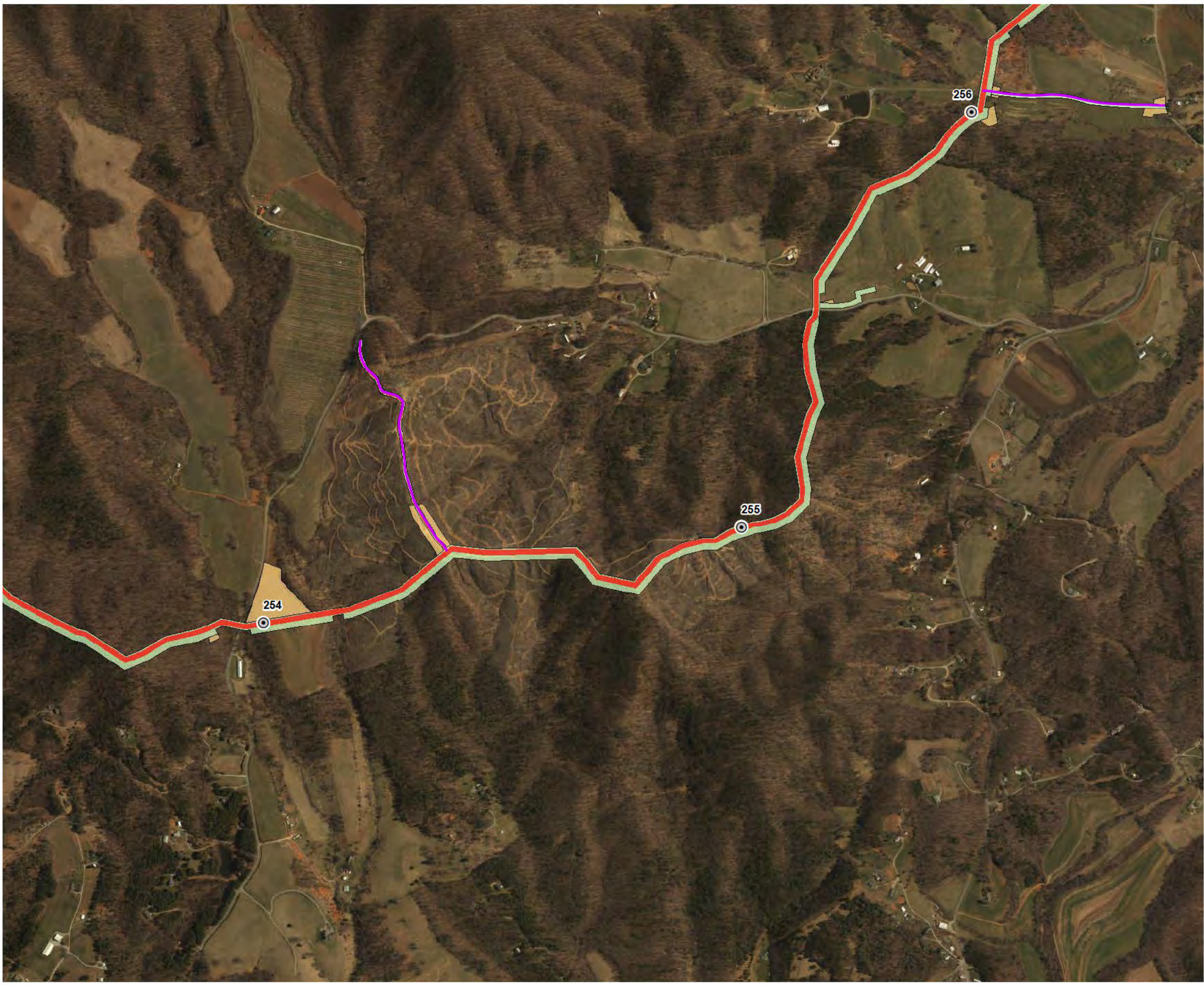
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ENVIRONMENTAL SOLUTIONS
& INNOVATIONS, INC.
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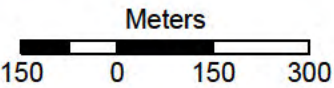
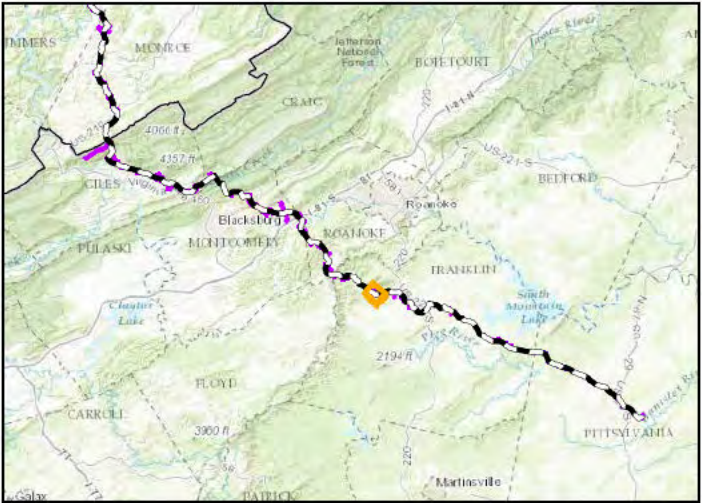


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 26 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

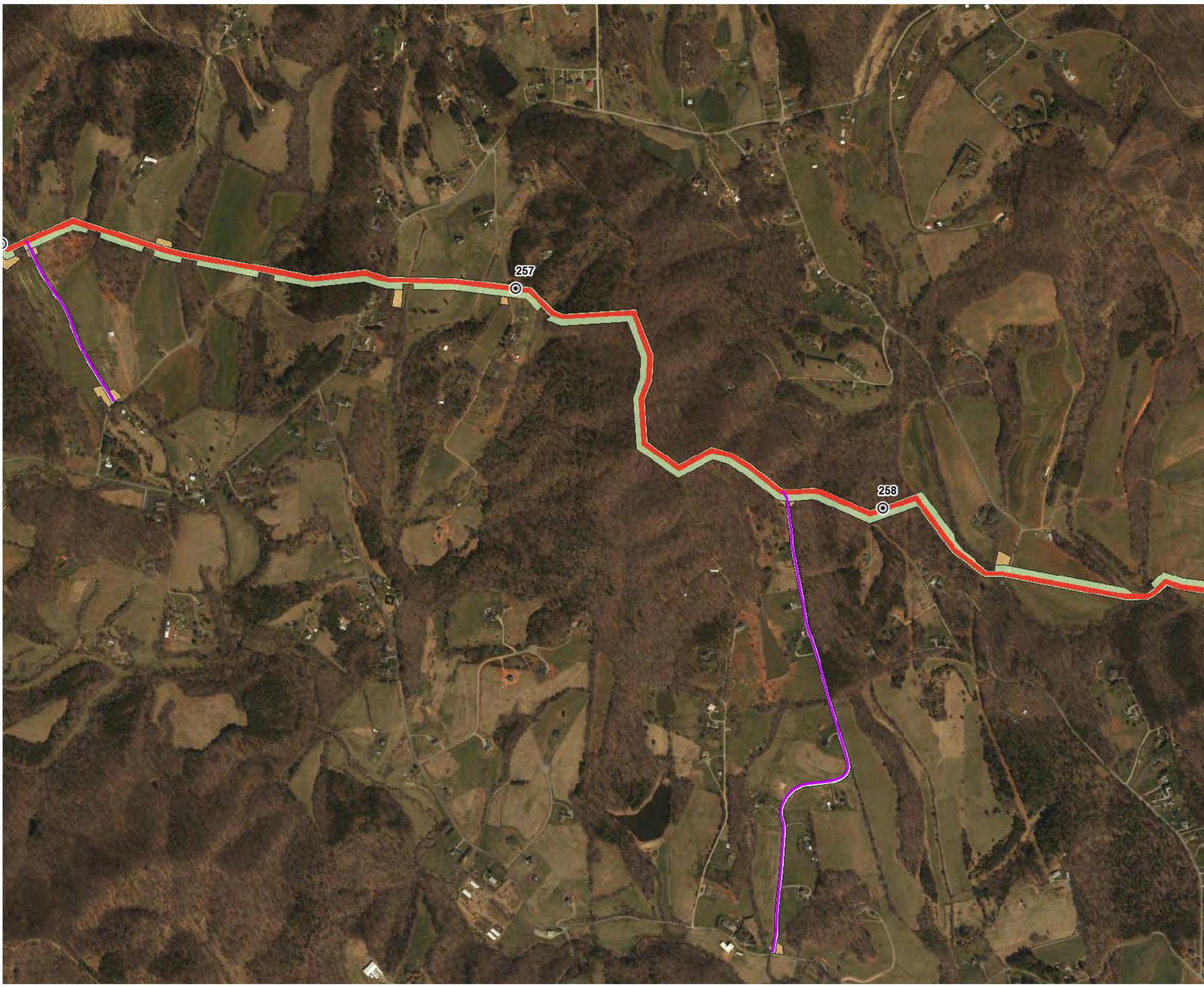
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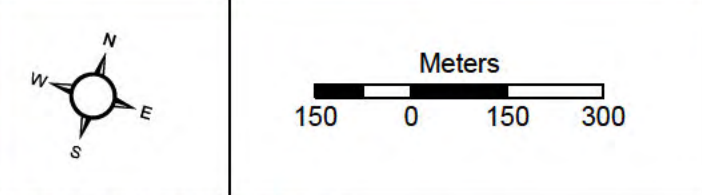
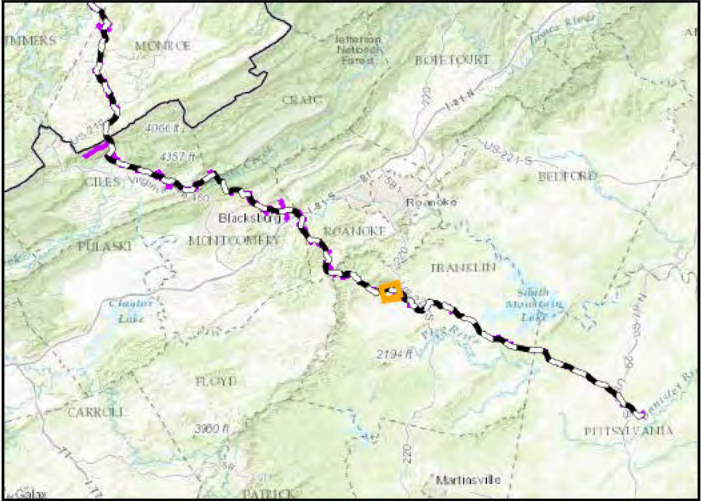


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 27 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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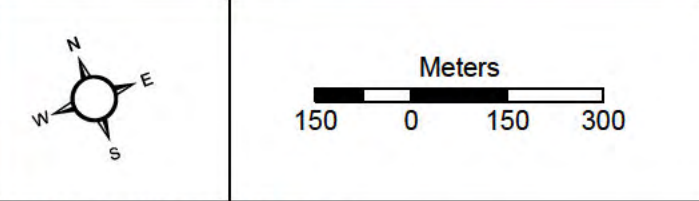
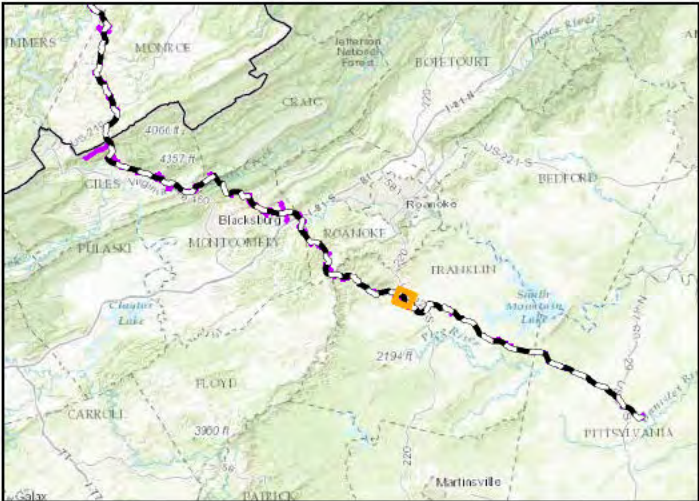


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

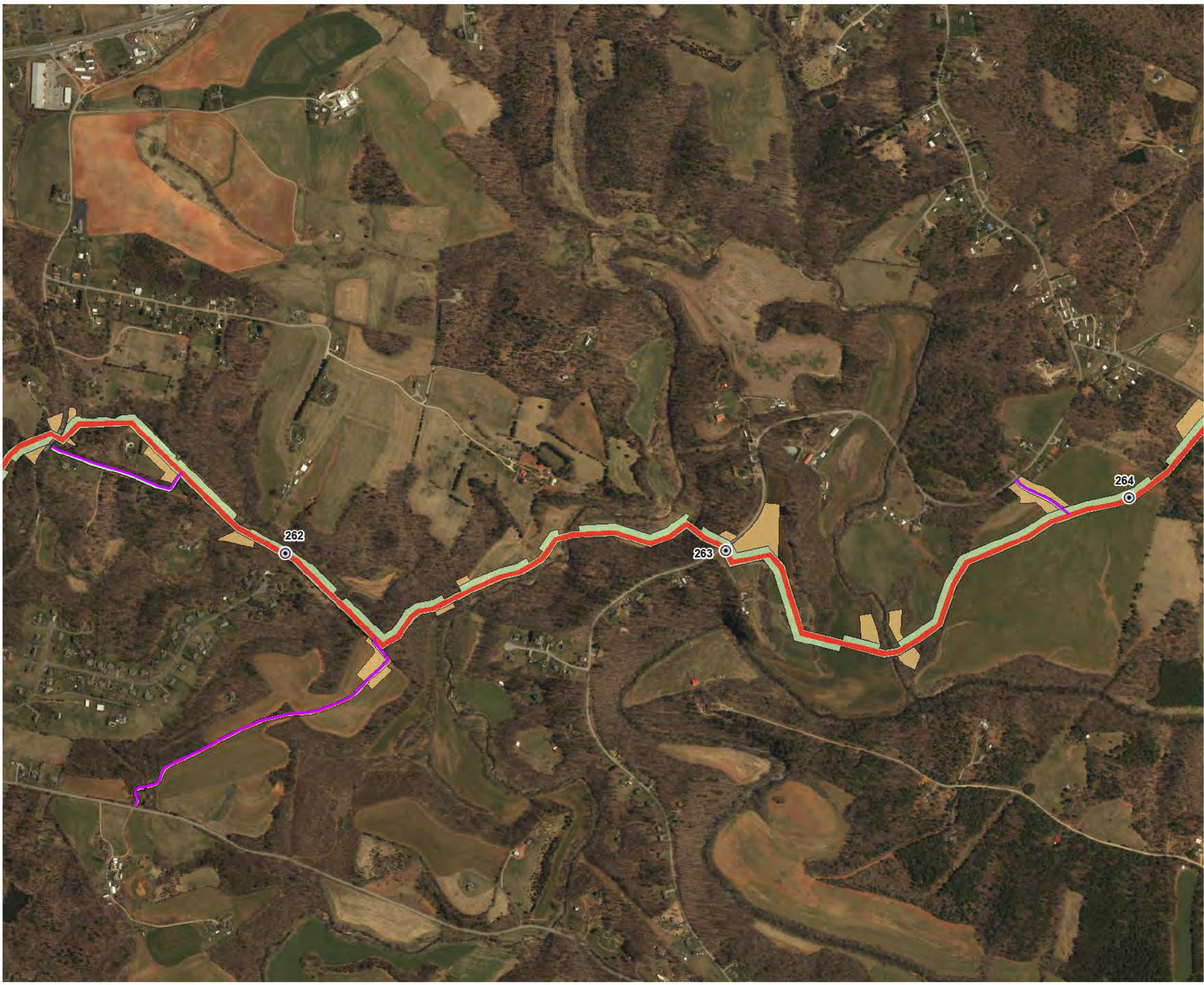
Map 28 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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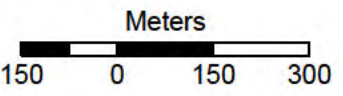
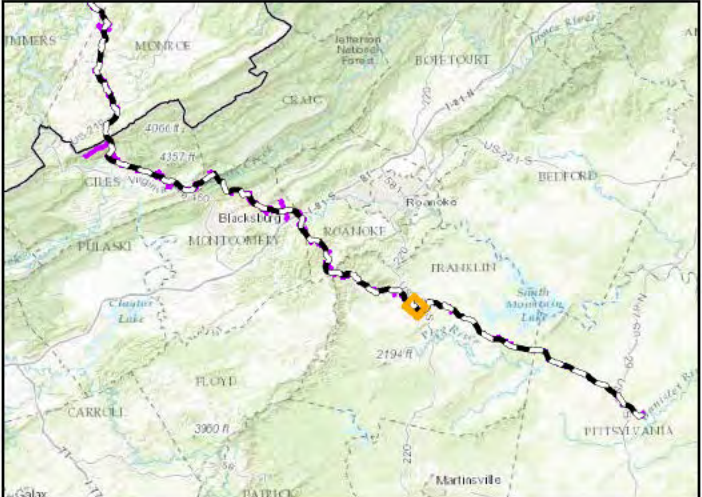


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 29 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

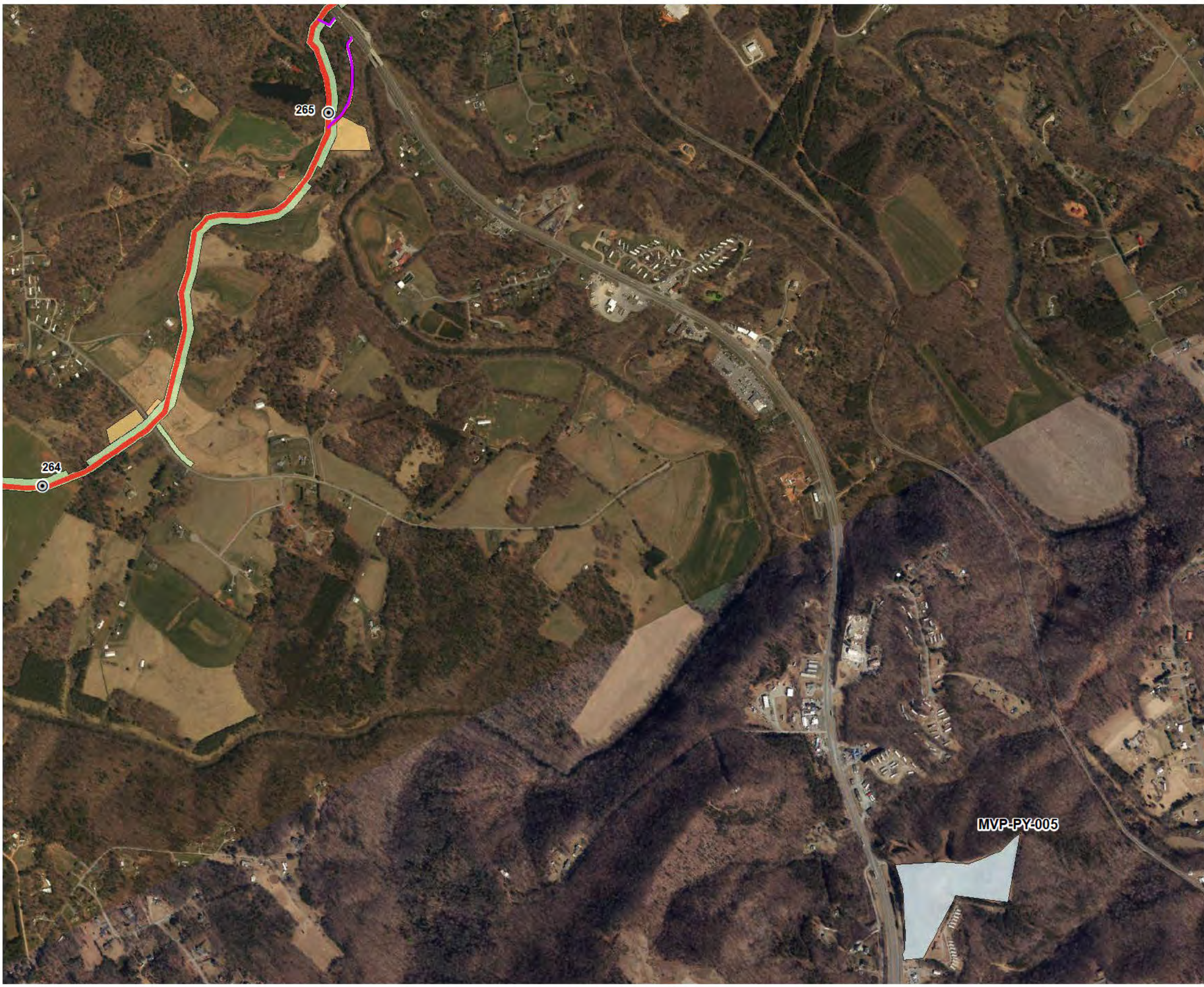
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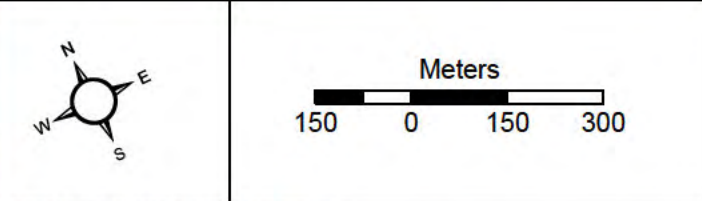
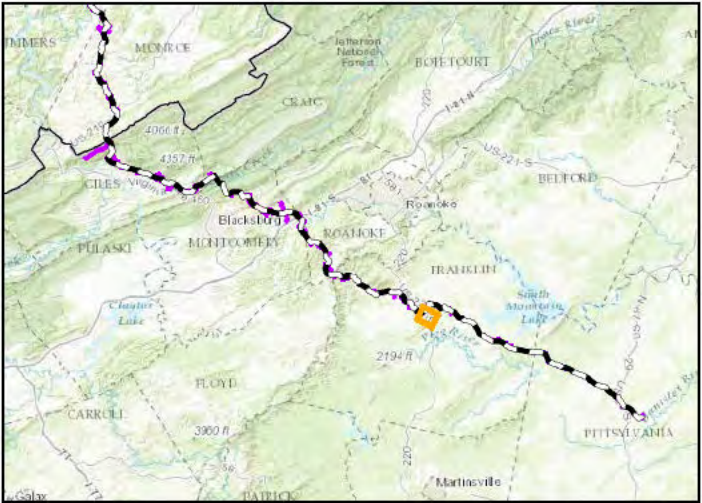


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

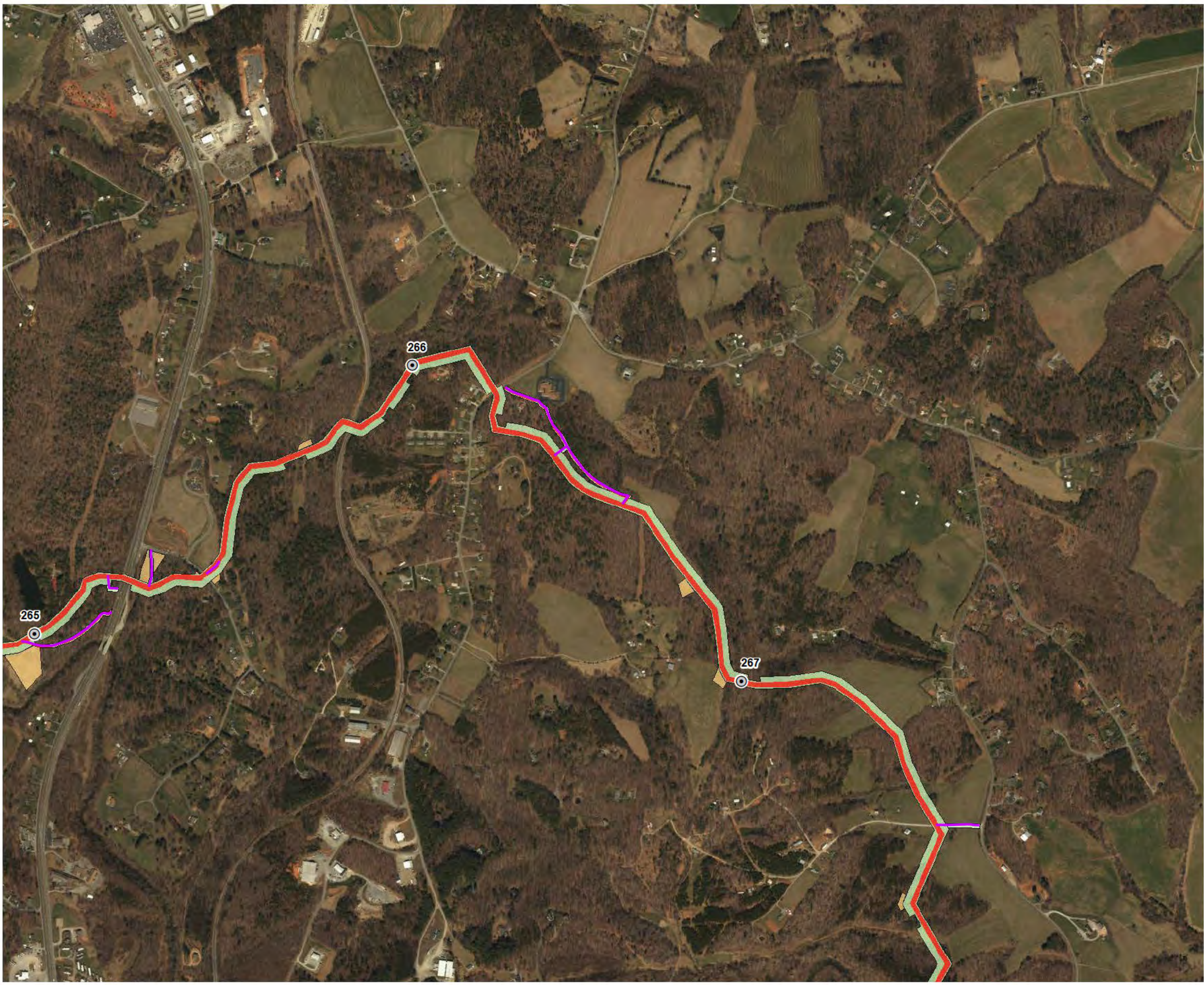
Map 30 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional
- Temporary Ancillary Site

*Surveys complete for Project features except where noted



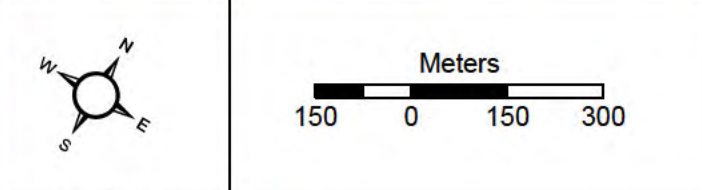
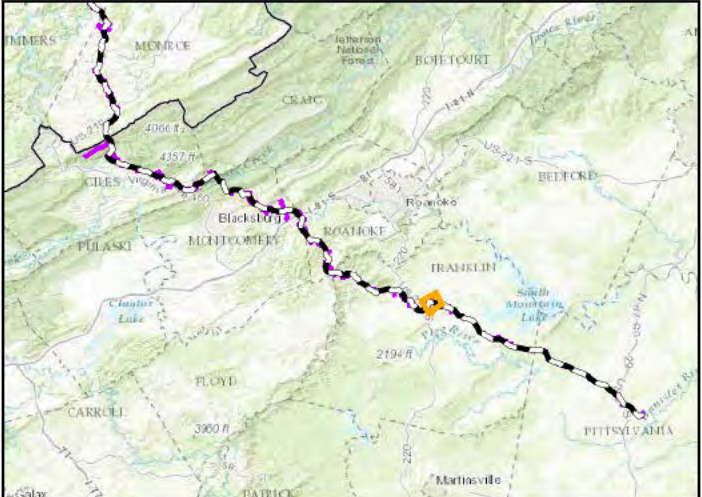
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accessed - 12/2/2016



Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

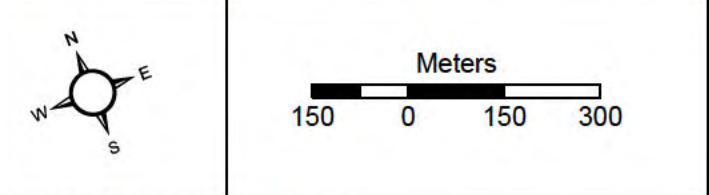
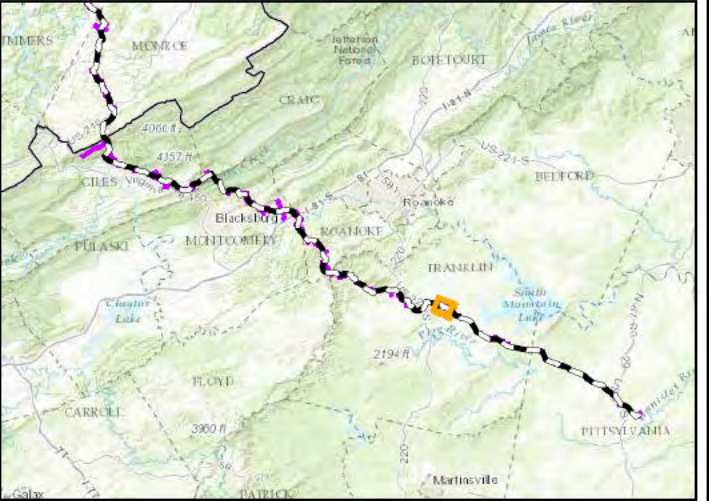
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- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

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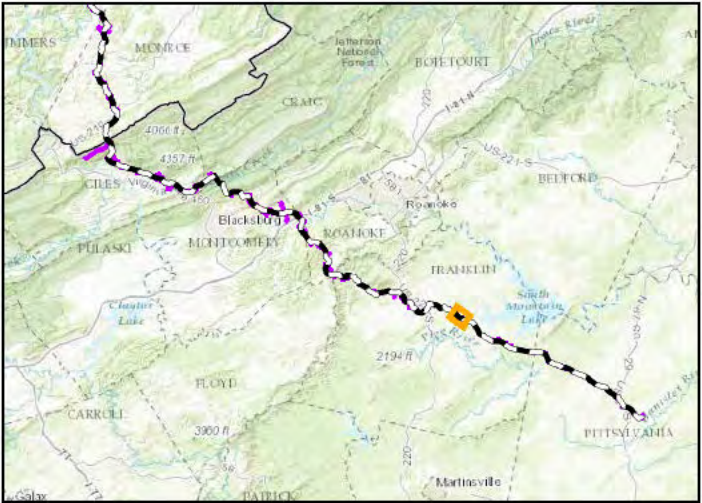


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 33 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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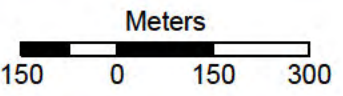
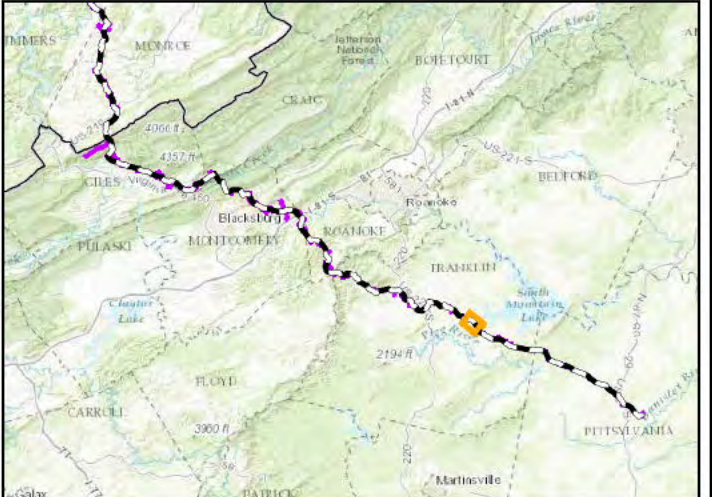
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Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

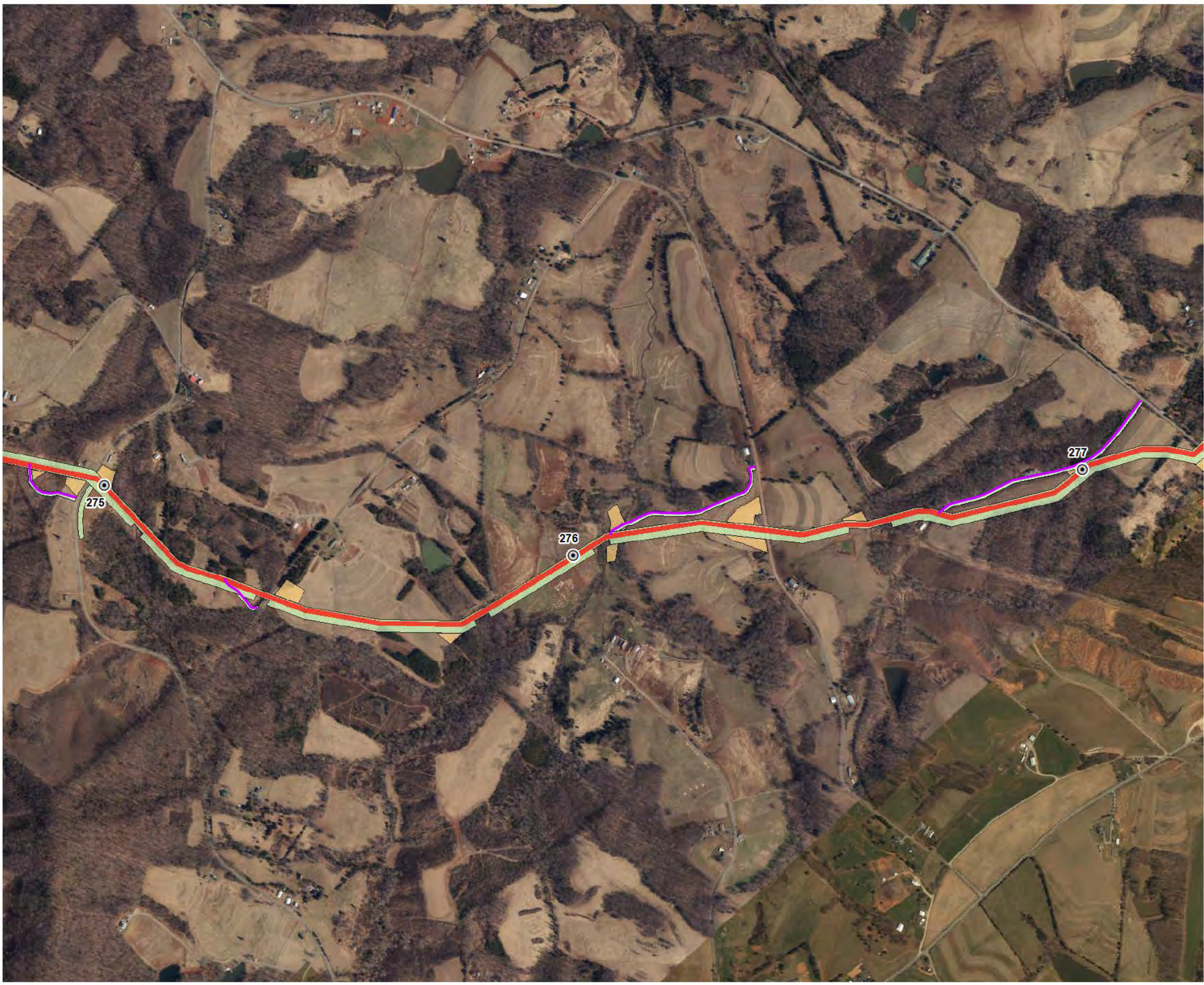
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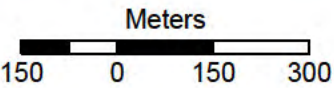
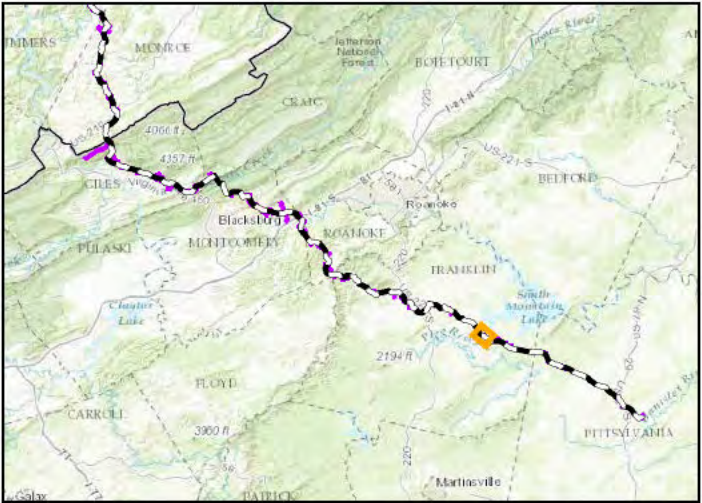


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 35 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
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Project No. 593.06

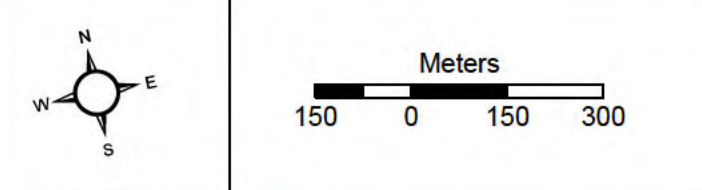
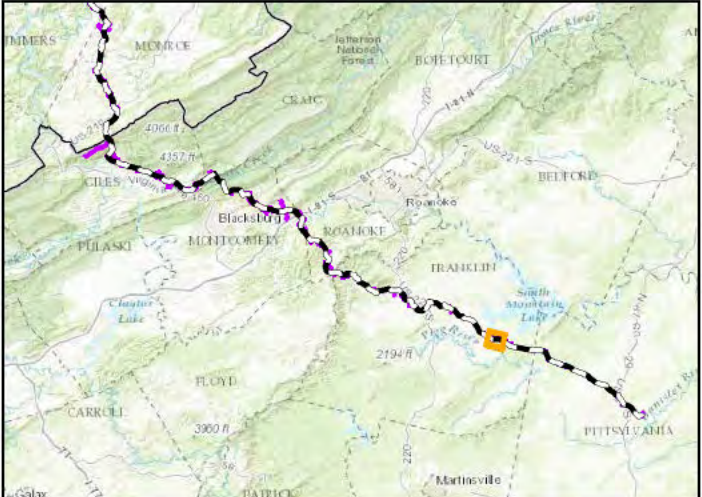


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

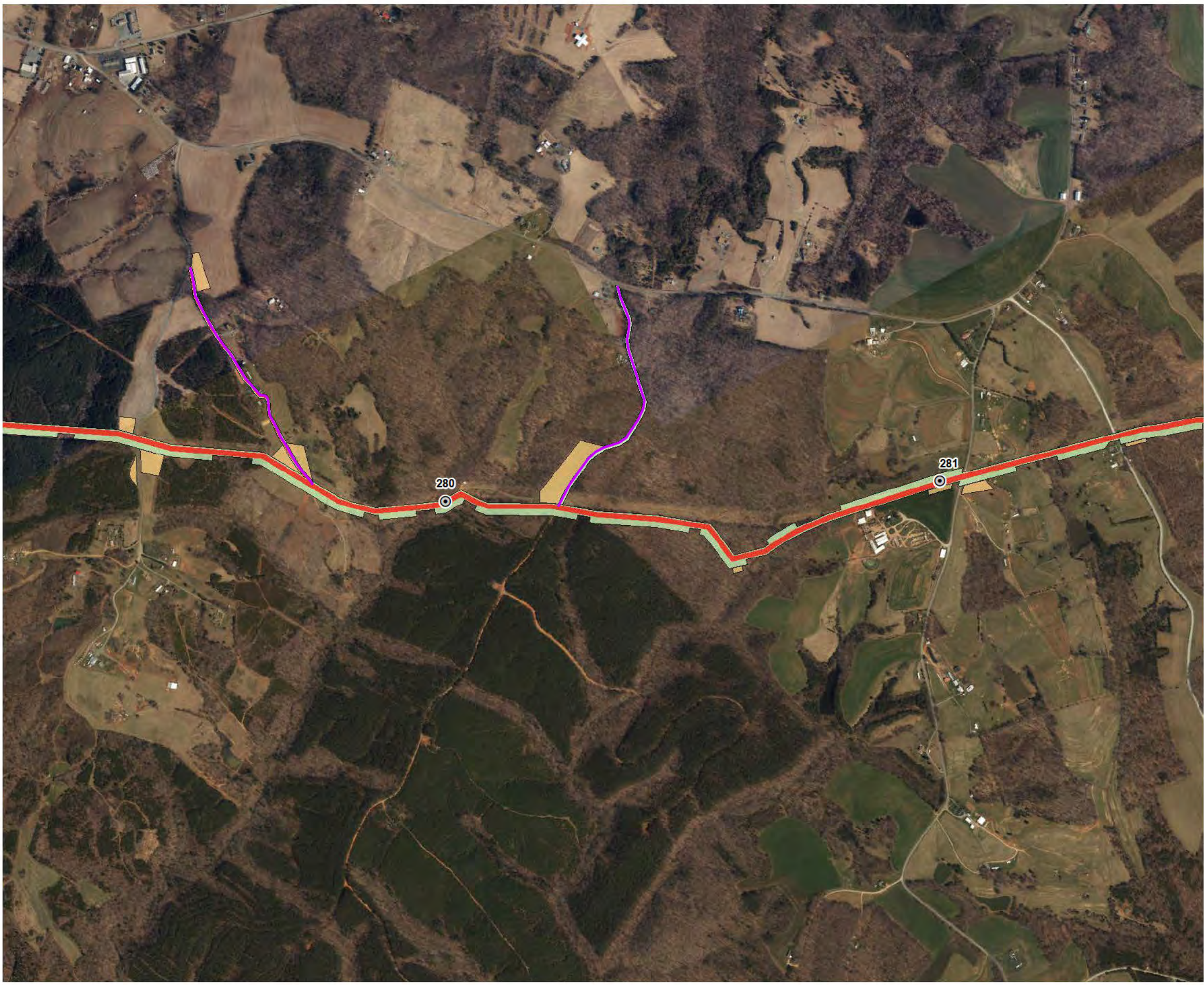
Map 36 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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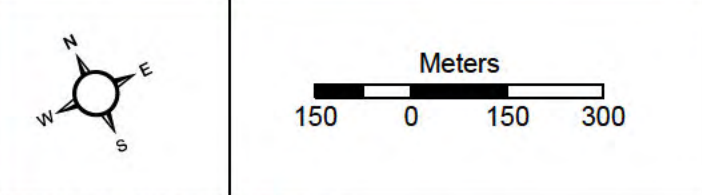
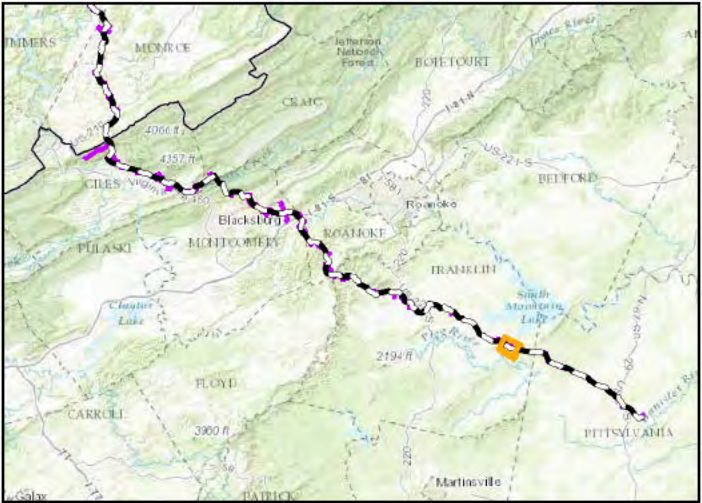


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

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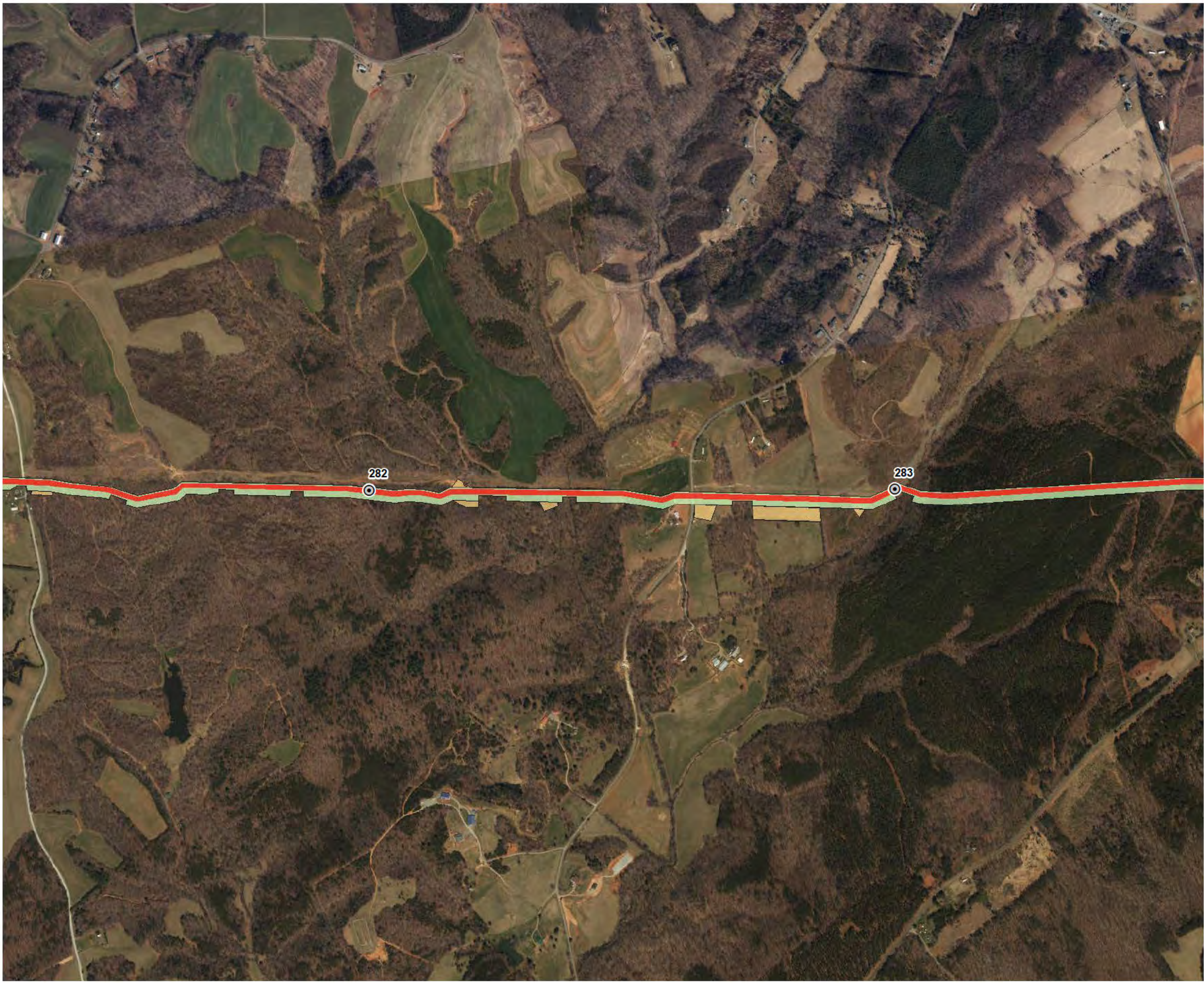
- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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Project No. 593.06

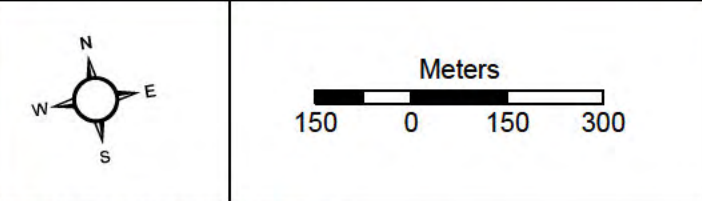
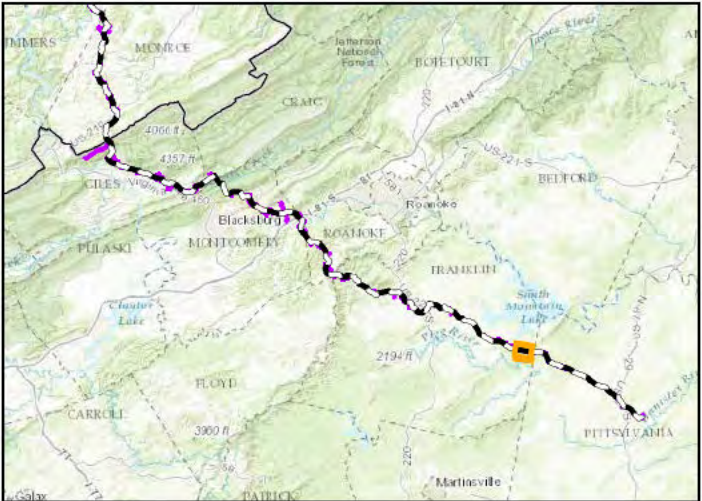


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

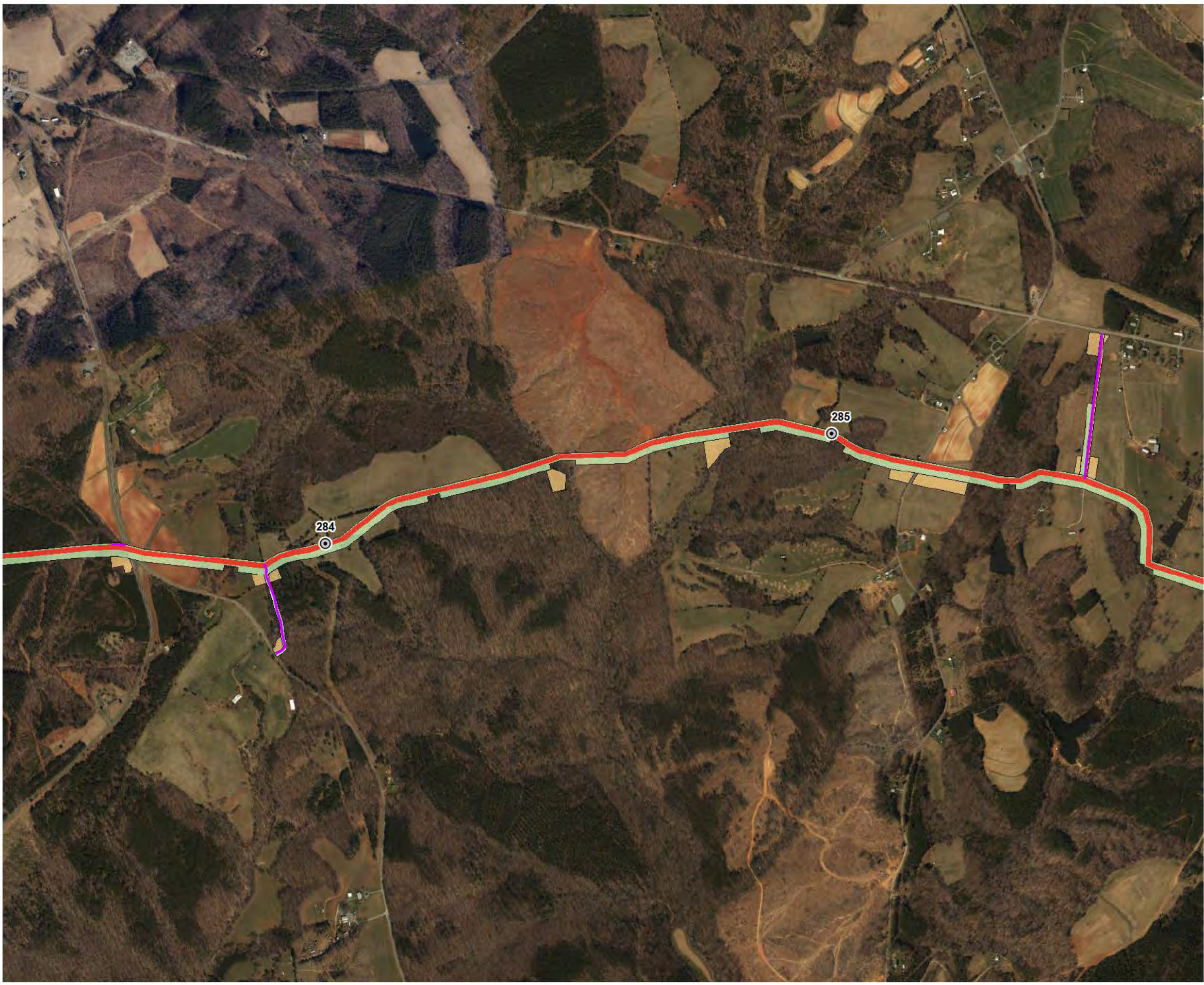
Map 38 of 47

- Milepost
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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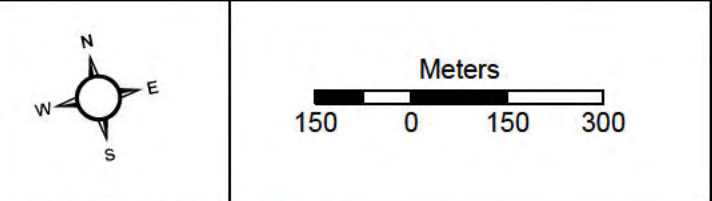
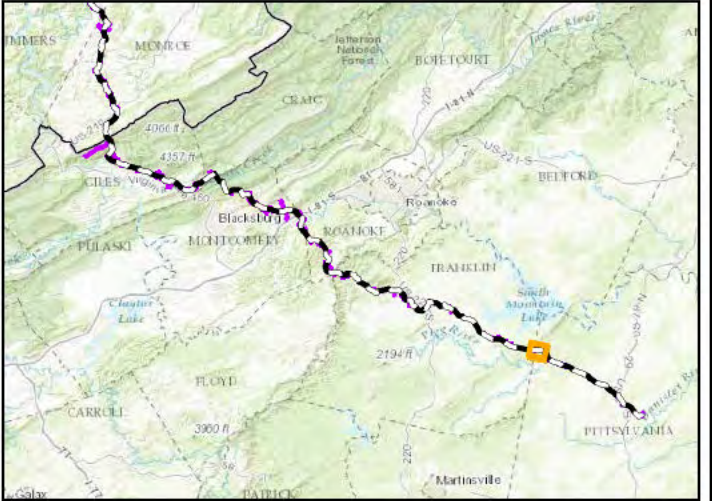


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 39 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted

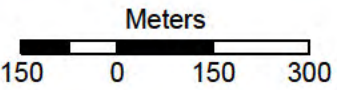
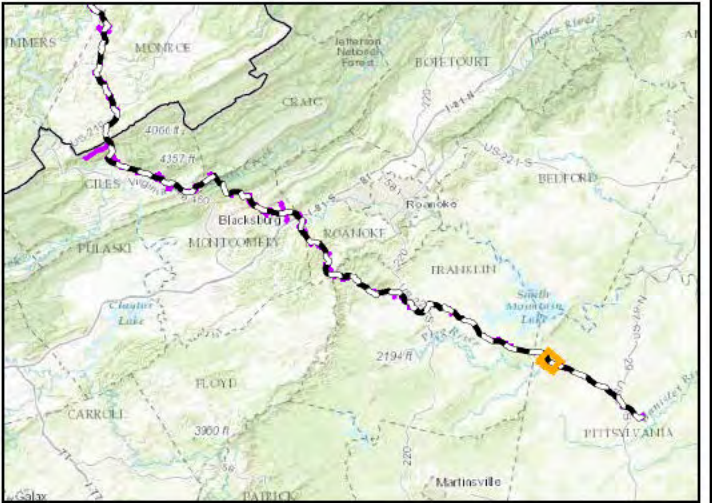


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- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional



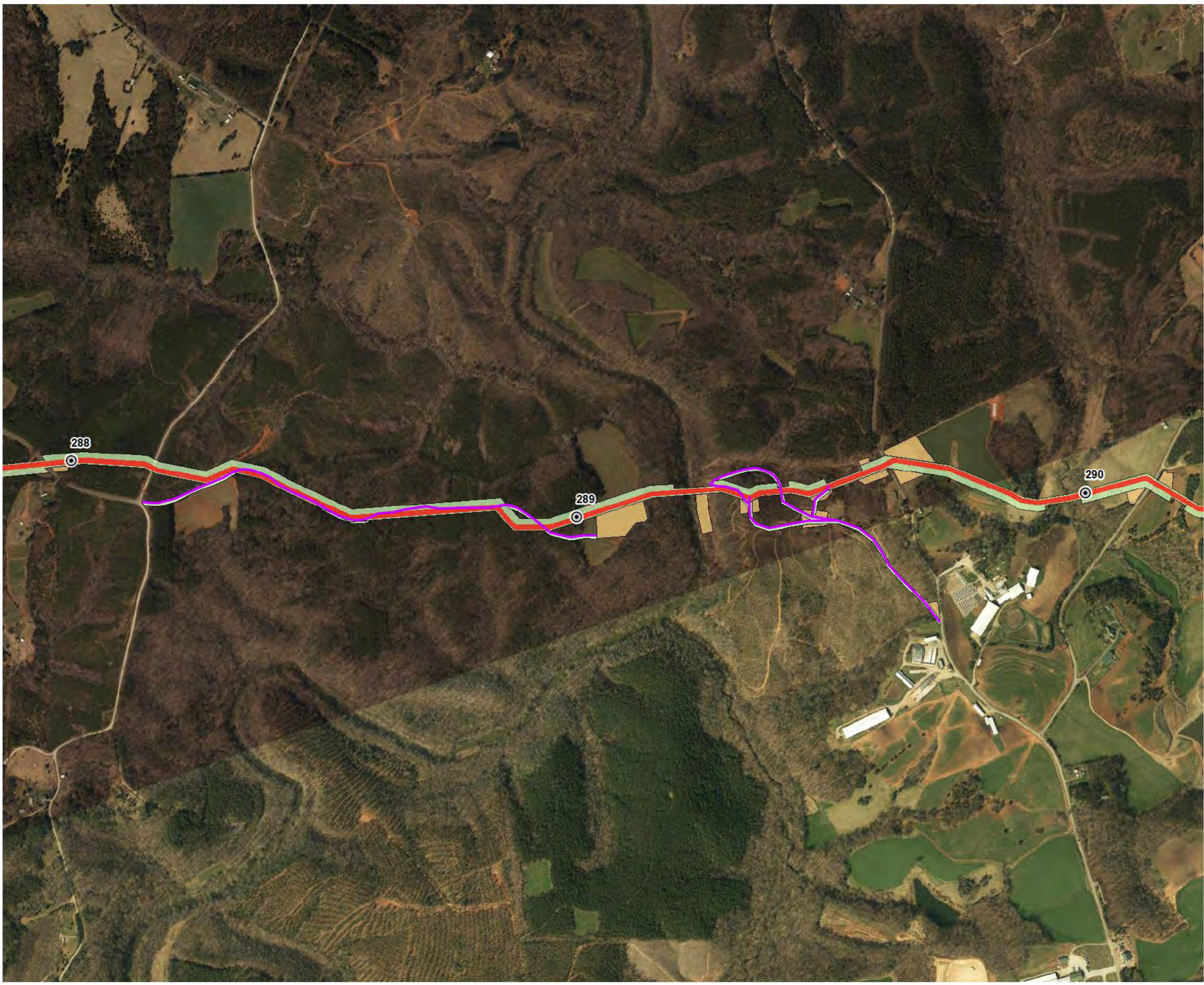
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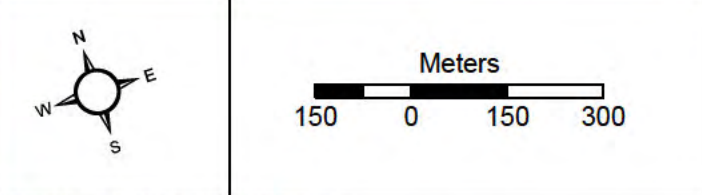
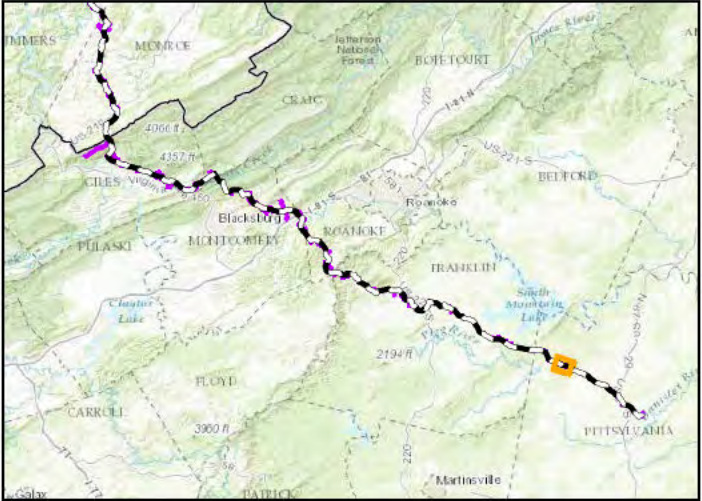


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 41 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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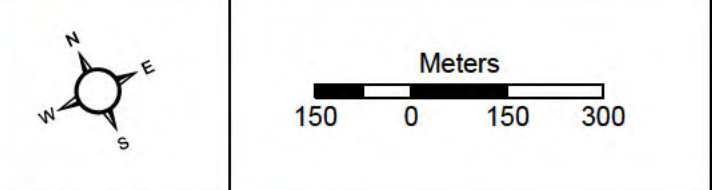
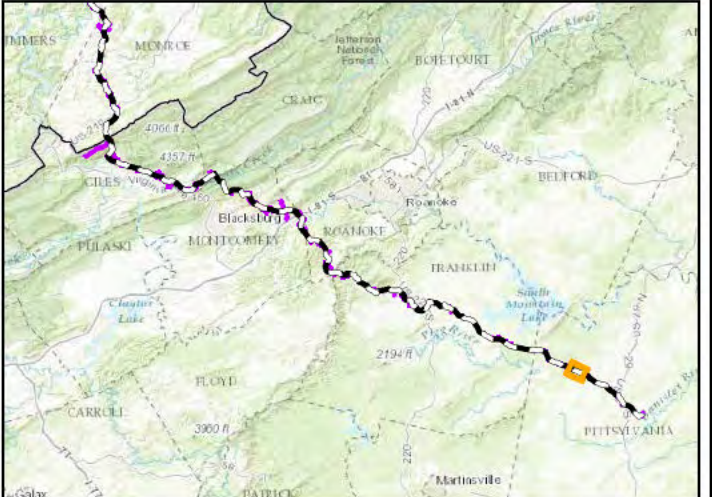
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Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



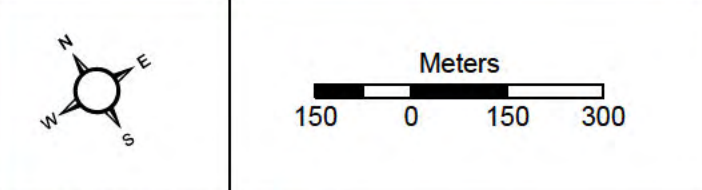
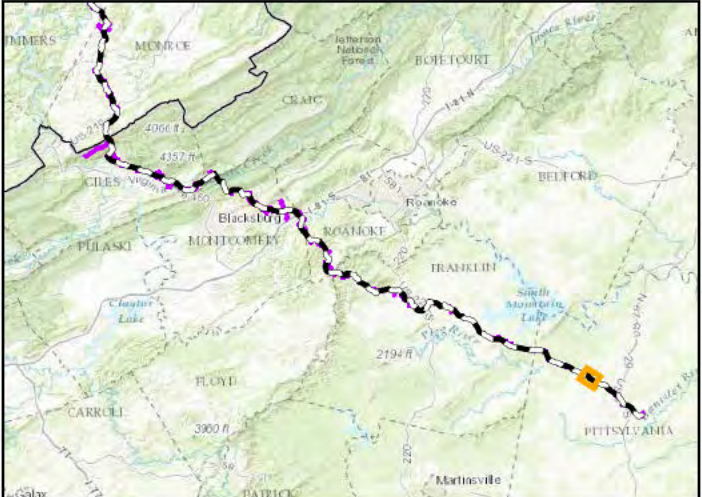
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Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

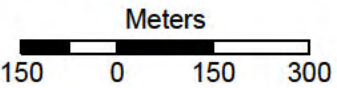
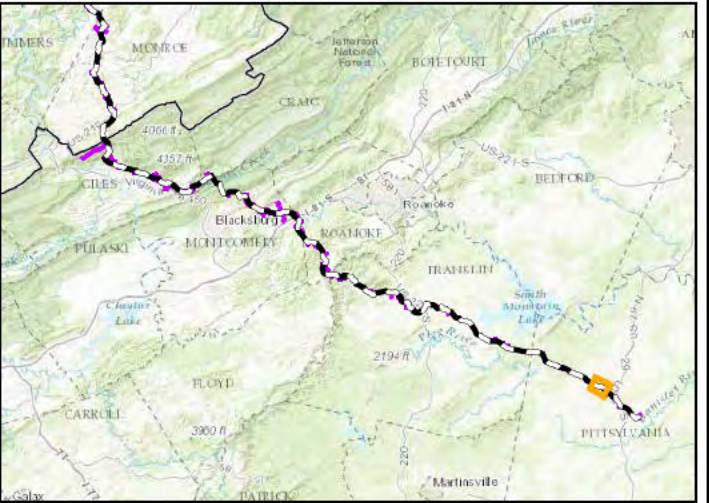
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- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



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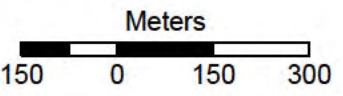
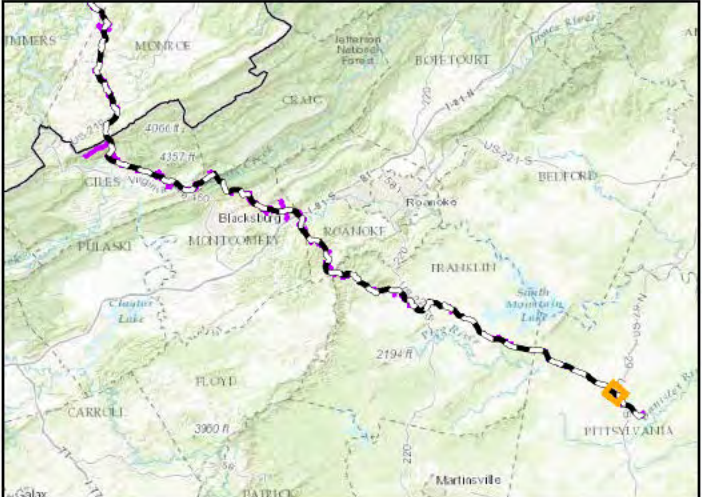


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 45 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
"wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm"
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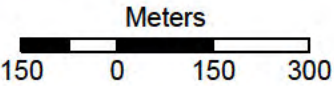
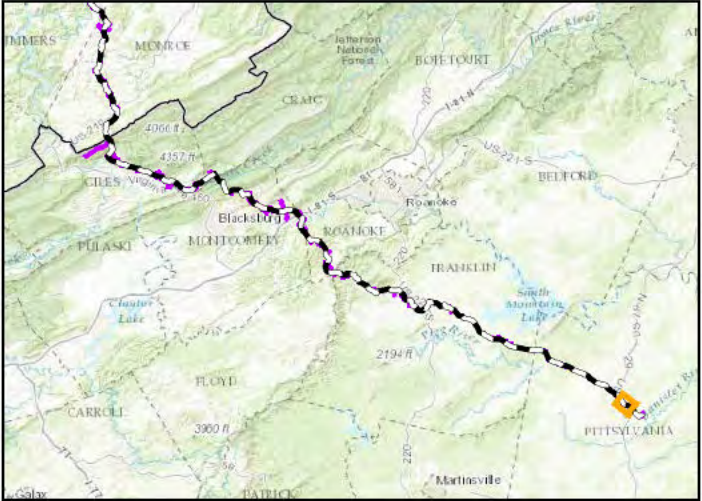


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 46 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Temporary Work Space - Additional

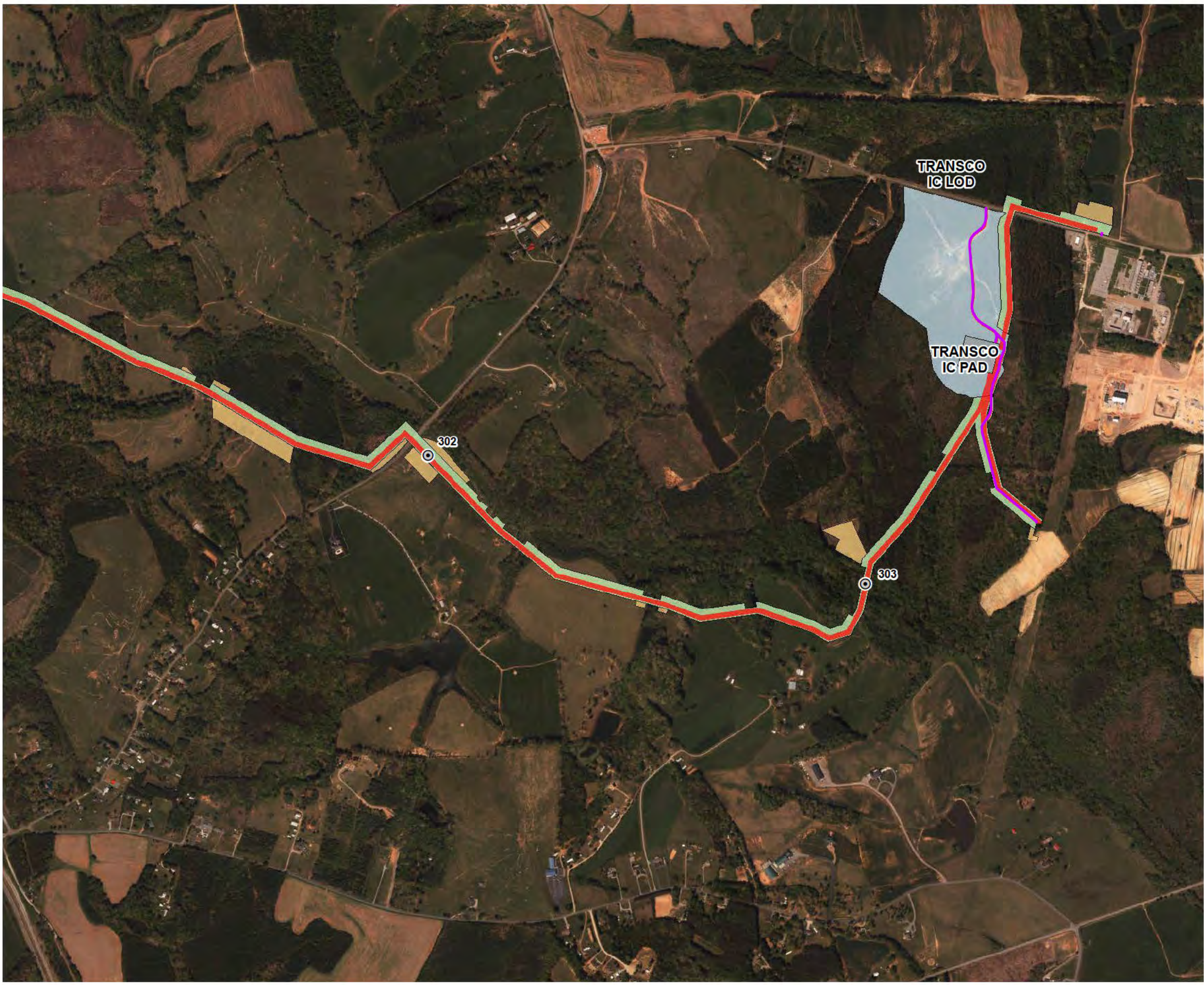
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Project No. 593.06

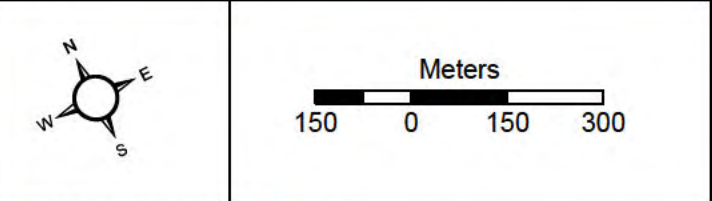
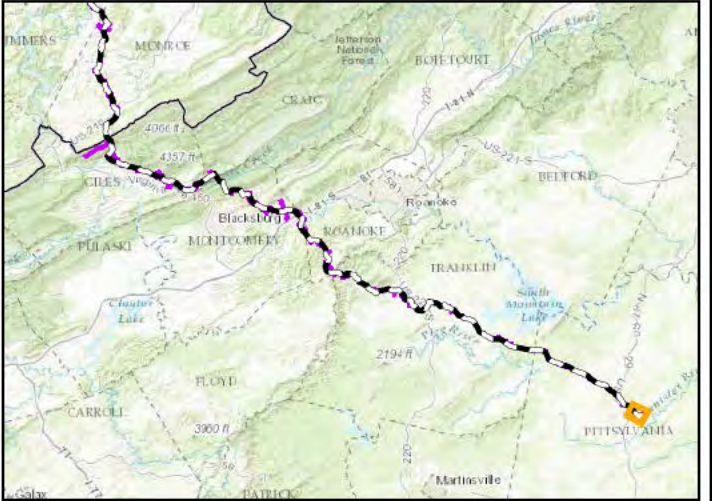


Project features and portal survey status along the Mountain Valley Pipeline Project in Virginia.

Map 47 of 47

- Milepost
- October 2016 Proposed Access Road
- Permanent Easement
- Temporary Work Space
- Aboveground Facilities Permanent
- Temporary Work Space - Additional
- Temporary Ancillary Site

*Surveys complete for Project features except where noted



Base Map: ESRI ArcGIS Web service -
"wv_aerial_photos_Sheriff_Assoc_2010_11_1ft_wm"
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APPENDIX B
LIFE HISTORY AND ECOLOGY OF LISTED BAT SPECIES

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1.0 Indiana Bat (*Myotis sodalis*)

1.1 Description

The Indiana bat is a medium-sized bat in the genus *Myotis*. The forearm length has a range of 35 to 41 millimeters (1.4 – 1.6 in). The head and body length range from 41 to 49 millimeters (1.6 – 1.9 in). Its appearance most closely resembles that of congeners little brown bat (*M. lucifugus*) and northern long-eared bat. Indiana bats differ from similar *Myotis* species in that they have a distinctly keeled calcar (cartilage that extends from the ankle to support the tail membrane). Other minor differences include smaller and more delicate hind feet, shorter hairs on the feet that do not extend past the toenails, and a pink nose. The fur lacks luster, and the wing and ear membranes have a dull, flat coloration that does not contrast with the fur (USFWS 2007). Fur on the chest and belly is lighter than fur on the back, but is not as strongly contrasting as that of similar *Myotis* species. Overall color is slightly grayer, while the little brown bat and northern bat are browner. The skull has a crest and tends to be smaller, flatter, and narrower than that of the little brown bat (USFWS 2007).



1.2 Ecology

The Indiana bat is a "tree bat" in summer and a "cave bat" in winter. There are four ecologically distinct components of the annual life cycle: winter hibernation, spring staging and autumn swarming, spring and autumn migration, and the summer season of reproduction. The U.S. Fish & Wildlife Service Recovery Plan (2007) provides a description of the life history. Figure 1 provides an annual chronology of seasonal activities.

1.2.1 Summer Roosting Ecology

The summer range of the Indiana bat is large and includes much of the eastern deciduous forestlands between the Appalachian Mountains and Midwest prairies (Figure 2). Distribution throughout the range is not uniform and summer occurrences are more frequent in southern Iowa and Michigan, northern Missouri, Illinois, and Indiana. Greater tree densities do not equate to more bats (Brack et al. 2002). Cooler summer temperatures associated with latitude or altitude likely affect reproductive success and the summer distribution of the species (Brack et al. 2002).

1.2.1.1 Males

Some males remain near hibernacula throughout summer while others migrate varying distances (Whitaker and Brack 2002). Males can be caught at hibernacula on most nights during summer (Brack 1983, Brack and LaVal 1985), although there may be a large turnover of individuals between nights (Brack 1983). Woodland roosts appear

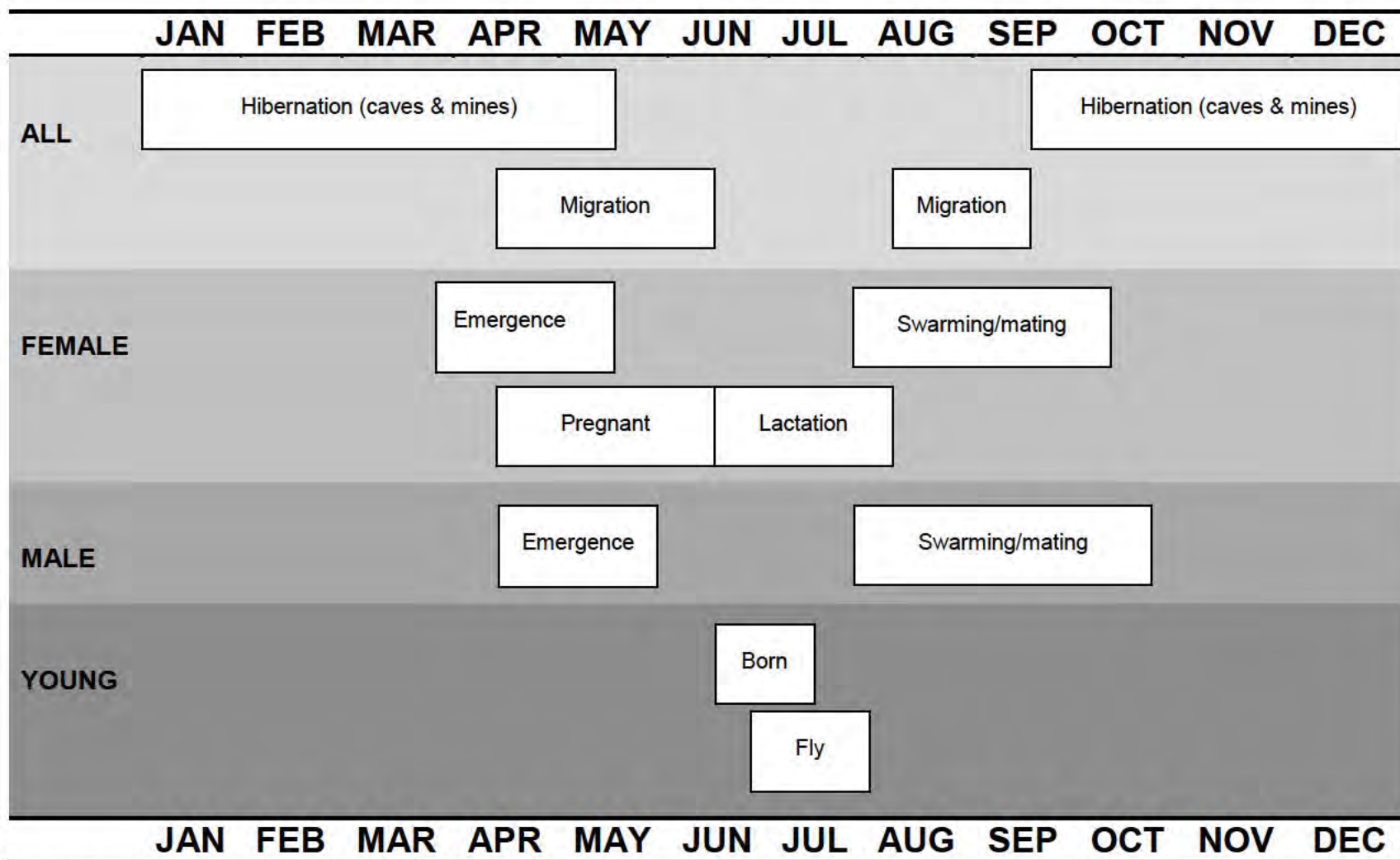


Figure 1. Seasonal chronology of Indiana bat activities.

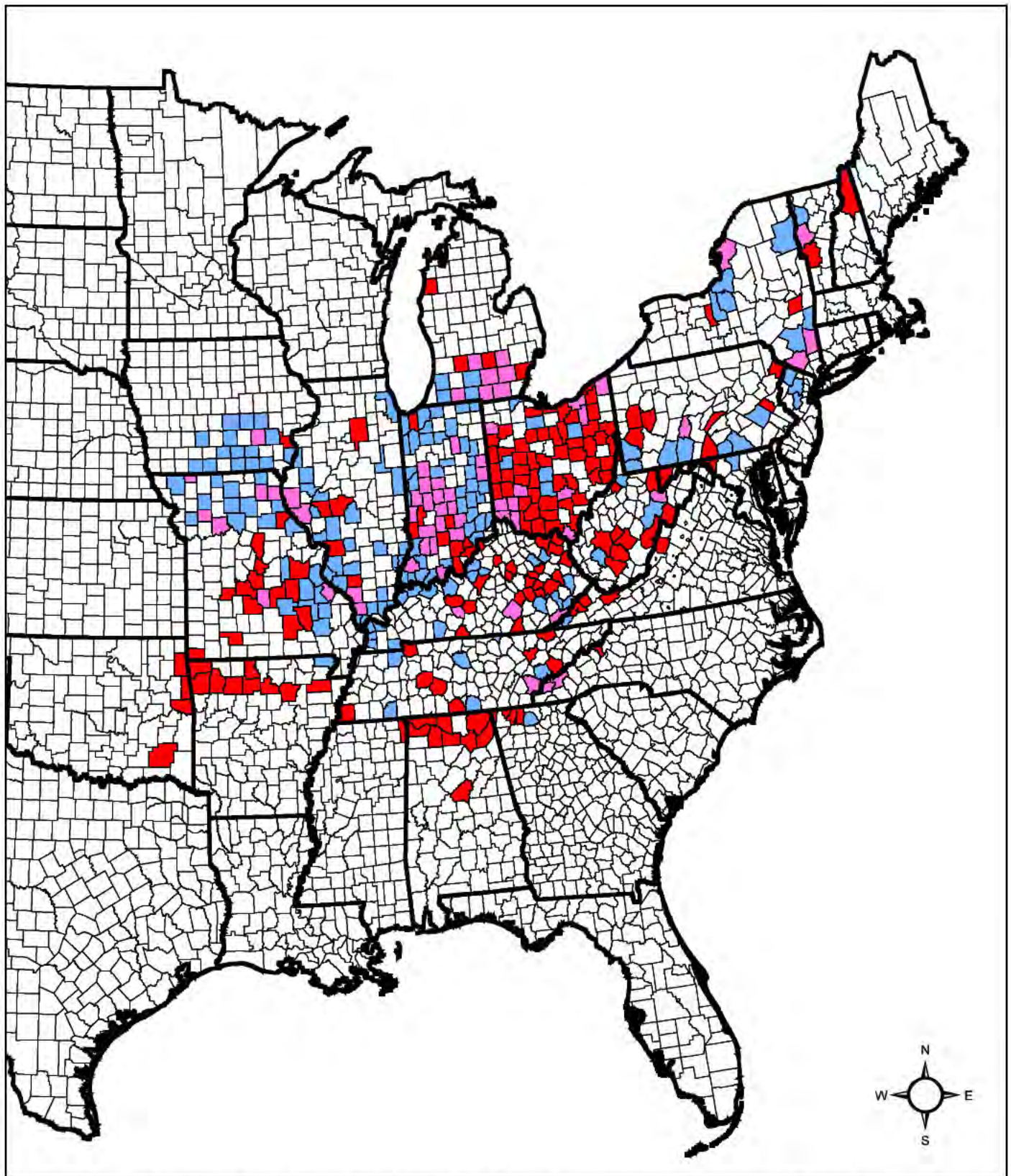
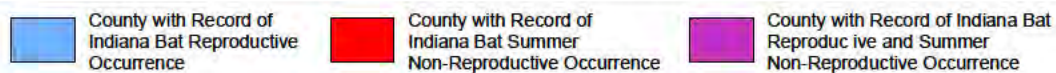


Figure 2. Rangewide distribution of the Indiana bat during summer, showing counties with reproductive (adult female and/or young-of-the-year) and non-reproductive records.



Sources: USFWS, Indiana Bat Revised Recovery Plan, Agency Draft, 2007. Updated: November 2014



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similar to maternity roosts (Kiser and Elliott 1996, Schultes and Elliott 2002, Brack and Whitaker 2004, Brack et al. 2004), although smaller diameter trees may be used. Less space may be required for a single bat than a colony of bats, or thermal requirements may differ. Males appear somewhat nomadic; over time, the number of roosts and the size of an area used increases. Activity areas encompass roads of all sizes, from trails to interstate highways. Roosts have also been located near roads of all sizes (Kiser and Elliott 1996, Schultes and Elliott 2002, Brack et al. 2004), including adjacent to an interstate highway (Brack et al. 2004).

1.2.1.2 Females and Maternity Colonies

When female Indiana bats emerge from hibernation, they migrate to maternity colonies that may be located up to several hundred miles away (Kurta and Murray 2002). Females form nursery colonies under exfoliating bark of dead, dying, and living trees in a variety of habitat types, including uplands and riparian habitats. A wide variety of tree species, including occasional pines (Britzke et al. 2003) are used as nursery colonies indicating that it is tree form, not species that is important for roosts. Since many roosts are in dead or dying trees, they are often ephemeral. Roost trees may be habitable for one to several years, depending on the species and condition of the tree (Callahan et al. 1997)

Indiana bats exhibit strong site fidelity to summer roosting and foraging areas (Kurta and Murray 2002, Kurta et al. 2002). Females are pregnant when they arrive at maternity roosts. Parturition typically occurs between late June and early July. A maternity colony typically consists of 25 to 325 adult females. Nursery colonies often use several roost trees (Kurta et al. 1993, Foster and Kurta 1999, Kurta and Murray 2002), moving among roosts within a season. Most members of a colony coalesce into a single roost tree about the time of parturition, which begins to break up again as soon as young are volant.

Roosts that contain large numbers of bats (more than 20 bats) are often called primary roosts, while secondary roosts hold fewer bats. Primary roost trees are often greater than 46 centimeters (18 in) diameter at breast height (dbh) and secondary roost trees are often greater than 23 centimeters (9 in) dbh (Gardner et al. 1991, Callahan et al. 1997, Kurta et al. 2002, Miller et al. 2002, Carter 2003). Numerous suitable roosts may be required to support a single nursery colony, possibly about 45 stems per hectare (20/acre) (Gardner et al. 1991, Miller et al. 2002, Carter 2003).

Roost trees are often located where they have solar exposure, with 20 to 80 percent canopy closure (Humphrey et al. 1977, Gardner et al. 1991, Kurta et al. 1993, Kurta et al. 1996, Kurta et al. 2002, Carter 2003). They are often exposed to 10 or more hours of solar radiation per day (Kurta et al. 2002). The need for solar exposure may vary with latitude.

Indiana bats live on anthropogenic landscapes and recent research indicates females do include roads in their active area. Although bats do cross roads, the studies that document this behavior were not designed to gauge a graded response (Gardner

et al. 1991, Brown et al. 2001, Kiser et al. 2002, Kurta et al. 2002, Brack and Whitaker 2006)

1.2.2 Food Habits and Foraging Ecology

Like many other species of microchiropterans, the Indiana bat often uses travel corridors that consist of open flyways such as streams, woodland trails, small infrequently used roads, and possibly utility corridors, regardless of suitability for foraging or roosting (Brown and Brack 2003). Members of maternity colonies forage in a variety of woodland settings, including upland and floodplain forest (Humphrey et al. 1977, Brack 1983, Gardner et al. 1991). Foraging activity is concentrated above and around foliage surfaces, such as over the canopy in upland and riparian woods, around crowns of individual or widely spaced trees, and along edges. They forage less frequently over old fields, and occasionally over bushes in open pastures. Forest edges, small openings, and woodlands with patchy trees provide more foraging opportunities than dense woodlands. Most species of woodland bats forage prominently along edges, less in openings, and least within forests (Grindal 1996). Openings also provide a better supply of insects than do wooded areas (Tibbels and Kurta 2003).

2.0 Northern Long-Eared Bat (*Myotis septentrionalis*)

2.1 Description

The northern long-eared bat ranges from the northern border of Florida north and west to Saskatchewan and east to Labrador. This bat is common to a variety of forest types ranging from intact to small remnants. Although primarily an eastern species, the northern long-eared bat can be found as far west as Montana, and onto the High Plains.



The northern long-eared bat weighs about 5-8 grams (0.17-0.28 oz) at maturity and its right forearm measures about 34-38 millimeters (1.3 – 1.5 in). The wing membrane connects to the foot at the base of the first toe. The northern long-eared bat is most easily characterized by the long ears (17 mm [0.7 in]), which extend past the muzzle when laid forward, as well as a long and thin tragus (9 mm [0.4 in]) (Whitaker and Mumford 2009). The northern long-eared bats' pelage is typically colored a light to dark brown on the dorsal side and a light brown on the ventral side (Caceres and Barclay 2000, Whitaker and Mumford 2009). Ears and wing membranes are usually a dark brown.

2.2 Ecology

The northern long-eared bat is a "tree bat" in summer and a "cave bat" in winter. During the summer, the species is forest dependent. As with the Indiana bat, there are four ecologically distinct components of the annual life cycle: winter hibernation, spring staging and autumn swarming, spring and autumn migration, and the summer season of reproduction (Figure 3).

2.3 Summer Roosting Ecology

The summer range of the northern long-eared bat is large and includes much of the eastern deciduous forestlands from the northern border of Florida north and west to Saskatchewan and east to Labrador (Caceres and Barclay 2000, Whitaker and Mumford 2009) (Figure 4). Distribution throughout the range is not uniform, and summer occurrences are more common in the northern and northeastern portions of the species' range than in southern and western portions (Caceres and Barclay 2000, Amelon and Burhans 2006). Historically, these areas were primarily forested. Through the southern portions of their range, they appear to be less abundant, and are thought of as rare in Alabama, South Carolina, and Georgia (Mumford and Cope 1964, Barbour and Davis 1969, Amelon and Burhans 2006, Whitaker and Mumford 2009, Timpone et al. 2010). Although occasionally captured/recorded in western portions of their range, they are uncommon when records are compared to eastern areas, and may now occupy this area as a result of range expansion following settlement (Sparks et al. 2011).

When female northern long-eared bats emerge from hibernation, they migrate to maternity colonies. The distance traveled from winter hibernacula to summer roosting areas is not known. Maternity colonies are typically found in hollow trees and under bark although they also use bat-houses, buildings, and other anthropogenic structures (Amelon and Burhans 2006). After parturition, pups usually achieve volancy by 21 days (Kunz 1971, Krochmal and Sparks 2007). As the offspring become volant, average number of bats using a maternity roost declines (Lacki and Schwierjohann 2001, Sparks 2003).

A wide variety of deciduous tree species, as well as occasional coniferous species, are used as nursery colonies indicating that it is tree form, not species that is important for roosts (Caceres and Barclay 2000, Carter and Feldhamer 2005). This species regularly uses both live and dead trees (Sasse and Pekins 1996, Foster and Kurta 1999, Lacki and Schwierjohann 2001, Sparks 2003, Timpone 2004, Whitaker et al. 2004, Carter and Feldhamer 2005, Ford et al. 2006, Timpone et al. 2010, Johnson et al. 2012, Silvis et al. 2012, Johnson et al. 2013, Silvis et al. 2014). The northern long-eared bat may choose either tree condition, depending on the presence or availability within an area or possibly due to competition with or predation from other wildlife (Perry and Thill 2007, Perry et al. 2007). Roost trees may be habitable for one to several years, depending on the species and condition of the tree. The species may also use several other structures as summer roost sites.

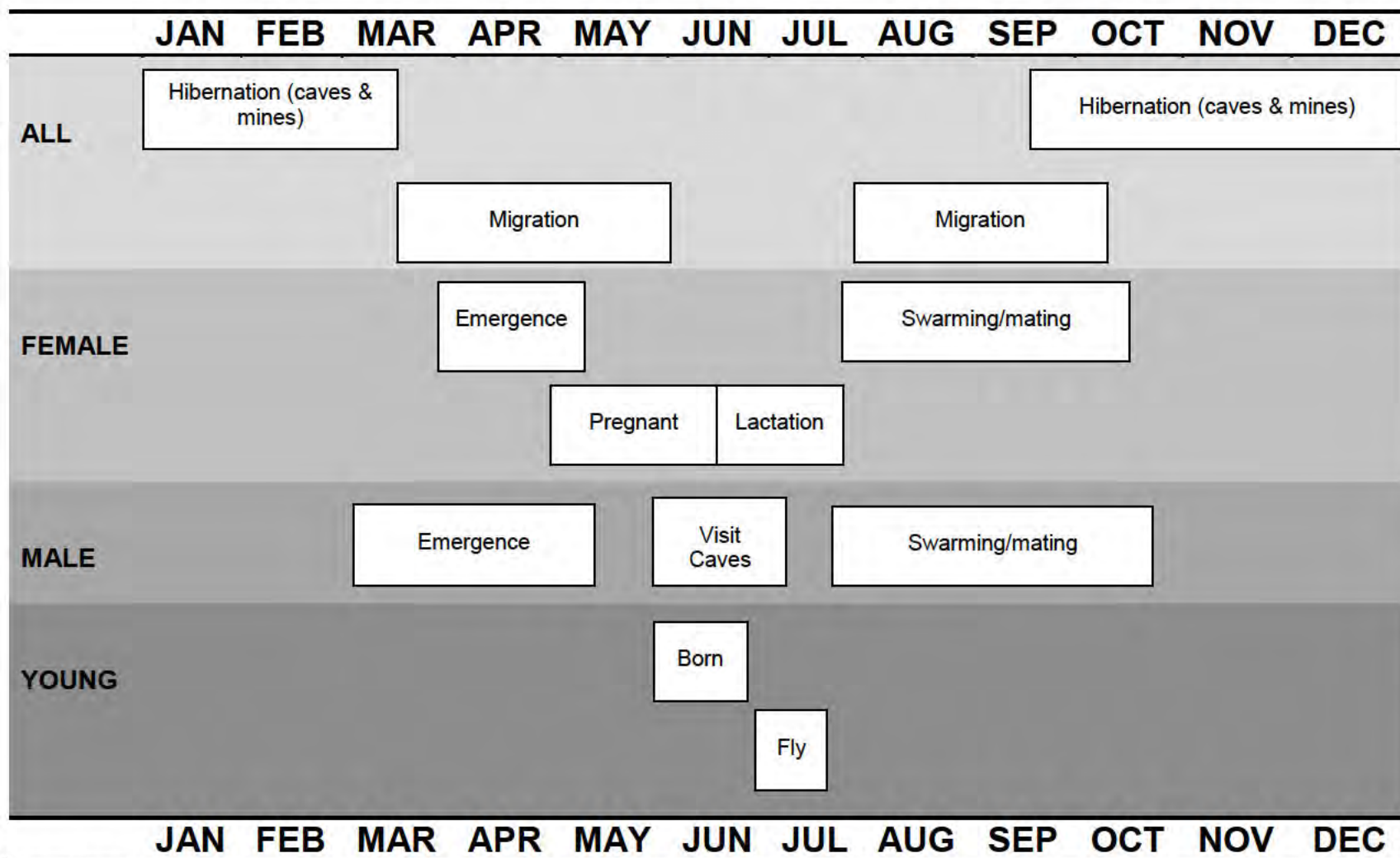
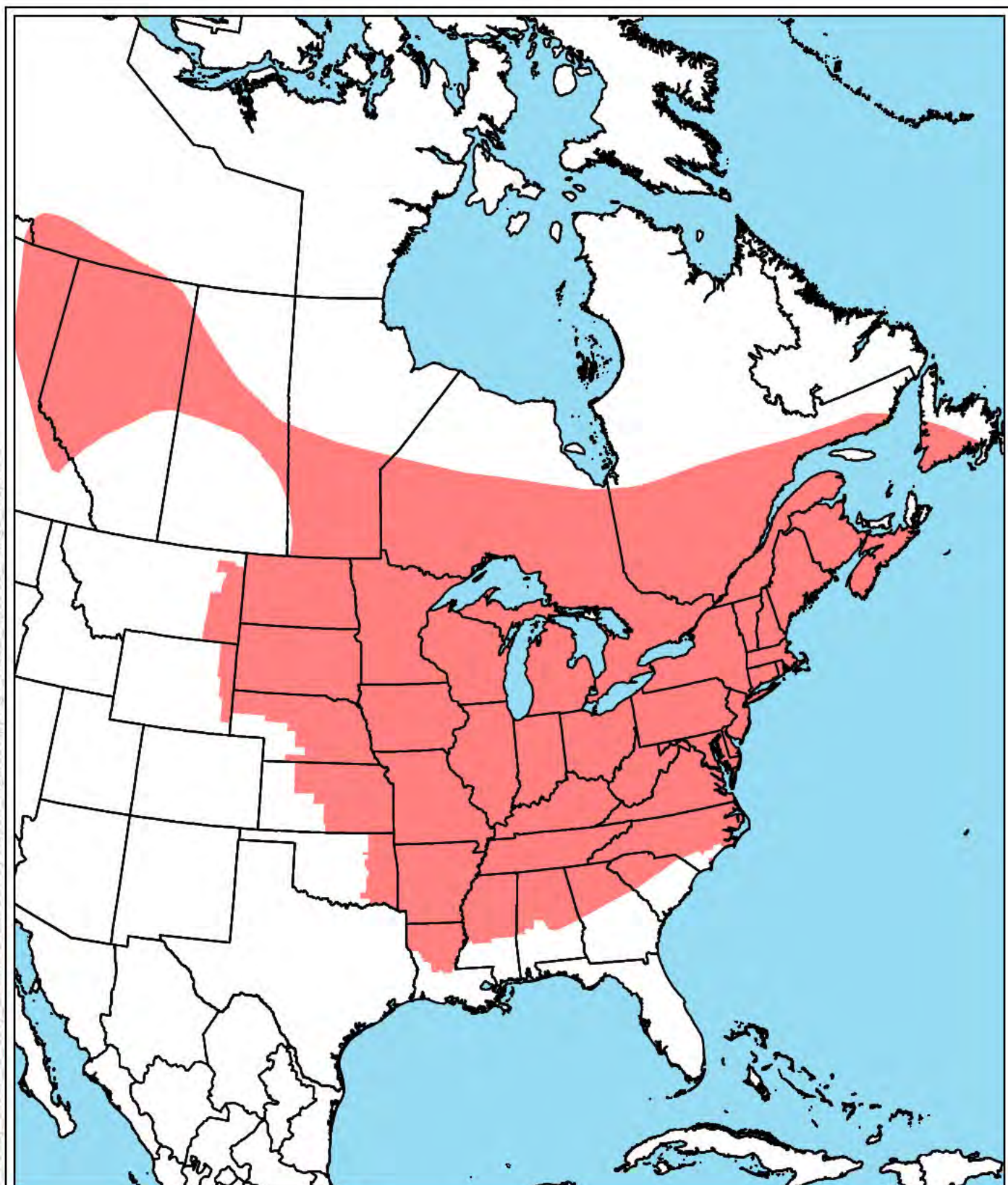


Figure 3. Seasonal chronology of northern long-eared bat activities.



 Northern Long-Eared Bat Range  State or Province Boundary

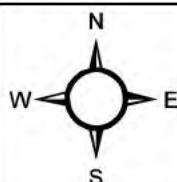


Figure 4. Rangewide distribution of the northern long-eared bat during summer.

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These can be natural or man-made (e.g. bridges, barns/homes, rocky cracks or crevices). Northern long-eared bats make extensive use of bat-houses when these structures are available (Whitaker et al. 2006).

Some males and non-reproductive females remain near their winter hibernacula throughout summer while others migrate varying distances. This may be due to a preference for cooler environments in the absence of pups (Barbour and Davis 1969, Amelon and Burhans 2006).

Males can be caught at hibernacula on most nights during summer, although there may be a large turnover of individuals between nights.

Structurally, summer roosts used by males are similar to those used by maternity colonies. Trees used by males of the species are often smaller than those used by maternity colonies, perhaps because males are often solitary or form small groups and thus need less space or they may have different thermal requirements than females.

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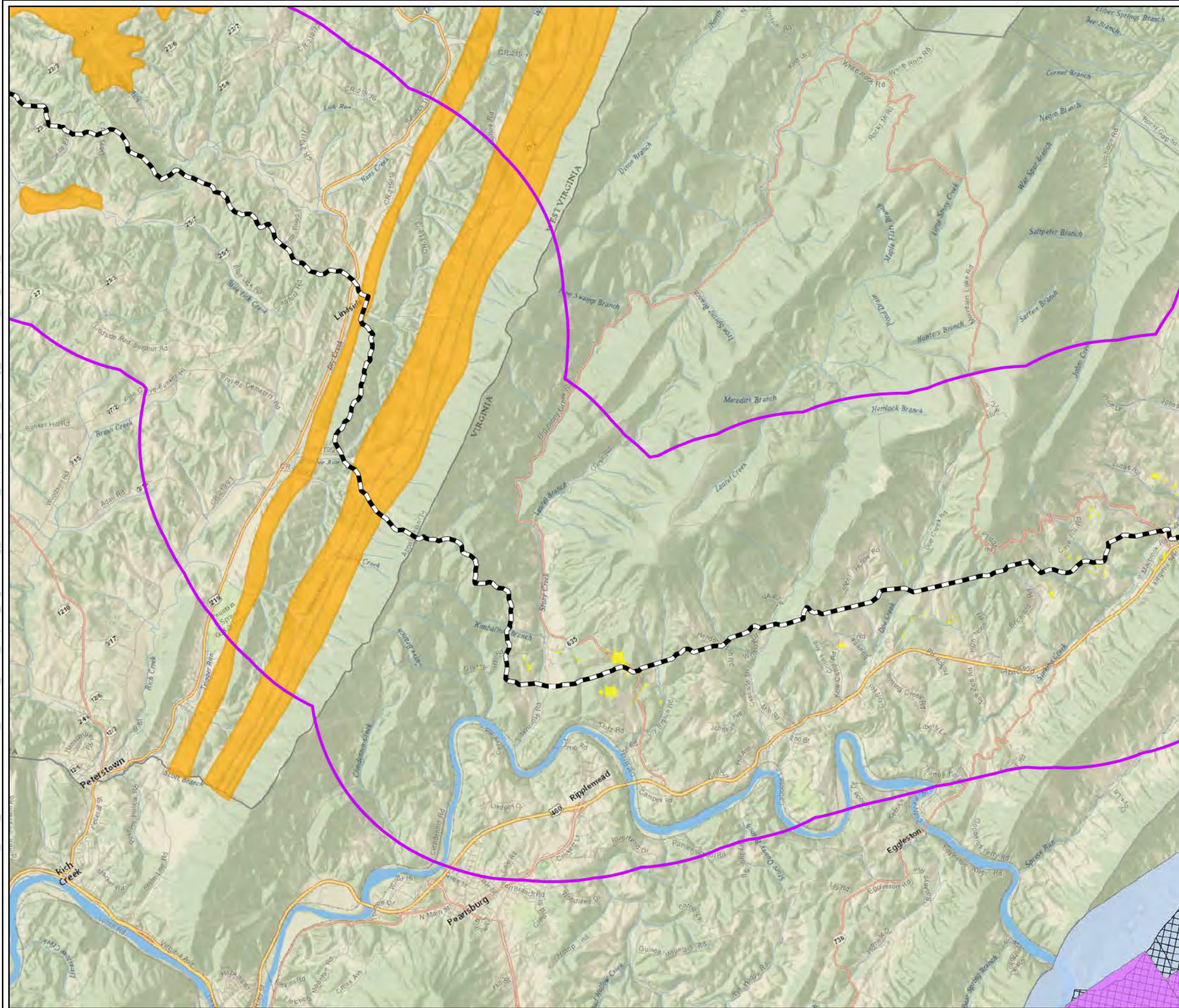
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APPENDIX C
EVIDENCE OF MINING AND CAVE/KARST GEOLOGY, MAPS 1-7

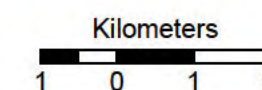
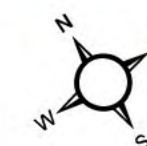




Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 1 of 7

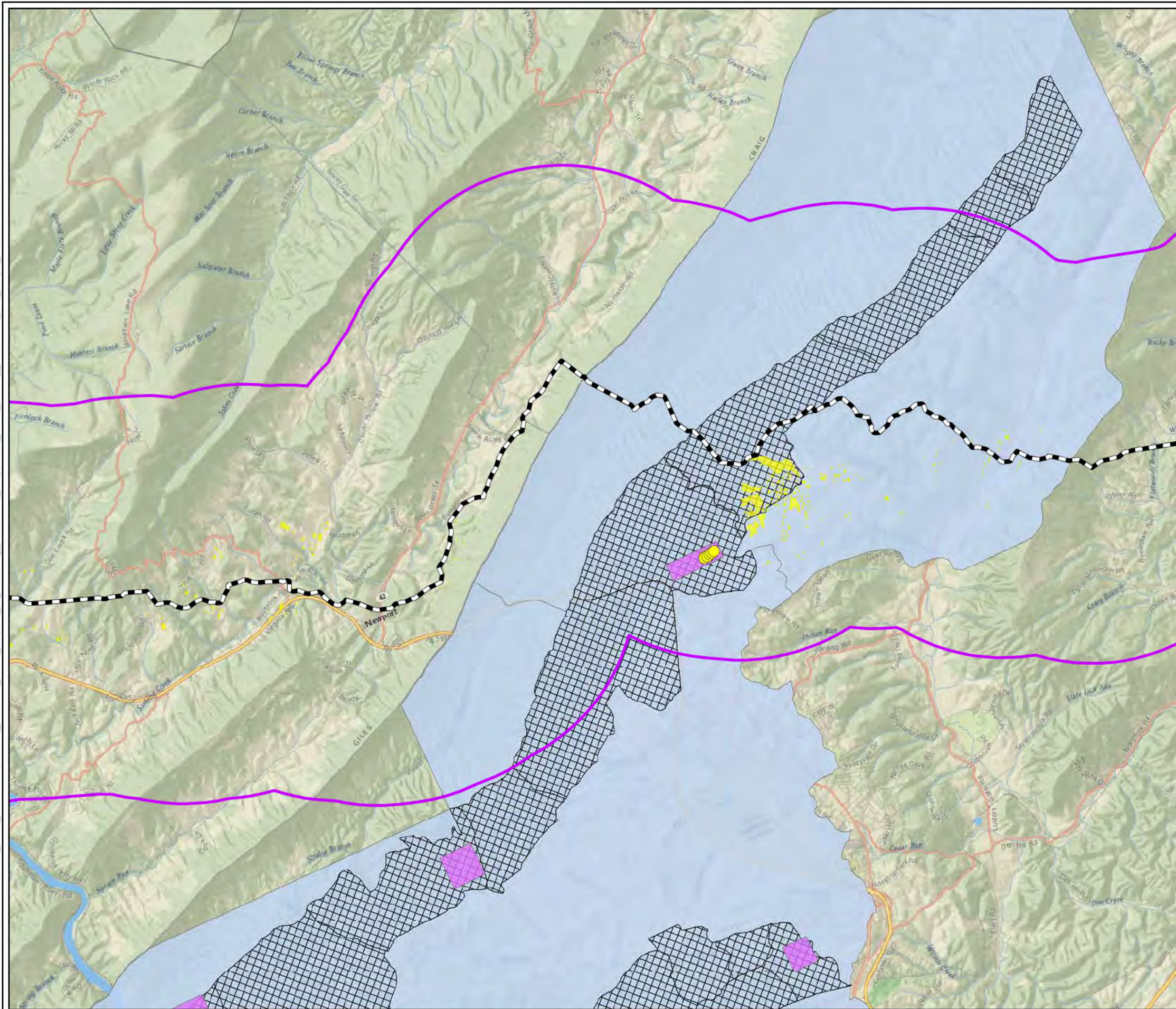
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- Mining Evidence Buffer
- Karst Formation (6)
- Sinkhole (110)
- AML Project Sites (2)
- AML Problem Areas (2)
- AML Planning Units (1)



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Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 2 of 7

- October 2016 Proposed Route
- Mining Evidence Buffer
- Mine Opening (5)
- Sinkhole (275)
- AML Project Sites (6)
- AML Problem Areas (14)
- AML Planning Units (2)



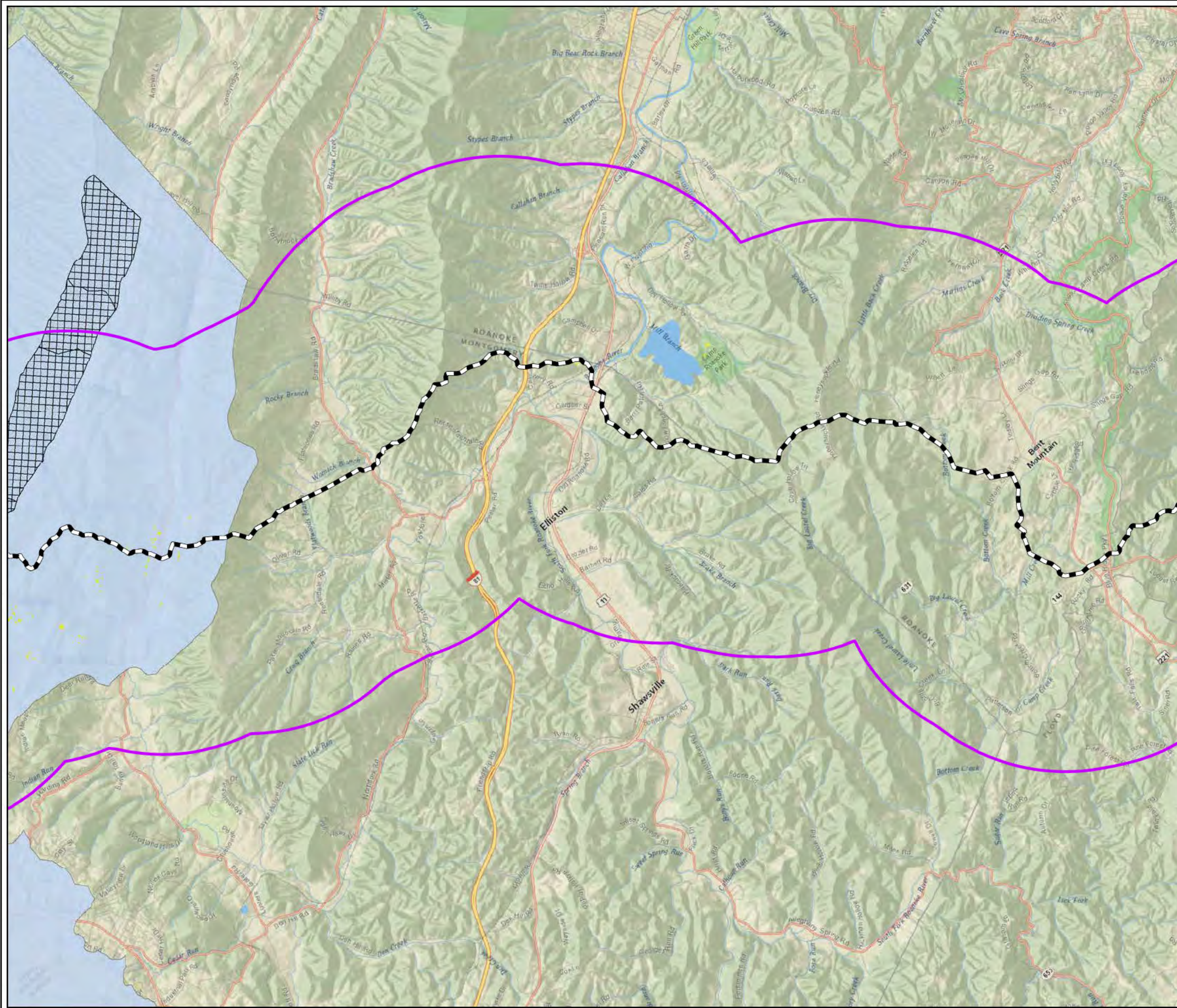
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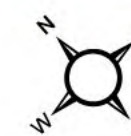
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Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 3 of 7

- October 2016 Proposed Route
- Mining Evidence Buffer
- Sinkhole (58)
- AML Problem Areas (4)
- AML Planning Units (2)

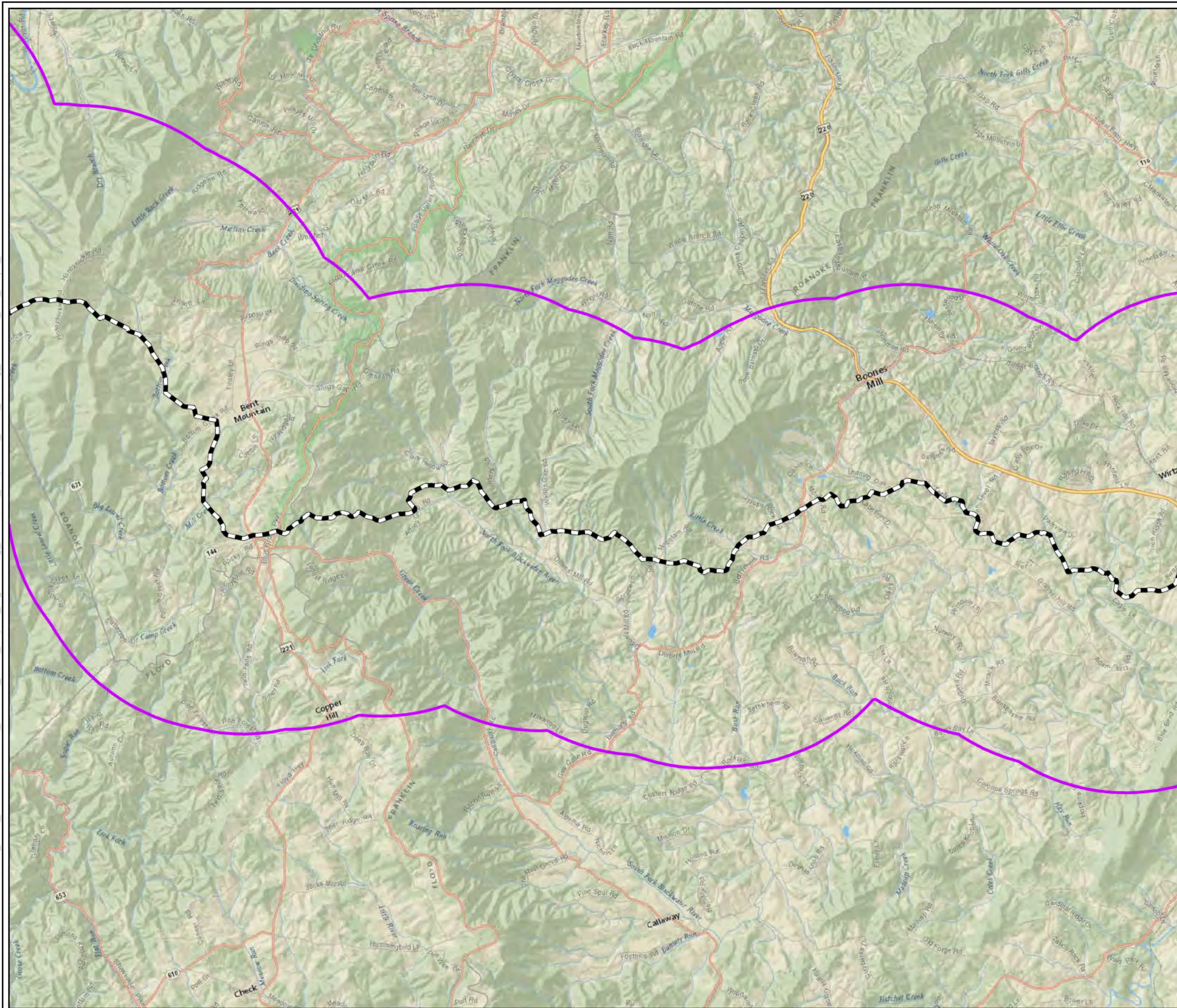


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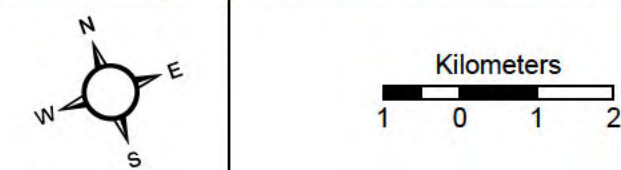
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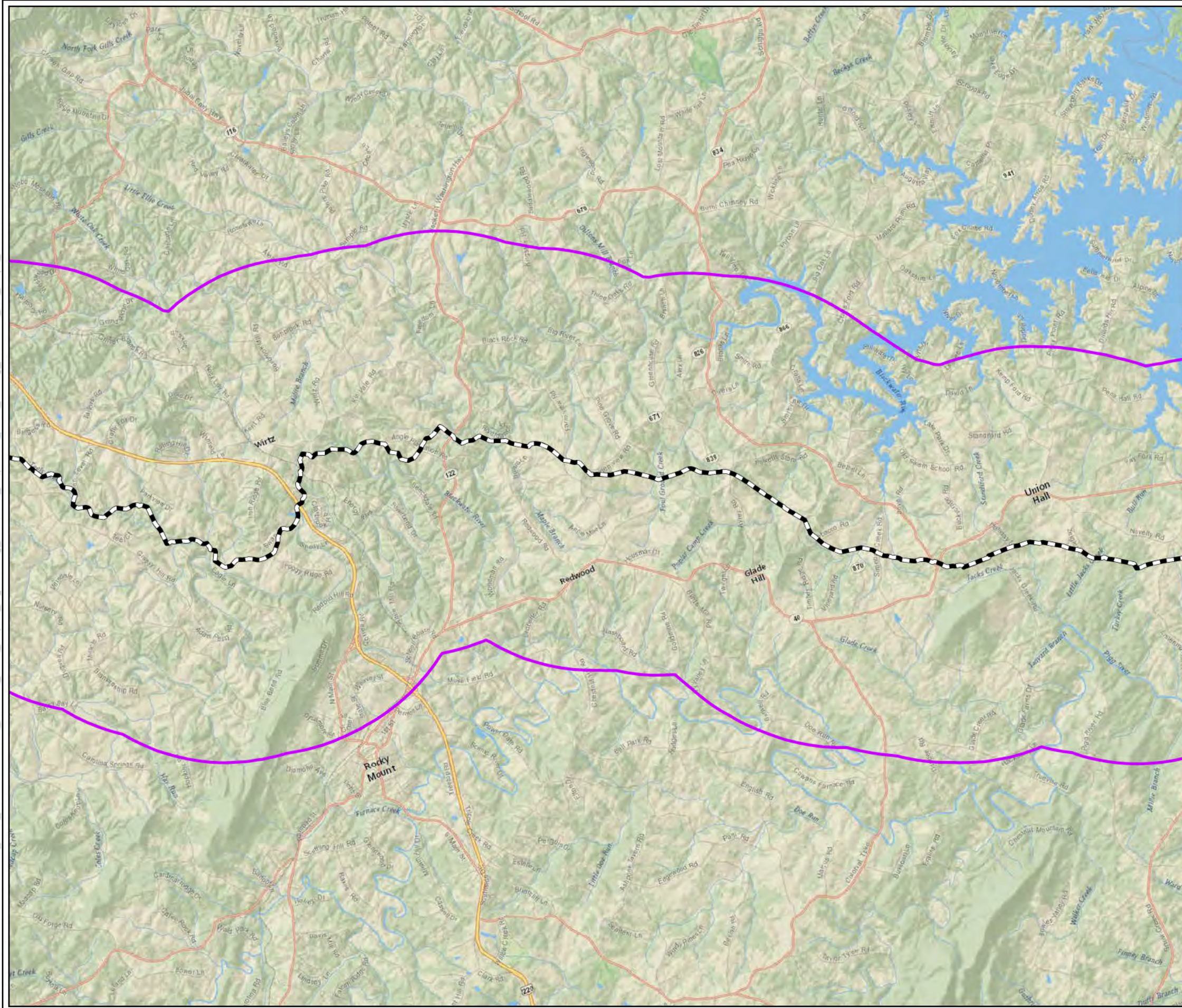
Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 4 of 7

- October 2016 Proposed Route
- Mining Evidence Buffer



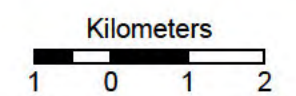
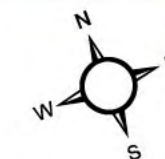
Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO,



Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 5 of 7

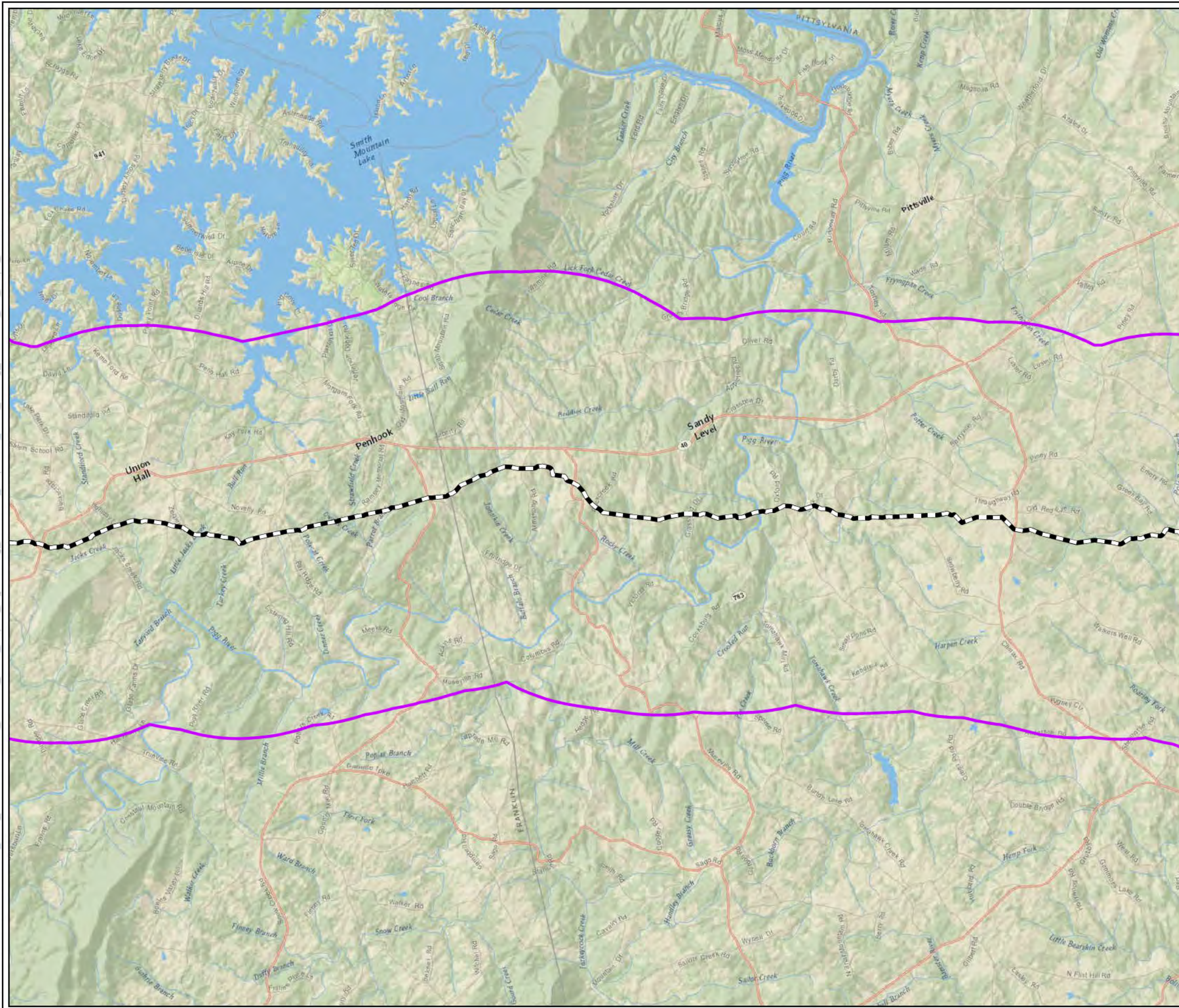
- October 2016 Proposed Route
- Mining Evidence Buffer



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO,



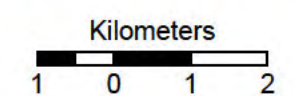
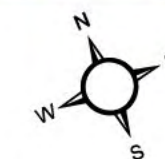
ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC
Project No. 593.06



Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 6 of 7

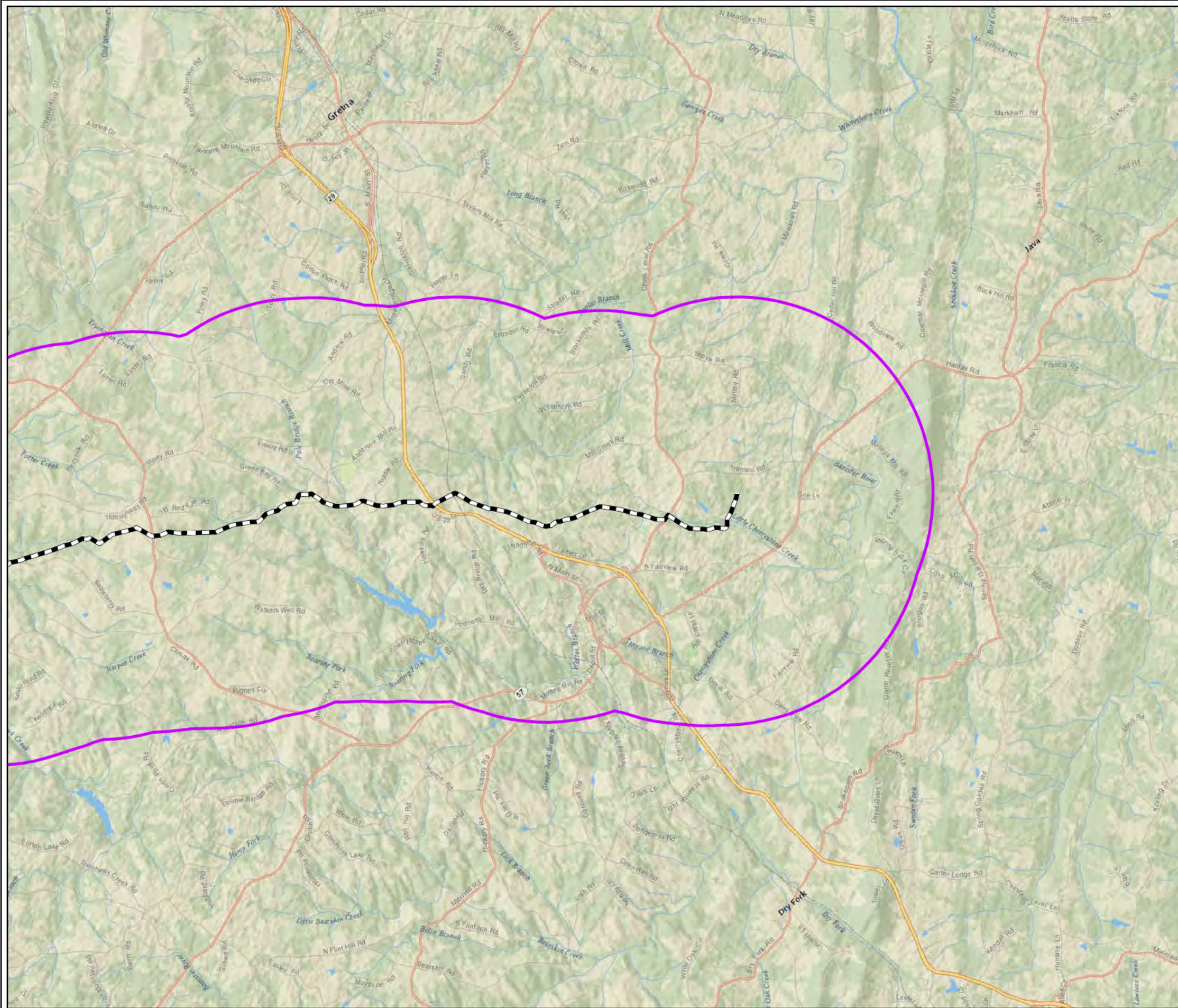
- October 2016 Proposed Route
- Mining Evidence Buffer



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO,



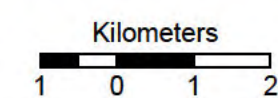
ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC
Project No. 593.06



Evidence of mining near the proposed Mountain Valley Pipeline Project in Virginia.

Map 7 of 7

- October 2016 Proposed Route
- Mining Evidence Buffer



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO,



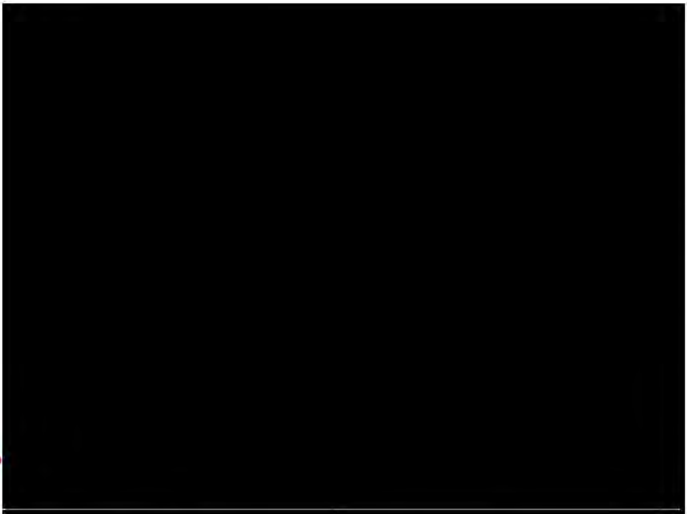
ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC
Project No. 593.06

APPENDIX D
PORTAL LOCATIONS, MAPS 1-3



Portals documented along the Mountain Valley Pipeline Project in Virginia.

- October 2016 Proposed Route
- October 2016 Proposed Access Road
- Portal - Unsuitable
- Portal - Suitable



Meters

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Path: G:\Current\2016_EOI_MVP\Map\Map1.mxd, 10/11/2016

Portals documented along the Mountain Valley Pipeline Project in Virginia.

Map 2 of 3

October 2016 Proposed Route

October 2016 Proposed Access Road

Portal - Unsuitable

Portal - Suitable

N

W

E

S

0

0.75

1.5

KM

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

ESI

ENVIRONMENTAL SOLUTIONS
& INNOVATIONS, INC.

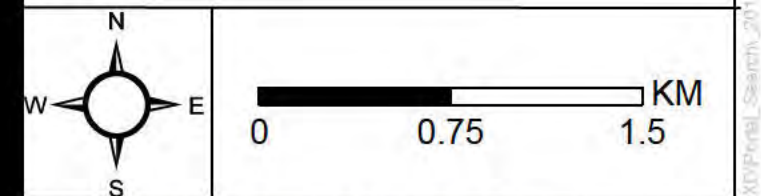
Project No. 593.06

Path: G:\Current\593_EQT_MVP\1\XDI\Portal_Search\2016_Report_Figs\Appendix_D\2016_11_X_17_portal_locations_Map2.mxd; VClarkston - 11/14/2016

Portals documented along the Mountain Valley Pipeline Project in Virginia.

Map 3 of 3

-  October 2016 Proposed Route
-  October 2016 Proposed Access Road
-  Portal - Unsuitable
-  Portal - Suitable

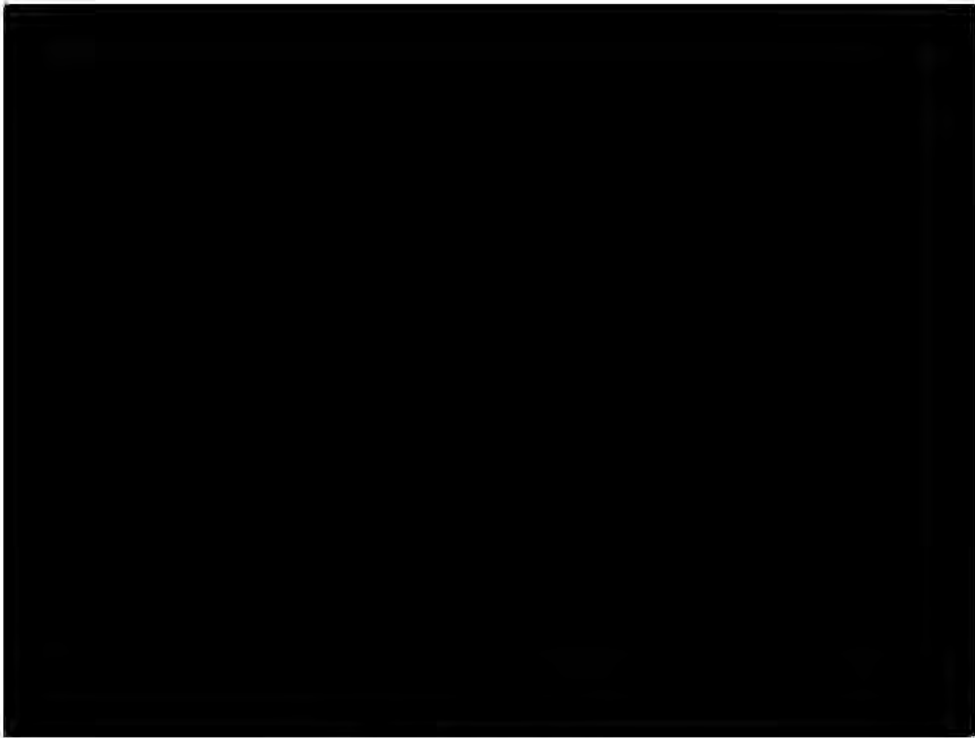


Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

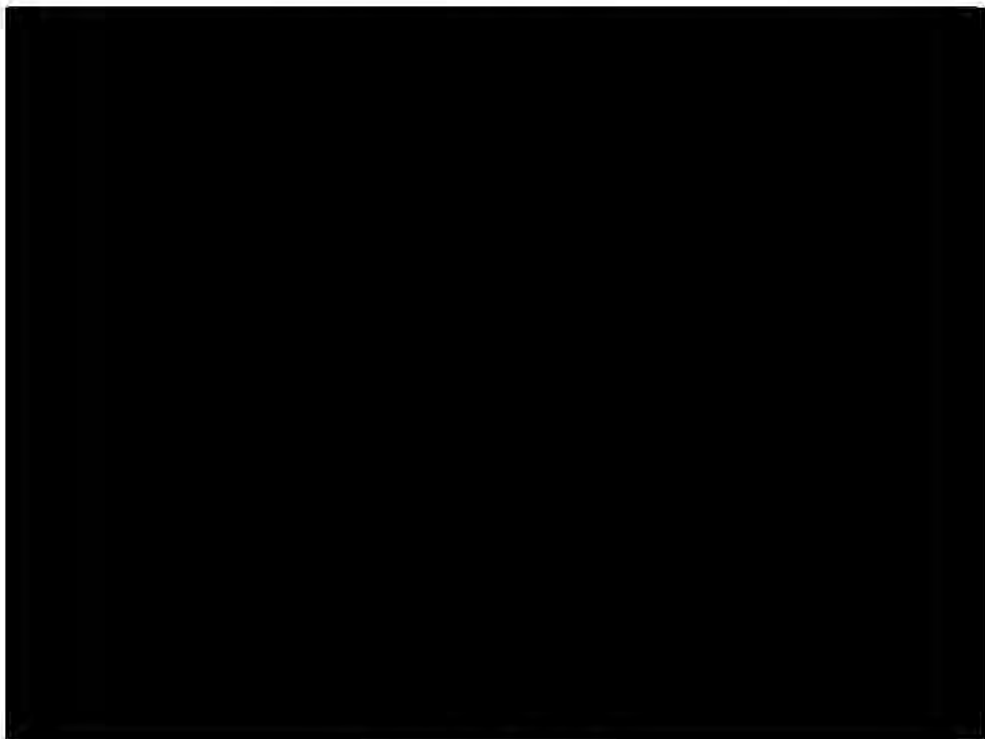


APPENDIX E
REPRESENTATIVE PHOTOGRAPHS

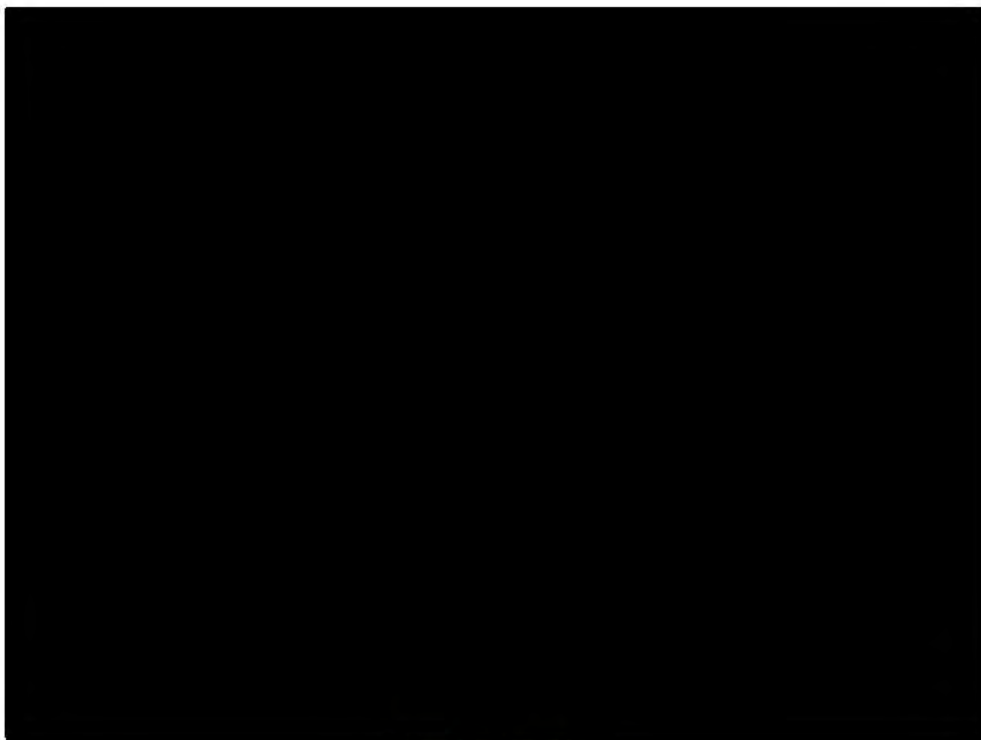




Fred Bulls Cave



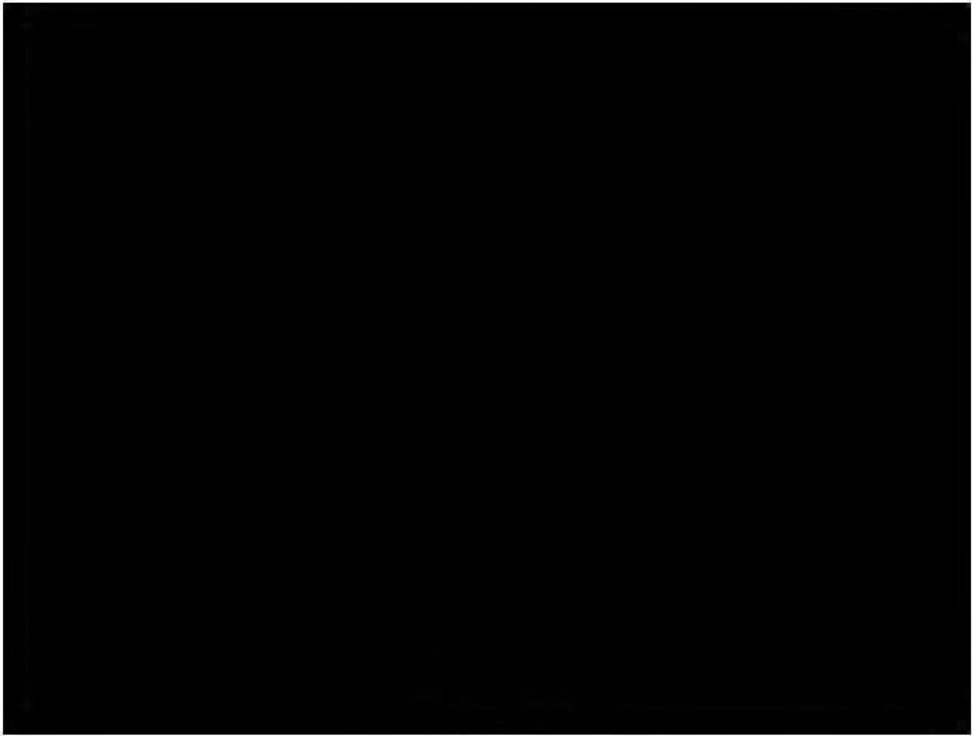
Fred Bulls Cave



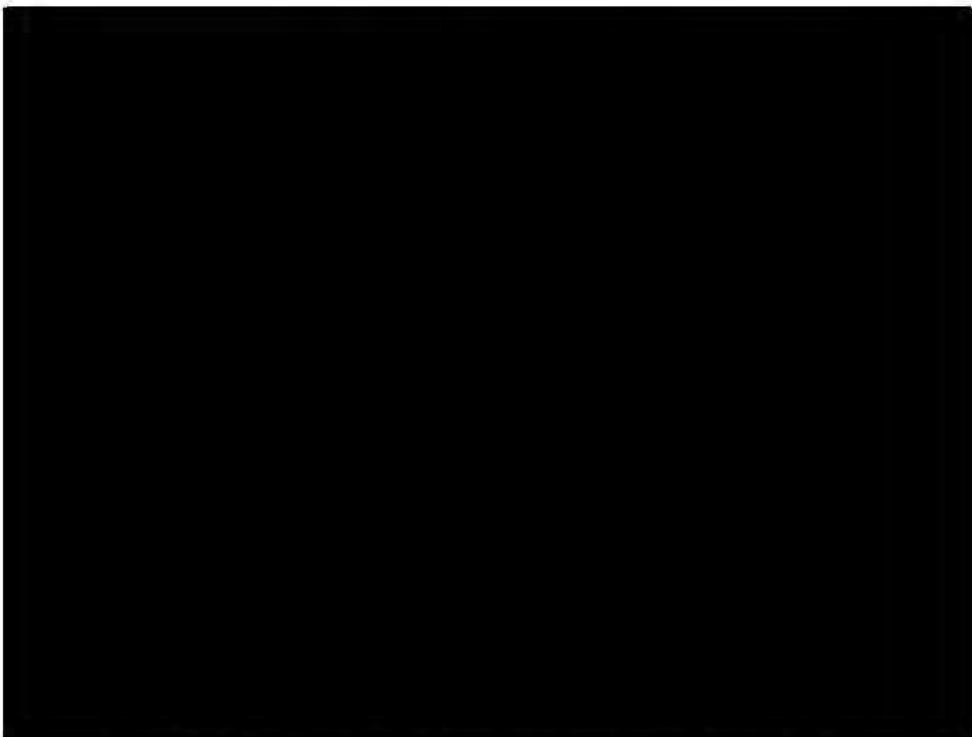
Crooks Crevice



Crooks Crevice, harp trap and acoustic detector



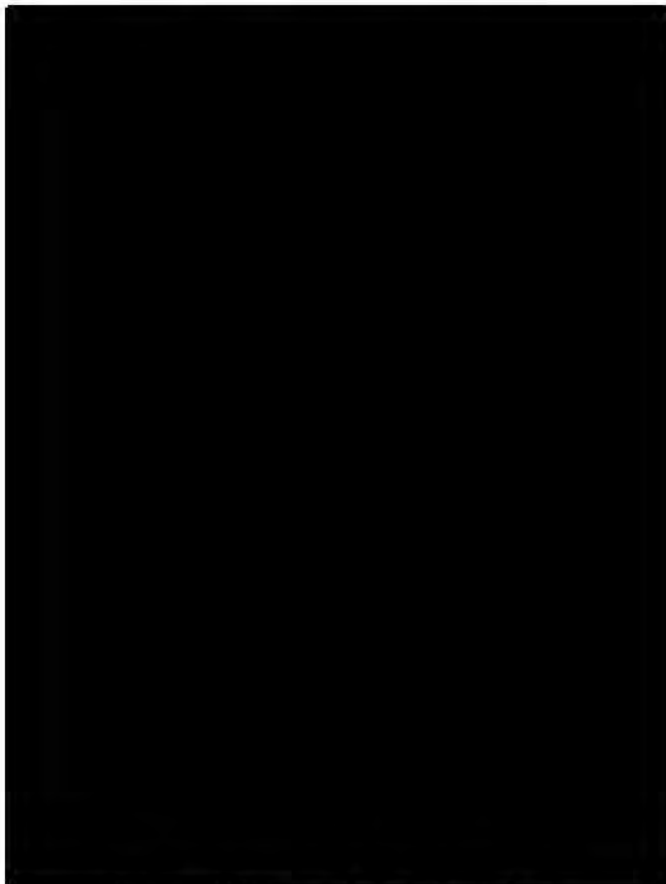
Old Mill Cave



Old Mill Cave, harp trap and acoustic detector



Homer Williams Cave



Homer Williams Cave, harp trap



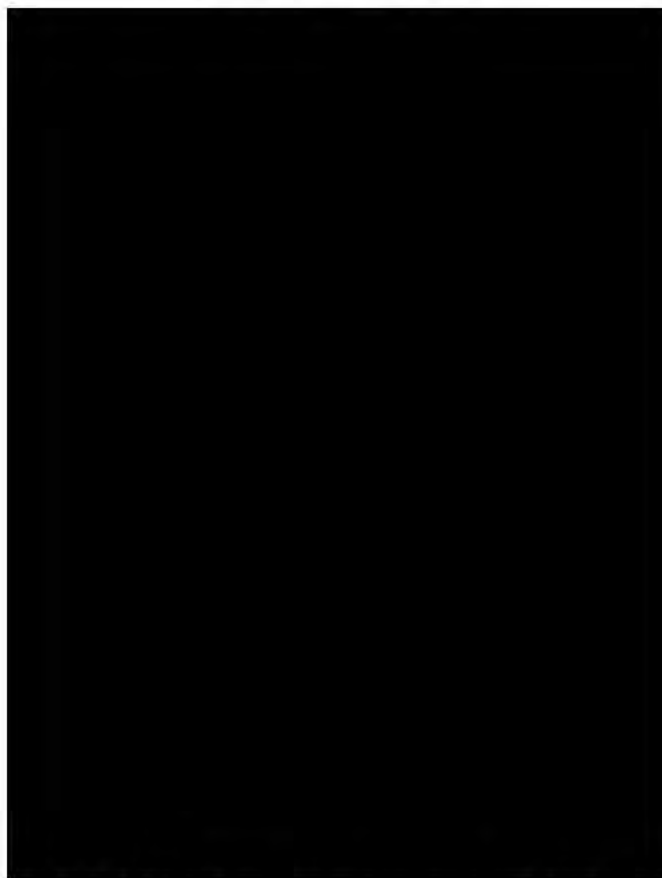
P-DG-001



P-DG-002



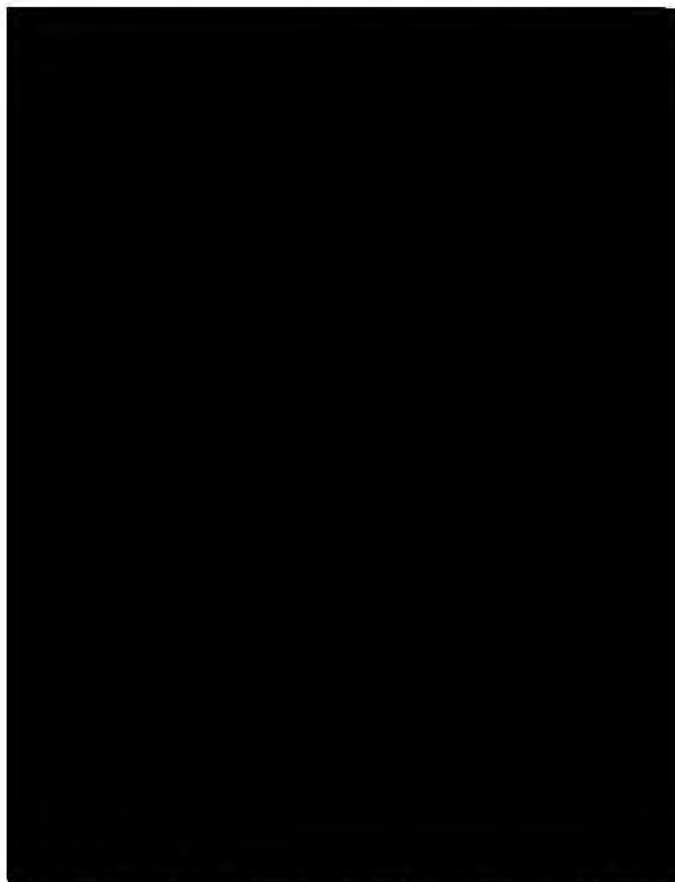
P-DG-002, harp trap



P-DG-002, harp trap and acoustic detector



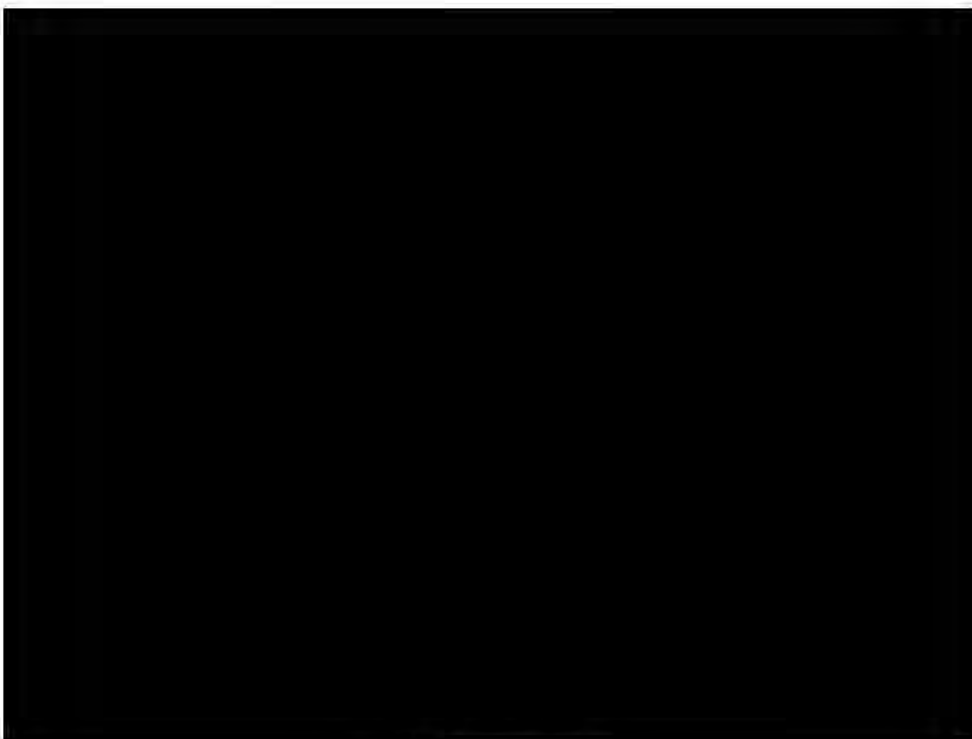
Overlooked Cave, harp trap



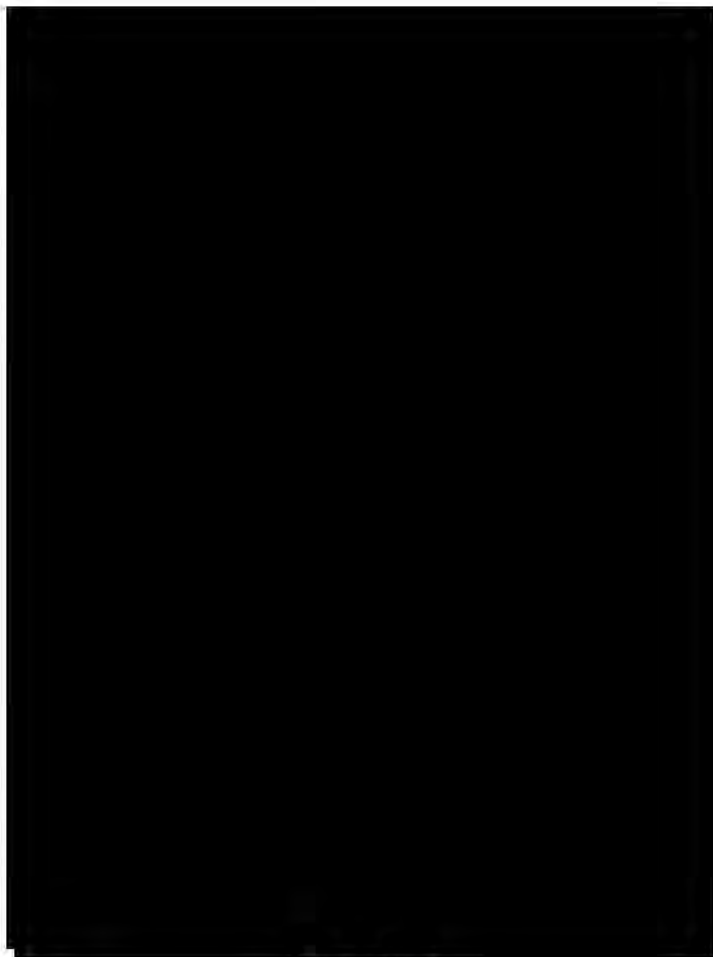
Overlooked Cave, tri-colored bat (*Perimyotis subflavus*)



MLM-PO-004



MLM-PO-004



Small Hole

APPENDIX F
PORTAL DESCRIPTION DATA SHEETS





Mine Portal Description

Property of: Environmental Solutions & Innovations Inc
4525 Este Avenue, Cincinnati OH 45232 (Phone: 513-451-1777)

Project Name: Mountain Valley Pipeline Project
Project Number: 593.06
Site Name: Mountain Valley Pipeline
Date: 06/22/2016
Permitted Biologist Mike Mairose
Field Crew1 N/A
Portal Opening ID Crooks Crevice

Company Name MVP
State Virginia
County Giles
Latitude (dec. deg.)
Longitude (dec. deg.)
Other Field Crew
Number of Portal Openings 2

Portal/Opening

Portal Opening Diameter Height 1.0
Portal Opening Diameter Width 3.0
Portal Opening Measurement Units Feet
Portal Orientation (V or H) Vertical
Estimated Portal Opening Slope 180
Is Entrance Stable? Yes Evidence of Collapse No Ceiling condition stable Yes
Amount of airflow N/A Direction of Airflow N/A
Outside Temperature 23.00 Temperature at Portal 21.00 Temperature Units used Celsius
Evidence of Past Flooding No
Percent of Canopy Closure at Entrance 0
Portal Obstructed by Vegetation No
Portal Obstructed by Spider Webs No
Presence of guano No Amount of Guano Present N/A
Estimated Distance to Water meters 100
Evidence of Foraging (insect remains) No Foraging Evidence Description None
Would use make bat susceptible to predation No

Comments Portal goes down an unknown distance, passage goes down a good way (at least 50 feet). Surrounding area has sinks. Opening had been partially been sealed by landowner (see photo) bats can still get in but rocks restricts airflow.

Additional Comments N/A

Would Portal be recommended for survey? Yes



Mine Portal Description

Property of: Environmental Solutions & Innovations Inc
4525 Este Avenue, Cincinnati OH 45232 (Phone: 513-451-1777)

Project Name: Mountain Valley Pipeline Project
Project Number: 593.06
Site Name: Mountain Valley Pipeline
Date: 06/22/2016
Permitted Biologist Mike Mairose
Field Crew1 N/A
Portal Opening ID Small Hole

Company Name MVP
State Virginia
County Giles
Latitude (dec. deg.)
Longitude (dec. deg.)
Other Field Crew
Number of Portal Openings 1

Portal/Opening

Portal Opening Diameter Height 1.0
Portal Opening Diameter Width 2.0
Portal Opening Measurement Units Feet
Portal Orientation (V or H) Vertical
Estimated Portal Opening Slope 50
Is Entrance Stable? Yes Evidence of Collapse No Ceiling condition stable Yes
Amount of airflow N/A Direction of Airflow N/A
Outside Temperature 22.50 Temperature at Portal 20.00 Temperature Units used Celsius
Evidence of Past Flooding No
Percent of Canopy Closure at Entrance 90
Portal Obstructed by Vegetation No
Portal Obstructed by Spider Webs No
Presence of guano No Amount of Guano Present N/A
Estimated Distance to Water meters 150
Evidence of Foraging (insect remains) N/A Foraging Evidence Description
Would use make bat susceptible to predation Yes

Comments Portal goes down six feet at an angle then stops.

Additional Comments

Would Portal be recommended for survey? No



Mine Portal Description

Project Name:	Mountain Valley Pipeline Project	Company Name	MVP
Project Number:	593.06	State	Virginia
Site Name:	Mountain Valley Pipeline	County	Montgomery
Date:	06/22/2016	Latitude (dec. deg.)	
Permitted Biologist	Chris Boggs	Longitude (dec. deg.)	
Field Crew1	Mike Mairose	Other Field Crew	
Portal Opening ID	Old Mill Cave	Number of Portal Openings	1

Portal/Opening

Portal Opening Diameter Height	1.0	Estimated Internal Dimensions Height	5.0	Estimated Internal	Meters
Portal Opening Diameter Width	1.5	Estimated Internal Dimensions Width	10.0	Measurement Units	
Portal Opening Measurement Units	Meters	Estimated Internal Dimension Depth ft			
Portal Orientation (V or H)	Horizontal				
Estimated Portal Opening Slope	10				
Is Entrance Stable?	Yes	Evidence of Collapse	Yes	Ceiling condition stable	Yes
Amount of airflow	Moderate	Direction of Airflow Out			
Outside Temperature	23.60	Temperature at Portal	9.30	Temperature Units used	Celsius
Evidence of Past Flooding	No				
Percent of Canopy Closure at Entrance	50				
Portal Obstructed by Vegetation	No				
Portal Obstructed by Spider Webs	No				
Presence of guano	No	Amount of Guano Present	N/A		
Estimated Distance to Water meters	0				
Evidence of Foraging (insect remains)	No	Foraging Evidence Description			
Would use make bat susceptible to predation	No				

Comments Once you crawl into the cave it opens up into a small rooms with some evidence of an old collapse. Small room goes back about 50 feet and ends. However, in the middle of the room there is a spring that comes out of a squeeze.

Additional Comments There is a small passage (2.5 feet by 4 feet at opening) that follows the spring. The passage turns and may narrow further but unable to confirm. Clearly this small passage is carved from the spring and may lead to a larger cave system.

Would Portal be recommended for survey? Yes



Mine Portal Description

Property of: Environmental Solutions & Innovations Inc
4525 Este Avenue, Cincinnati OH 45232 (Phone: 513-451-1777)

Project Name: Mountain Valley Pipeline Project
Project Number: 593.06
Site Name: Mountain Valley Pipeline
Date_: 06/22/2016
Permitted Biologist Mike Mairose
Field Crew1 N/A
Portal Opening ID Williams

Company Name MVP
State Virginia
County Giles
Latitude (dec. deg.)
Longitude (dec. deg.)
Other Field Crew
Number of Portal Openings 1

Portal/Opening

Portal Opening Diameter Height 1.0 Estimated Internal Dimensions Height 3.2
Portal Opening Diameter Width 2.0 Estimated Internal Dimensions Width 5.0 Estimated Internal Measurement Units Meters
Portal Opening Measurement Units Meters Estimated Internal Dimension Depth ft 16.0
Portal Orientation (V or H) Horizontal
Estimated Portal Opening Slope 10
Is Entrance Stable? Yes Evidence of Collapse No Ceiling condition stable Yes
Amount of airflow Slight Direction of Airflow Out
Outside Temperature Temperature at Portal 2.50 Temperature Units used Celsius
Evidence of Past Flooding Yes
Percent of Canopy Closure at Entrance 35
Portal Obstructed by Vegetation No
Portal Obstructed by Spider Webs No
Presence of guano No Amount of Guano Present N/A
Estimated Distance to Water meters 5
Evidence of Foraging (insect remains) No Foraging Evidence Description
Would use make bat susceptible to predation No

Comments Main chamber goes back over 120 feet. The main chamber starts to narrow until it's about 2-3 ft high and around 7 feet wide, it likely continues but couldn't proceed due to safety. Temp was 2.5 C, could hear dripping.

Additional Comments Secondary shoot is about 25 feet inwards from the opening and proceeds at a 35 degree slope up. Passage is about 6 feet wide and narrows slightly as it goes up, it turns and narrows but likely goes on based on erosion pattern.

Would Portal be recommended for survey? Yes



Mine Portal Description

Project Name:	Mountain Valley Pipeline Project	Company Name	MVP
Project Number:	593.06	State	Virginia
Site Name:	Mountain Valley Pipeline	County	Montgomery
Date_:	07/14/2016	Latitude (dec. deg.)	
Permitted Biologist	Mike Mairose	Longitude (dec. deg.)	
Field Crew1	Doug Gilbert	Other Field Crew	
Portal Opening ID	Fred Bulls Cave	Number of Portal Openings	2

Portal/Opening

Portal Opening Diameter Height	8.0	Estimated Internal Dimensions Height	12.0	Estimated Internal	Feet
Portal Opening Diameter Width	30.0	Estimated Internal Dimensions Width	18.0	Measurement Units	
Portal Opening Measurement Units Feet		Estimated Internal Dimension Depth ft	70.0		
Portal Orientation (V or H)	Horizontal				
Estimated Portal Opening Slope	30				
Is Entrance Stable?	Yes	Evidence of Collapse	Yes	Ceiling condition stable	Yes
Amount of airflow	Moderate	Direction of Airflow Out			
Outside Temperature	80.00	Temperature at Portal	53.80	Temperature Units used	Fahrenheit
Evidence of Past Flooding	No				
Percent of Canopy Closure at Entrance	40				
Portal Obstructed by Vegetation	No				
Portal Obstructed by Spider Webs	No				
Presence of guano	No	Amount of Guano Present	N/A		
Estimated Distance to Water meters	0				
Evidence of Foraging (insect remains)	No	Foraging Evidence Description	N/A		
Would use make bat susceptible to predation	No				

Comments Main portal (ground) opening back to 70 feet than narrows to a squeeze (1 x 2) that continues on. A spring comes out at entrance. The water was once pumped to the old house.

Additional Comments Spring flows into the second and much bigger portal, the two portals we once connected underground but a giant sink caused the two to become exposed and thus separated. The spring emptying out into mill creek (land owners onced used dye and tracked)

Would Portal be recommended for survey? Yes



Mine Portal Description

Project Name:	Mountain Valley Pipeline Project	Company Name	MVP
Project Number:	593.06	State	Virginia
Site Name:	Mountain Valley Pipeline	County	Montgomery
Date_:	08/11/2016	Latitude (dec. deg.)	
Permitted Biologist	Doug Gilbert	Longitude (dec. deg.)	
Field Crew1	Jack Hopkins	Other Field Crew	
Portal Opening ID	P-DG-001	Number of Portal Openings	1

Portal/Opening

Portal Opening Diameter Height	1.5	Estimated Internal Dimensions Height	2.0	Estimated Internal	Feet
Portal Opening Diameter Width	1.5	Estimated Internal Dimensions Width	2.0	Measurement Units	
Portal Opening Measurement Units	Feet	Estimated Internal Dimension Depth ft	20.0		
Portal Orientation (V or H)	Vertical				
Estimated Portal Opening Slope	0				
Is Entrance Stable?	No	Evidence of Collapse	No	Ceiling condition stable	N/A
Amount of airflow	N/A	Direction of Airflow	N/A		
Outside Temperature	81.00	Temperature at Portal	74.00	Temperature Units used	Fahrenheit
Evidence of Past Flooding	N/A				
Percent of Canopy Closure at Entrance	85				
Portal Obstructed by Vegetation	No				
Portal Obstructed by Spider Webs	No				
Presence of guano	No	Amount of Guano Present	N/A		
Estimated Distance to Water meters	1,000				
Evidence of Foraging (insect remains)	No	Foraging Evidence Description	None		
Would use make bat susceptible to predation	No Record				

Comments No airflow; unable to assess deep interior of portal due to vertical opening. Portal has been excavated for inspection by Draper--leaf litter and soil removed from portal (photo #2). Unlikely that it has been used by bats

Additional Comments <null>

Would Portal be recommended for survey? No



Mine Portal Description

Project Name:	Mountain Valley Pipeline Project	Company Name	MVP
Project Number:	593.06	State	Virginia
Site Name:	Mountain Valley Pipeline	County	Montgomery
Date_:	08/11/2016	Latitude (dec. deg.)	
Permitted Biologist	Doug Gilbert	Longitude (dec. deg.)	
Field Crew1	Jack Hopkins	Other Field Crew	
Portal Opening ID	P-DG-002	Number of Portal Openings	1

Portal/Opening

Portal Opening Diameter Height	3.0	Estimated Internal Dimensions Height	6.0	Estimated Internal	Feet
Portal Opening Diameter Width	10.0	Estimated Internal Dimensions Width	10.0	Measurement Units	
Portal Opening Measurement Units	Feet	Estimated Internal Dimension Depth ft	80.0		
Portal Orientation (V or H)	Vertical				
Estimated Portal Opening Slope	5				
Is Entrance Stable?	Yes	Evidence of Collapse	No	Ceiling condition stable	N/A
Amount of airflow	N/A	Direction of Airflow	N/A		
Outside Temperature	82.00	Temperature at Portal	76.00	Temperature Units used	Fahrenheit
Evidence of Past Flooding	<null>				
Percent of Canopy Closure at Entrance	90				
Portal Obstructed by Vegetation	No				
Portal Obstructed by Spider Webs	No				
Presence of guano	No	Amount of Guano Present	N/A		
Estimated Distance to Water meters	1,000				
Evidence of Foraging (insect remains)	No	Foraging Evidence Description	None		
Would use make bat susceptible to predation	N/A				

Comments From Draper: An irregular entrance about 1' to 3' wide and 10' long, drops 60' to a canyon/fissure type passage that is about 40' long. The downslope end is about 80' below surface. There is no continuation, no airflow, no stream, no bats

Additional Comments Without entering the portal it appears that trapping may be necessary; however, Draper's assessment of the interior leads me to think trapping is not necessary

Would Portal be recommended for survey? Yes



Mine Portal Description

Project Name:	Mountain Valley Pipeline Project	Company Name	MVP
Project Number:	593.06	State	Virginia
Site Name:	Mountain Valley Pipeline	County	Giles
Date_:	10/13/2016	Latitude (dec. deg.)	
Permitted Biologist	Mike Mairose	Longitude (dec. deg.)	
Field Crew1	Renea Wilson	Other Field Crew	
Portal Opening ID	MLM-PO-0004	Number of Portal Openings	1

Portal/Opening

Portal Opening Diameter Height	2.0	Estimated Internal Dimensions Height	1.5	Estimated Internal	Feet
Portal Opening Diameter Width	5.0	Estimated Internal Dimensions Width	3.0	Measurement Units	
Portal Opening Measurement Units Feet		Estimated Internal Dimension Depth ft	16.0		
Portal Orientation (V or H)	Horizontal				
Estimated Portal Opening Slope	5				
Is Entrance Stable?	Yes	Evidence of Collapse	Yes	Ceiling condition stable	Yes
Amount of airflow	Slight	Direction of Airflow Out			
Outside Temperature	12.00	Temperature at Portal	11.20	Temperature Units used	Celsius
Evidence of Past Flooding	No				
Percent of Canopy Closure at Entrance	90				
Portal Obstructed by Vegetation	No				
Portal Obstructed by Spider Webs	No				
Presence of guano	No	Amount of Guano Present	N/A		
Estimated Distance to Water meters	2				
Evidence of Foraging (insect remains)	No	Foraging Evidence Description	N/A		
Would use make bat susceptible to predation	Yes				

Comments Portal goes back at least 15-16 feet until it turns and we are unable to see how much farther it goes back. The portal is elevated about 5 feet from the river. The opposing bank is lower and flush with a pasture. Portal may flood if the river is very

Additional Comments High but I don't see any signs of High water marks near the portal. Likely this is because the opposite bank is lower.

Would Portal be recommended for survey? Yes

APPENDIX G
PORTAL SURVEY DATA SHEETS



2015

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

HABITAT ASSESSMENT

Project #: 593Date: 12 APRIL 2016State: VA County: GILESProject Name: MVPSite Name/ID: UNLOCKED CAVE

USGS Quad: _____

Permitted Biologist: BETH MEYER
(full name)Other Field Staff: BEN WARD
(full name)State Permit #: 056397

Federal Permit #: _____

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Picture #	Waypoint #
TRAP					
DETECTOR	SD 2-J			DC-100-2	IPAD-
		"N	"W	DC-300-9	IPAD-
		"N	"W		
		"N	"W		

Distance to closest water source (meters): UNKType of water source: UNKWater source name: UNK

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS OR DETECTOR):

Bank Height: _____ meters Channel Width: _____ meters Stream Width: _____ meters

Substratum: _____ Bedrock _____ Boulder _____ Cobble _____ Gravel _____ Sand _____ Silt/Clay

Still Water Present (Y/N): _____ Average Water Depth: _____ m or cm Clarity (H,M,L): _____

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh)

Liriodendron tulipifera

Subdominant Canopy Species (< 40 cm/16" dbh)

AESCULUS FLAVALiriodendron tulipiferaCorylus alba, CARYA OVATAEstimated dbh range: Lg: _____ Sm: 46 cmEstimated dbh range: Lg: 35 Sm: 10Relative abundance of dominant vs. subdominant (ratio): 1:50Estimated canopy closure: N Closed _____ Moderate _____ OpenRoost tree potential consists of: _____ Large Trees X Snags _____ NeitherRoost tree potential for the area is: _____ High _____ Moderate P LowRoost potential comments: SONG SMALL SNAGS W/ EXFOLIATING BARK; A FEW CARYA OVATASubcanopy clutter: _____ Closed ✓ Moderate _____ OpenSubcanopy comprised largely of: X Lower Branches of Canopy Trees _____ Saplings _____ Shrubs

Common Subcanopy Species:

Carpinus carolinianaCARYA OVATAAcer saccharinumHabitat Description: Upland deciduous forest. Trap net is located inshallow gully / ephemeral creek drainage. Approx 50 meters from Hwy 460

Check all that apply:

☐ Mature Upland Forest☐ Recently Logged Forest☐ Crop/Pasture Land☐ Other _____☒ Young Upland Forest☒ Forest Edge☐ Stream/River☐ Mature Lowland Forest☐ Woodlot☐ Vernal Pool☐ Young Lowland Forest☐ Old Field☐ Deepwater Lake/PondHerbaceous Cover: ☒ Sparse _____ Moderate _____ Dense



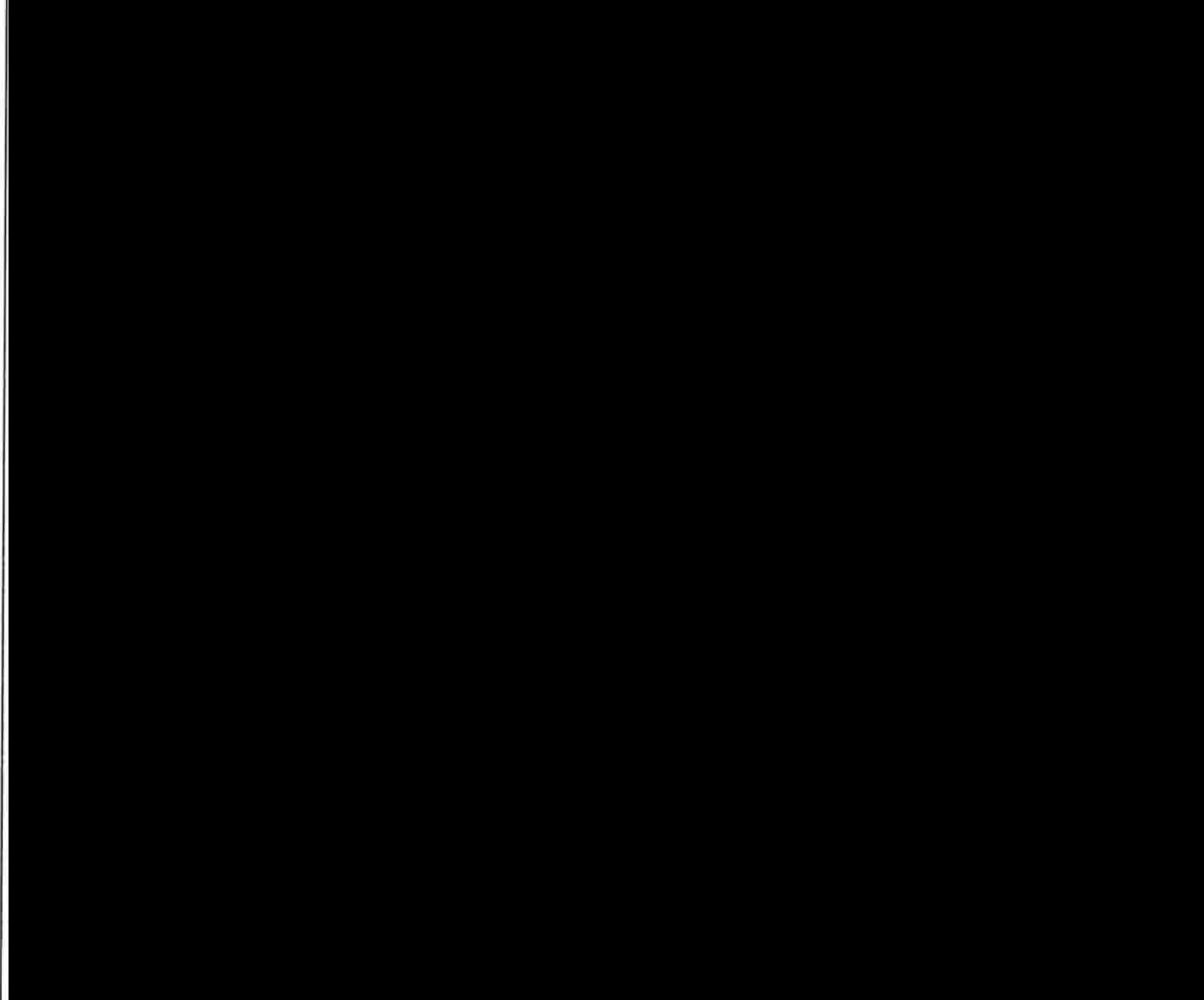
2015

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

HABITAT ASSESSMENT (continued)

Project #: 593	State/County: VA / Giles	Site Name/ #: YA-GI-079	Initials: BWM
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SKETCH NETS and/or DETECTORS



LEGEND

Net: ● — ●

Detector:

Portal:

COMMENTS

TRAP PLACED AT ENTRANCE TO OVERLOOKED
CAVE.



WEATHER DATA

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

~~00000000~~

Net Placement/Site Description: TRAP PLACED AT ENTRANCE TO OVERLOOKED CAVE; PARCEL # VA-G1-675

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = $\uparrow/\downarrow$ * Refer to table on the back



BAT CAPTURE DATA

Project #: 593.26
Project Name: MVP
State: VA
GPS Unit #: iPad 0144
Permitted Biologist: Beth Meyer (full name)
State Permit #: 056397

Date: 14 APRIL 2016
Site Name#: OVERLOOKED CREEK
County: Giles
Camera #: iPad 0144
Other Field Staff: Ben Ward (full name)
Federal Permit #: TE02373A-8

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
19:25	13.8	1-3	0	—
19:55	13.5	1-3	0	—
20:25	11.3	1-3	0	—
20:55	10.6	0	0	observed
21:25	9.5	0	0	—
COLD				
OUT				

NetTrap/ Detector	NetTrap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
TLAP						1920	2125	0C-1→	1PAD
DETECTOR	SD 2-5	0° 1' N	0° 1' W			1920	2125	0C-6	1PAD
		0° 1' N	0° 1' W						
		0° 1' N	0° 1' W						

Net Placement/Site Description: TRAP PLACED AT ENTRANCE TO OVERLOOKED CAVE: PARCEL # VA-G1-075

[illegible]¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



2015

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated – see chart)	% Cloud Cover (estimated)	Comments
1930	19.7	Ø	Ø	—
2000	16.0	Ø	Ø	—
2030	14.6	Ø	Ø	—
2100	13.2	Ø	Ø	—
2130	12.6	Ø	Ø	—
2200	11.3	Ø	Ø	—
2230	11.0	Ø	Ø	—
2300	10.1	Ø	Ø	—
2330	9.4	Ø	Ø	—
0000	8.9	Ø	Ø	—
0030	8.6	Ø	Ø	—

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
TRAP				-	-	1930	0030	OC-1 →	1PAD
DETECTOR	SD-2-J	N	"W	-	-	1930	0030	OC-6	1PAD
		"N	"W						
		"N	"W						

Net Placement/Site Description: TRAP PLACED AT ENTRANCE TO OVERLOOKED CAVE; PARCEL # VA-G1-075

[illegible]

¹ Reproductive Condition. Female = NR/PG/L/PL; Male = $\uparrow\downarrow$ * Refer to table on the back



WEATHER DATA

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Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	-	[REDACTED]	[REDACTED]	-	-	1930	0030	1A-D	1PAD
Detector	S02-J	N	W			1930	0030	OC-1→6C5	
		N	W						
		N	W						

Net Placement/Site Description: Trap is placed @ entrance of Portal; "overlooked cave" on VA-61-075

[illegible][†] Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



BAT CAPTURE DATA

Project #: 593.26 Date: 19.4.2016
Project Name: MVP - Portal Trapping Site Name#: VA-61-075
State: VA County: Giles
GPS Unit #: iPad 0144 Camera #: iPad 0144
Permitted Biologist: Beth Meyer (full name) Other Field Staff: Ben Nord (full name)
State Permit #: 056397 Federal Permit #: TE02373A-8

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1930	23.5	1-3	40%	-
2000	21.1	1-3	50%	-
2030	19.5	0	80%	-
2100	18.6	0	95%	-
2130	17.8	0	90%	-
2200	17.4	0	95%	-
2230	17.1	0	90%	-
2300	16.4	1-3	88%	-
2330	16.1	0	93%	-
0000	16.5	1-3	100%	-
0030	16.7	0	100%	-

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	-			-	-	1930	0030	IPAD	IPAD
Detector	SD 2-5					1930	0030	IPAD	IPAD
								DC-1 → DC-6	

Net Placement/Site Description: Trap is placed at entrance of Portal; "overlooked cave" on VA-61-075

Capt #	Net/Trap	Species	Time	Age (Ad/Ju)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Comments Picture # /Guano/Hair Sample/Band #
		NO BATS									

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = T/L * Refer to table on the back



WEATHER DATA

Property of: Environmental Solutions & Innovations, Inc.
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Net Placement/Site Description: Trap is placed at entrance of Portal; "overlooked cave" at VA-41-075

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
1462	—			—	—	1930	0030	OC-1 →	1PA2
Detector	SD 2-J	"N °	"W °	—	—	1930	0030	OC-6	1PA2
		"N °	"W °						
		"N °	"W °						

Net Placement/Site Description:

[illegible]¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



2015

Property of: Environmental Solutions & Innovations, Inc.
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WEATHER DATA

WEATHER DATA				
Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1930	20.9	1-3	100%	—
2000	20.5	1-3	100%	—
2030	19.9	1-3	100%	—
2100	19.8	1-3	100%	—
2130	18.9	1-3	100%	—
2200	17.8	1-3	90%	—
2230	17.2	1-3	90%	—
2300	16.8	1-3	88%	—
2330	17.6	1-3	50%	—
0000	16.8	1-3	40%	—
0030	15.0	0	25%	—

Net/Trip/ Detector	Net/Trip/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trip				—	—	1930	0030	OC-1 →	IPAD
Detector	SF2-J	N	W			1930	0030	OC-6	IPAD
		N	W						
		N	W						

Net Placement/Site Description: Trap is placed @ entrance to Portal; "Overlooked cave", VA-61-075

[illegible]

¹ Reproductive Condition; Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back

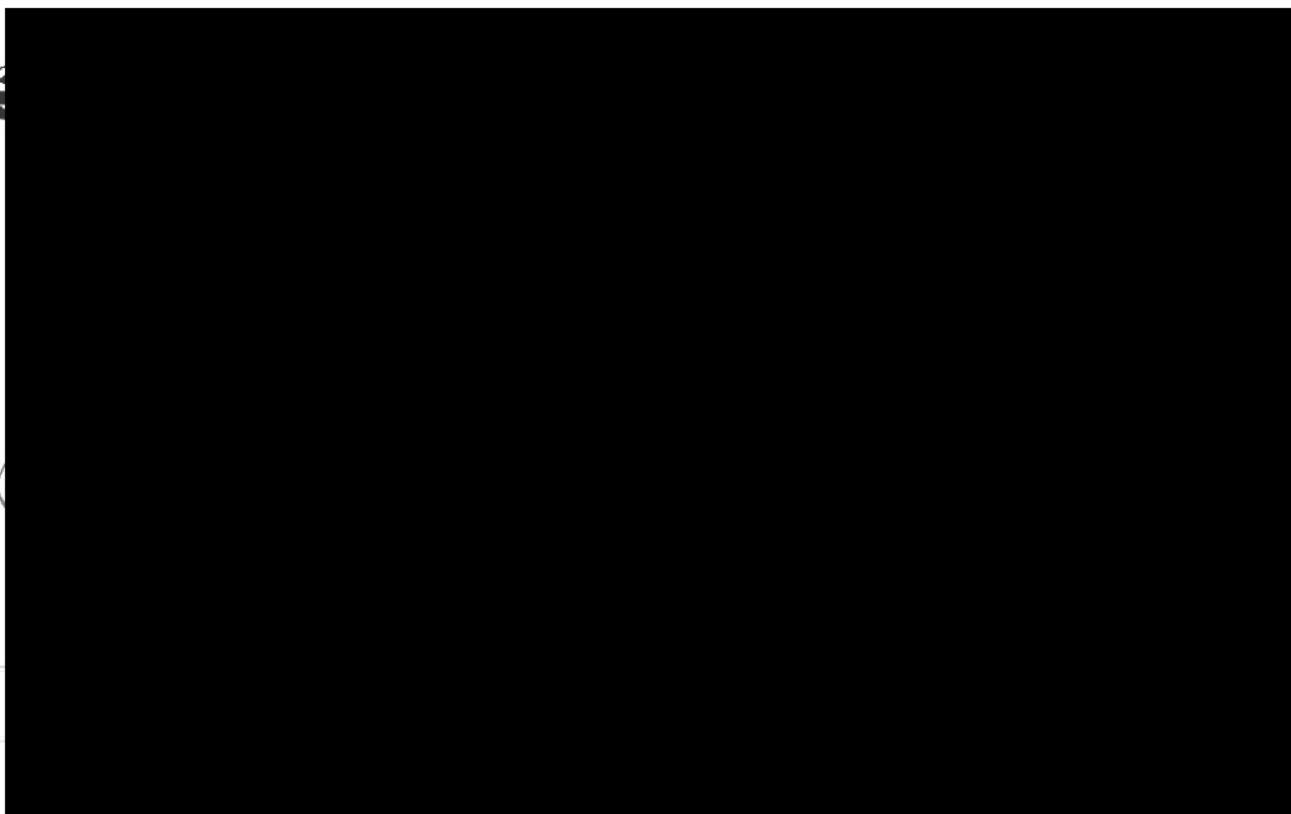


PORTAL ANABAT DATA

Project #: 593 Task #: 06 Biologists: Mike Mairasc
Project Name: MVP Portal Name/ #: Overlooked Cave
State: VA County: Giles USGS Quad: Unknown
Camera #: 1 (Mairasc) Picture #s: Cloud GPS Unit #: SPAP Waypoint #: 11A
Latitude: [REDACTED] "N Longitude: [REDACTED] "W

Date	Start	End	Total time	ID #	CF Card #	Rain / Cold
14 Oct 2016	1810	2310	5hrs	Unknown	Unknown	No
15 Oct 2016	1810	2310	5hrs	Unknown	Unknown	No

SKETCH: AnaBat location (relative to portal) & surrounding habitat



LEGEND

COMMENTS

Anabat placed southeast of portal



BAT CAPTURE DATA

Project #:

53

Date: 14 Oct 2016

Project Name: _____

10

Site Name/#: Overlooked Curve

State:

7

County: Glenn

GPS Unit #:

TRAD

Camera #: MRes009e

Permitted Biologist:

Mike Mancoske

Other Field Staff: Reed Wilson

(full name)

(full name)

State Permit #:

056397

Federal Permit #:

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated – see chart)	% Cloud Cover (estimated)	Comments
1800	12.5	0	0	
1820	12.1	0	0	
1900	11.6	0	0	
1930	11.6	0	0	
2000	11.6	0	0	
2030	11.5	0	0	
2100	11.4	0	0	
2130	11.6	0	0	
2200	11.5	0	0	
2230	11.4	0	0	
2300	11.4	0	0	
2330				

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trawl	A	[REDACTED]	[REDACTED]	-	~	1800	2320	-	-
Dredge	B	[REDACTED]	[REDACTED]	-	3	1800	0320	-	-
		N	W						
		"N	"W						

Net Placement/Site Description:

[illegible]

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back

Page 1 of

Revised April 2014

* One PISO observed upon evaluating the potential for change between now and the potential for biological invasions, vaccinated the initial documentation. But was not even and biological invasions, vaccinated the

Revised April 2014

Page 1 of ____

2015



BAT CAPTURE DATA

Project #: 593 Date: 15 Oct 2016
 Project Name: MVP Site Name#: Overlooked Cave
 State: VA County: Giles
 GPS Unit #: TRAX Camera #: Mike's Phone
 Permitted Biologist: Mike Mairose Other Field Staff: Renee Wilson
 State Permit #: 056397 Federal Permit #: —

Property of: Environmental Solutions & Innovations, Inc.
 4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1800	15.0	0	15	
1830	15.1	0	15	
1900	14.6	0	10	
1930	14.3	0	0	
2000	14.1	0	0	
2030	14.2	0	0	
2100	14.1	0	0	
2130	14.1	0	0	
2200	13.8	0	0	
2230	13.6	0	0	
2300	13.6	0	0	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	A			1.5	2.	14:00	23:15	Cloud	N/A
Det	Detector A			—	3	14:00	23:15	Cloud	N/A
		N							
		"N							

Net Placement/Site Description:

Trap placed @ entrance of cave.

Capt #	Net/ Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #	Comments

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



HABITAT ASSESSMENT

Project #: 593 Date: 27 Sept 2016 State: VA County: Giles
 Project Name: MVP Site Name/ #: Crooks Crevise USGS Quad: Onk
 Permitted Biologist: Mike Mairose Other Field Staff: Renea Wilson State Permit #: 056397
 (full name) (full name) Federal Permit #: _____

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Picture #	Waypoint #
<u>Tran</u>	<u>Crooks Crevise</u>	[REDACTED]		<u>On Cloud</u>	<u>N/A</u>
<u>Detector</u>	<u>0018</u>			<u>On Cloud</u>	<u>N/A</u>
		"N	"W		
		"N	"W		

Distance to closest water source (meters): 100 Type of water source: Small stream
 Water source name: Onk

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS OR DETECTOR):

Bank Height: _____ meters Channel Width: _____ meters Stream Width: _____ meters

Substratum: _____ Bedrock _____ Boulder _____ Cobble _____ Gravel _____ Sand _____ Silt/Clay

Still Water Present (Y/N): _____ Average Water Depth: _____ m or cm Clarity (H,M,L): _____

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh)

Robinia pseudoacacia
Liriodendron tulipifera
Juglans nigra

Subdominant Canopy Species (< 40 cm/16" dbh)

Celtis occidentalis
Juniperus virginiana

Estimated dbh range: Lg: 80 Sm: 40

Estimated dbh range: Lg: 31 Sm: 15

Relative abundance of dominant vs. subdominant (ratio): 1:5

Estimated canopy closure: _____ Closed ~~_____~~ Moderate ~~_____~~ X Open

Roost tree potential consists of: X Large Trees X Snags ~~_____~~ Neither

Roost tree potential for the area is: _____ High _____ Moderate X Low

Roost potential comments: few snags and log trees in the surrounding area

Subcanopy clutter: _____ Closed X Moderate _____ Open

Subcanopy comprised largely of: _____ Lower Branches of Canopy Trees X Saplings X Shrubs

Common Subcanopy Species: Sassafras albidum
Celtis occidentalis

Habitat Description: Forest is in a cow field near a road.
field is surrounded by woodlands.

Check all that apply:

____ Mature Upland Forest _____ Recently Logged Forest X Crop/Pasture Land _____ Other _____
 ____ Young Upland Forest X Forest Edge _____ Stream/River _____
 ____ Mature Lowland Forest _____ Woodlot _____ Vernal Pool _____
X Young Lowland Forest _____ Old Field _____ Deepwater Lake/Pond _____

Herbaceous Cover: X Sparse _____ Moderate _____ Dense



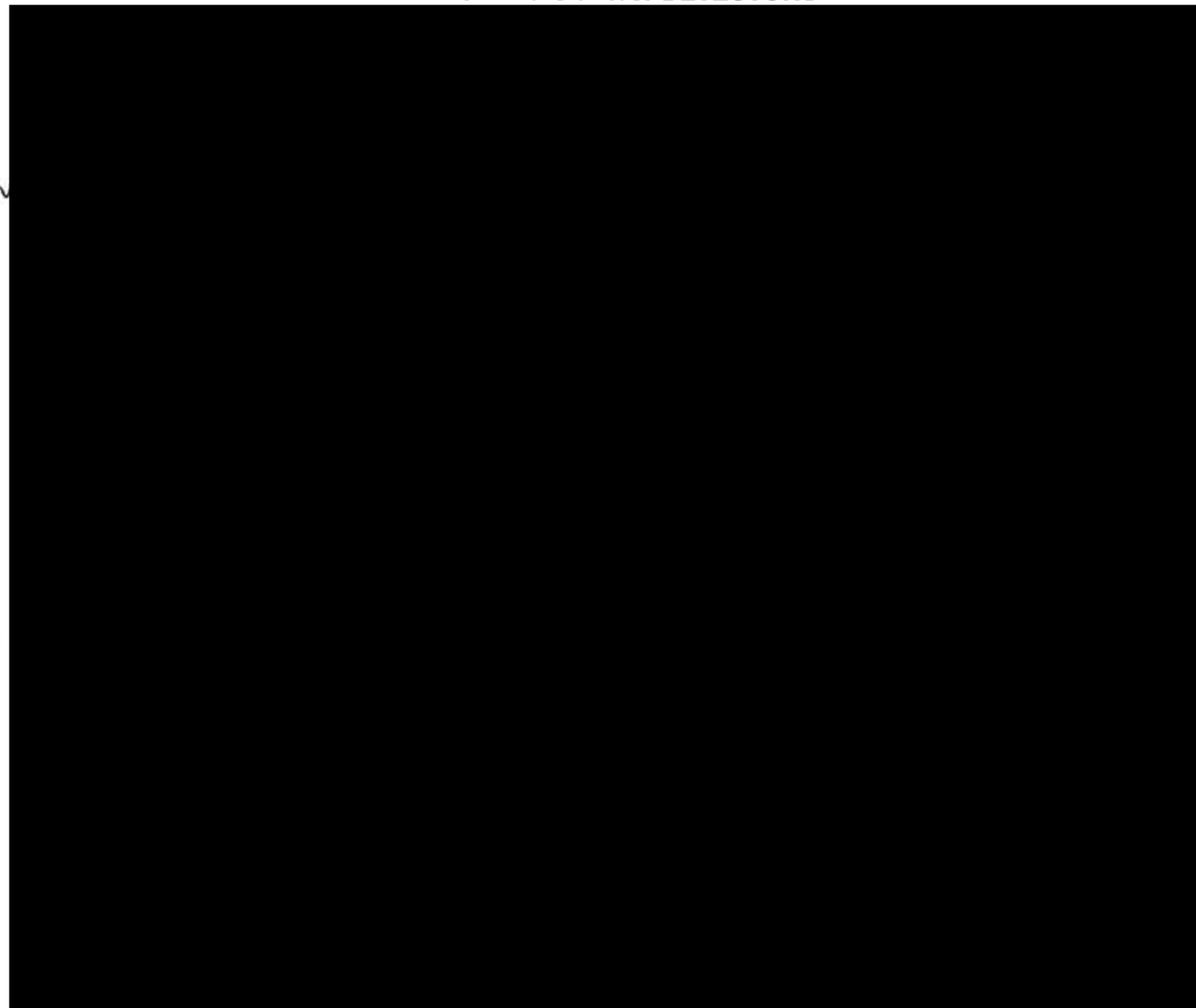
2015

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HABITAT ASSESSMENT (continued)

Project #: <i>SA3</i>	State/County: <i>VA / Giles</i>	Site Name/#: <i>Crook's Cove</i>	Initials: <i>KCM</i>
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SKETCH NETS and/or DETECTORS



LEGEND

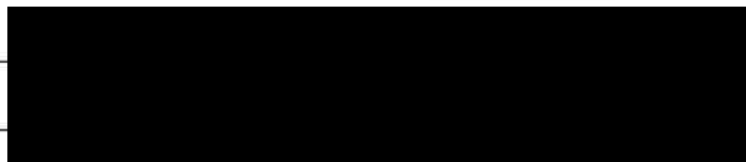
Trap
~~Net~~



Detector:



COMMENTS



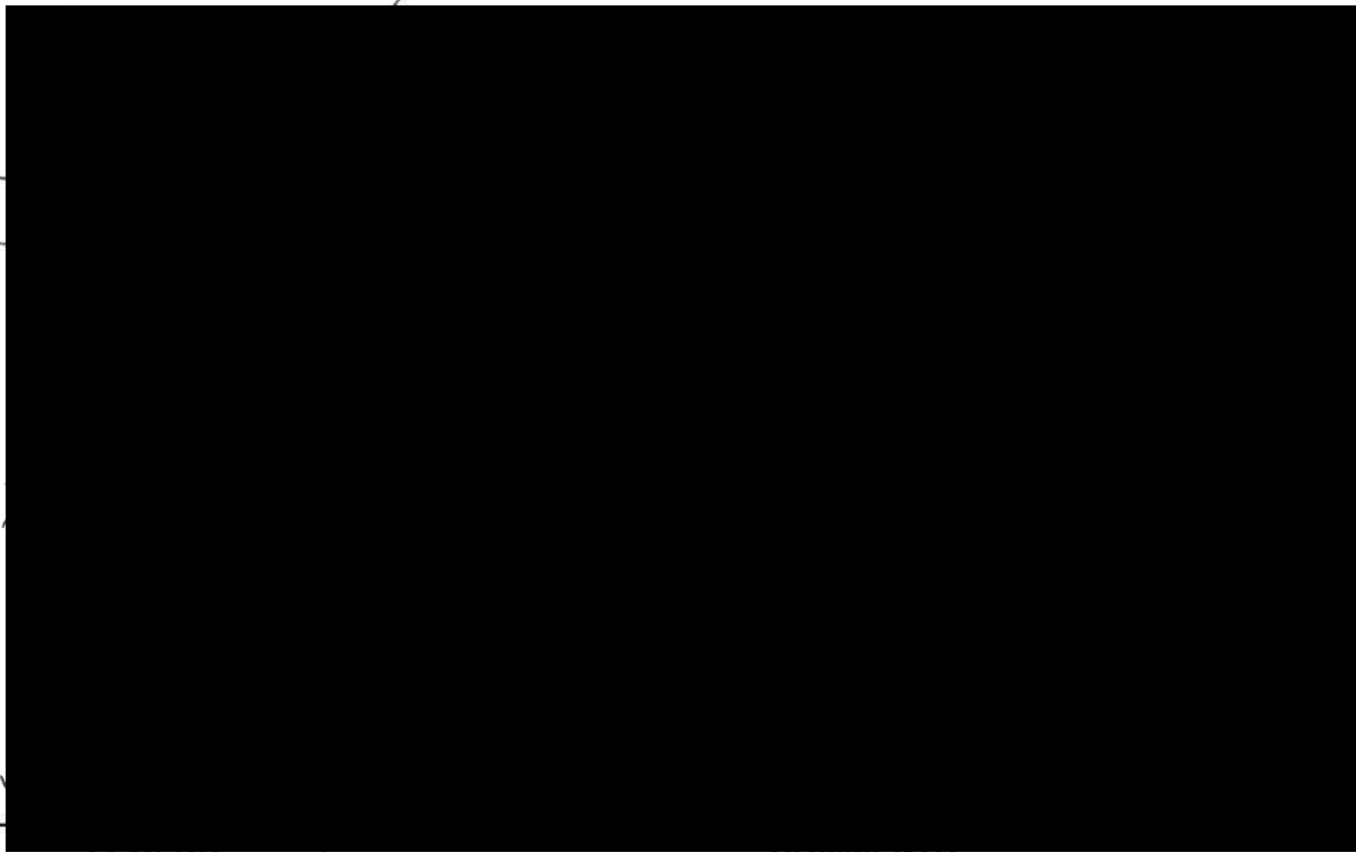


PORTAL ANABAT DATA

Project #: 893 Task #: 06 Biologists: Mike Mairose
Project Name: MVP Portal Name/ #: Crooks Crevise 019
State: VA County: Giles USGS Quad: Owl
Camera #: Cloud Picture #s: Cloud GPS Unit #: Lead Waypoint #: —
Latitude: [REDACTED] N Longitude: [REDACTED] W

Date	Start	End	Total time	ID #	CF Card #	Rain / Cold
27 Sept 2016	1805 1905	2340 0709	10 hours	0018	—	—
28 Sept 2016	1805	—	Rain out	—	—	Rain
29 Sept 2016	1805	2340	5hr 40min	0018	—	Rain
30 Sept	1800	2335	5hrs 35min	—	—	—

SKETCH: AnaBat location (relative to portal) & surrounding habitat



x = trees
— trap

Portal south of dirt drive on edge of
cow pasture

Night 1

2015



BAT CAPTURE DATA

Project #: 993 Date: 27 Sept 2016
 Project Name: MVP Site Name/ #: Crooks Crevice
 State: VA County: Giles
 GPS Unit #: IPAD Camera #: Mike Ploue
 Permitted Biologist: Mike Mairrose Other Field Staff: Renea Wilson
 State Permit #: 056397 Federal Permit #: —

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1830	13.4	0	5	
1900	12.2	0	5	
1930	11.6	0	5	
2000	11.3	0	0	
2030	10.9	0	0	
2100	10.5	0	0	
2130	9.7	0	0	
2200	9.0	0	0	
2230	8.5	0	0	
2300	8.3	0	0	
2330		0	0	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	Crooks Crevice			1.5	3.3	1840	2340	Cloud	Cloud
Detector	0018			—	3	1905	0709	Cloud	Cloud

Net Placement/Site Description:

Audubon sampling across cave and picking up flyway from road

Capt #	Net/Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Comments	Picture # /Guano/Hair Sample/Band #

No Bats

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back

Night 2 Run Out 2015



BAT CAPTURE DATA

Project #: 593 Date: 28 Sept 2016
 Project Name: MVP Site Name#: Cracks Crevice
 State: VA County: Giles
 GPS Unit #: iPad Camera #: Mike's phone
 Permitted Biologist: Mike Marose Other Field Staff: Reneah Wilson
 State Permit #: 056397 Federal Permit #:

Property of: Environmental Solutions & Innovations, Inc.
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WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1930	63.1			
2000				
2030				
2100				
2130				
2200				
2230				
2300				
2330				

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap detector	0018			15	3	1846	2000	Cloud	
				~	3	1845	2000	Cloud	

Net Placement/Site Description: Trap over portal opening, acrobat sampling portal and flyway from road

Capt #	Net/ Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #	Comments

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



BAT CAPTURE DATA

Date: 29 Sept 2016

Site Name/#: Crooks Crevice

County: Giles

Camera #: Mikes phone

Other Field Staff: Renea Wilson

Federal Permit #:

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	—			15	3	1840	2100	Cloud	Cloud
Detector	0018			—	3	1845	2100	Cloud	Cloud

Tree placed over partial crown and about sampling point and record

[illegible]

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = $\hat{1}/\downarrow$ * Refer to table on the back

2015



BAT CAPTURE DATA

Project #: 593 Date: 30 Sept 2016
 Project Name: MVP Site Name#: Crooks Creviche
 State: VA County: Giles
 GPS Unit #: pad 0244 Camera #: Mike's phone
 Permitted Biologist: Mike Mairose Other Field Staff: Renea Wilson
 (full name) (full name)
 State Permit #: 056397 Federal Permit #: —

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1930	18.7	0	90	
2000	18.4	0	80	
2030	17.6	2	20	
2100	17.1	2	5	
2130	16.3	0	0	
2200	15.5	0	0	
2230	15.5	800	80	
2300	15.5	800	90	
2330	15.3	780	75	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	—			15	3	1840	2340	Cloud	Cloud
Det	0018			—	3	1840	2340	Cloud	Cloud

Net Placement/Site Description:

Trap 6 partial, available sampling across forest

Capt #	Net/ Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #	Comments

NO BATS

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



2015

Property of: Environmental Solutions & Innovations, Inc.
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HABITAT ASSESSMENT

Project #: 593 Date: 2 October 2016 State: VA County: Montgomery
 Project Name: MVP Site Name/#: Mill Creek Old Mill cave USGS Quad: Unknown
 Permitted Biologist: Mike Mairose Other Field Staff: Renee Wilson State Permit #: 056397
 (full name) (full name) Federal Permit #:

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Picture #	Waypoint #
Trap				Cloud	N/A
Det	0018			Cloud	N/A
		"N	"W		
		"N	"W		

Distance to closest water source (meters): 0 Type of water source: stream
 Water source name: Mill Creek

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS OR DETECTOR):

Bank Height: 1 meters Channel Width: 5 meters Stream Width: 3 meters
 Substratum: ☒ Bedrock ☒ Boulder ☒ Cobble ☐ Gravel ☐ Sand ☐ Silt/Clay
 Still Water Present (Y/N): N Average Water Depth: 1 m or cm Clarity (H,M,L): H

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)
Platanus occidentalis Ulmus americana
Juglans nigra

Estimated dbh range: Lg: 70 Sm: 40 Estimated dbh range: Lg: 39 Sm: 10

Relative abundance of dominant vs. subdominant (ratio): 1:1.5

Estimated canopy closure: ☐ Closed ☒ Moderate ☐ Open
 Roost tree potential consists of: ☒ Large Trees ☒ Snags ☐ Neither
 Roost tree potential for the area is: ☐ High ☒ Moderate ☐ Low

Roost potential comments: snags, large trees

Subcanopy clutter: ☐ Closed ☒ Moderate ☐ Open
 Subcanopy comprised largely of: ☐ Lower Branches of Canopy Trees ☒ Saplings ☒ Shrubs

Common Subcanopy Species: Eleagnus umbellata Ostrya
Juniperus virginiana

Habitat Description: Cave is in a low-lying formation slash w/ a road.
A stream runs parallel with the road. Stream and river are
situated in a valley.

Check all that apply:

☐ Mature Upland Forest ☐ Recently Logged Forest ☐ Crop/Pasture Land ☐ Other _____
☐ Young Upland Forest ☒ Forest Edge ☒ Stream/River _____
☒ Mature Lowland Forest ☐ Woodlot ☐ Vernal Pool _____
☐ Young Lowland Forest ☐ Old Field ☐ Deepwater Lake/Pond _____

Herbaceous Cover: ☒ Sparse ☐ Moderate ☐ Dense



2015

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)**HABITAT ASSESSMENT (continued)**Project #: S93 State/County: VA / Manassas Site Name/ #: Old Mill Cove Initials: MLM**SKETCH NETS and/or DETECTORS****LEGEND**

Net:

Detector:

COMMENTS

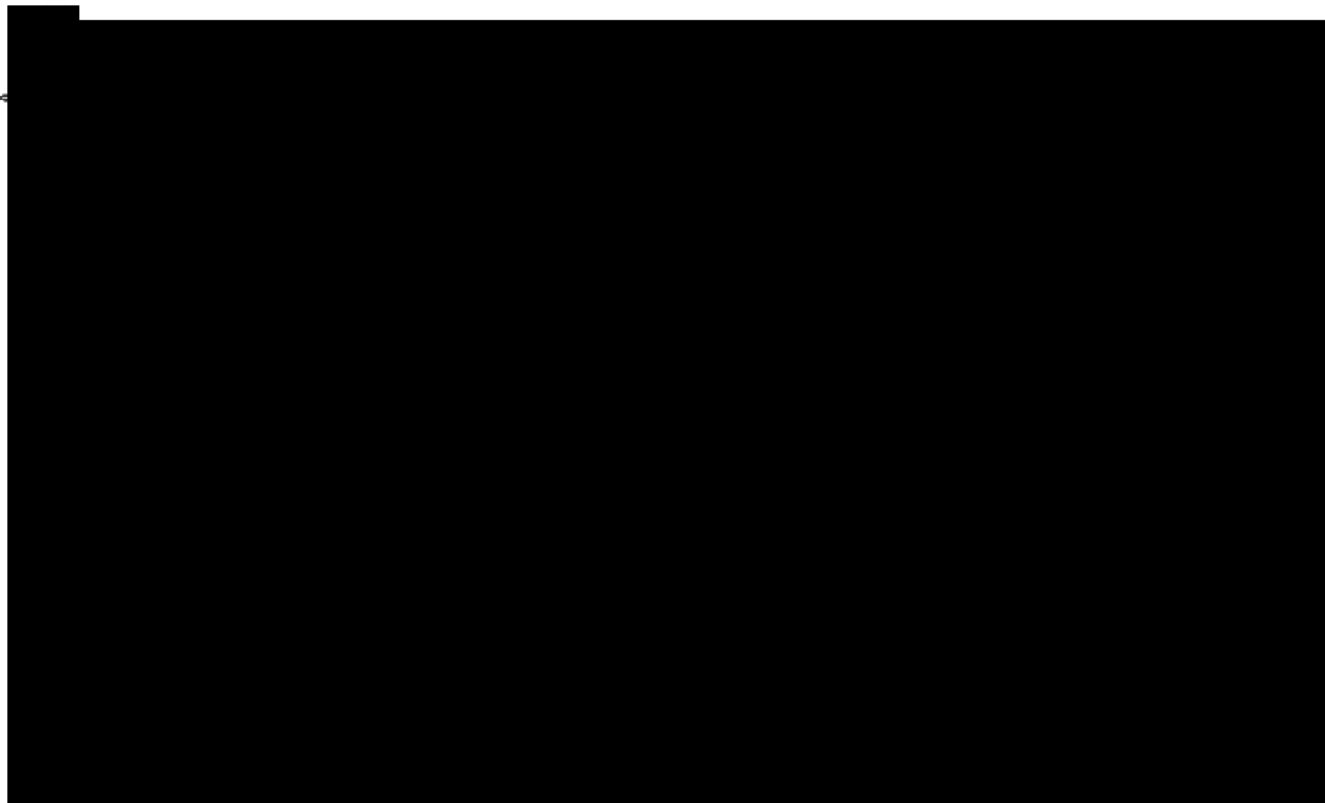


PORTAL ANABAT DATA

Project #: 593 Task #: 6 Biologists: Mike Marose
Project Name: MVP Portal Name/ #: Mill Creek ^{MM} old Mill ^{cave}
State: VA County: Montgomery USGS Quad: unknown
Camera #: — Picture #s: Cloud GPS Unit #: — Waypoint #: —
Latitude: "N Longitude: "W

Date	Start	End	Total time	ID #	CF Card #	Rain / Cold
1 Oct 2016	1815	2330	5.25hrs	—	—	NA
2 Oct 2016	1825	2335	5.10hrs	—	—	NA

SKETCH: AnaBat location (relative to portal) & surrounding habitat



LEGEND

—•— trap
□ Detector

COMMENTS



Night 1

2015



BAT CAPTURE DATA

Project #: 593 Date: Oct. 01, 2016
 Project Name: MVP Site Name/ID: Old Mill Cave
 State: VA County: Montgomery
 GPS Unit #: TRAD 0244 Camera #: Mike's Phone
 Permitted Biologist: Michael Maness Other Field Staff: Rebecca Wilson
 State Permit #: 056397 Federal Permit #: unk.

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud	Cover (estimated)	Comments
1900	19	0	10		
1930	17	0	10		
2000	16	0	0		
2030	15	0	0		
2100	15	0	0		
2130	14	0	0		
2200	14	0	0		
2230	13	0	0		
2300	13	0	0		
2330	13	0	0		

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	Old Mill Cave			1.5	2.5	18:40	23:45	cloud	cloud
Detector	0-018			N/A	N/A	18:30	23:45	cloud	cloud

 Net Placement/Site Description: Harp trap over cave, detector pointed across portal and away from the stream

Capt #	Net/ Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #

NO BATS

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back

2015



BAT CAPTURE DATA

Project #: 593
 Project Name: MVP
 State: VA
 GPS Unit #: lpad
 Permitted Biologist: Mike Mairose
 State Permit #: 056397
 Date: 2 Oct 2016
 Site Name: Mill Creek
 County: Montgomery
 Camera #: Mikes phone
 Other Field Staff: Reneal Wilson
 Federal Permit #:

Old Mill
will
cave

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1900	17	990	90	
1930	17	0	90	
2000	17	0	80	
2030	16	0	0	
2100	15	0	0	
2130	15	0	0	
2200	14	0	0	
2230	14	0	0	
2300	14	0	50	
2330	14	0	40	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	A			1.5	3	1815	2330	Cloud	Cloud
Detector	0018			NA	3	1825	2335	Cloud	Cloud

Net Placement/Site Description: Harp trap over cave; detector pointed across portal opening & away from stream

Capt #	Net/Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #	Comments

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



2015

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

HABITAT ASSESSMENT

Project #: 593 Date: 3 Oct 2016 State: VA County: Montgomery
 Project Name: MVP Site Name/ID: P.DG-002 USGS Quad: 0116
 Permitted Biologist: Mike Mairose Other Field Staff: Reneah Jilson State Permit #: 056397
 (full name) (full name) Federal Permit #: —

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Picture #	Waypoint #
<u>trap</u>	<u>—</u>		"W	<u>Close</u>	<u>11</u>
<u>Det</u>	<u>0061</u>		"W	<u>11</u>	<u>11</u>
<u>Det</u>	<u>0203</u>		"W		
			"W		

Distance to closest water source (meters): 100m Type of water source: Stream
 Water source name: Uwh

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS OR DETECTOR):

Bank Height: — meters Channel Width: — meters Stream Width: — metersSubstratum: — Bedrock — Boulder — Cobble — Gravel — Sand — Silt/ClayStill Water Present (Y/N): — Average Water Depth: — m or cm Clarity (H,M,L): —

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh)

Quercus alba
Carya tomentosa

Subdominant Canopy Species (< 40 cm/16" dbh)

Acer saccharum
Quercus montana
Liriodendron tulipiferaEstimated dbh range: Lg: 60 Sm: 40Estimated dbh range: Lg: 39 Sm: 15Relative abundance of dominant vs. subdominant (ratio): 1:15

Estimated canopy closure:

☒ Closed☐ Moderate☐ Open

Roost tree potential consists of:

☒ Large Trees☒ Snags☐ Neither

Roost tree potential for the area is:

☒ High☐ Moderate☐ LowRoost potential comments: Log trees including snag trees, some snags

Subcanopy clutter:

☐ Closed☐ Moderate☒ Open

Subcanopy comprised largely of:

☐ Lower Branches of
Canopy Trees☒ Saplings☐ Shrubs

Common Subcanopy Species:

Acer saccharumHabitat Description: Upland forest traversed by several dirt roads, lots of mast features

Check all that apply:

☒ Mature Upland Forest☐ Recently Logged Forest☐ Crop/Pasture Land☐ Other☐ Young Upland Forest☒ Forest Edge☐ Stream/River☐ Mature Lowland Forest☐ Woodlot☐ Vernal Pool☐ Young Lowland Forest☐ Old Field☐ Deepwater Lake/PondHerbaceous Cover: ☒ Sparse ☐ Moderate ☐ Dense



2015

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HABITAT ASSESSMENT (continued)

Project #: 593 State/County: VA / NO. Site Name/#: P-DG-005 Initials: MM

SKETCH NETS and/or DETECTORS



LEGEND

Net: ● — ●

Detector: ☐

COMMENTS

Upland forest transected by
several two-tracks

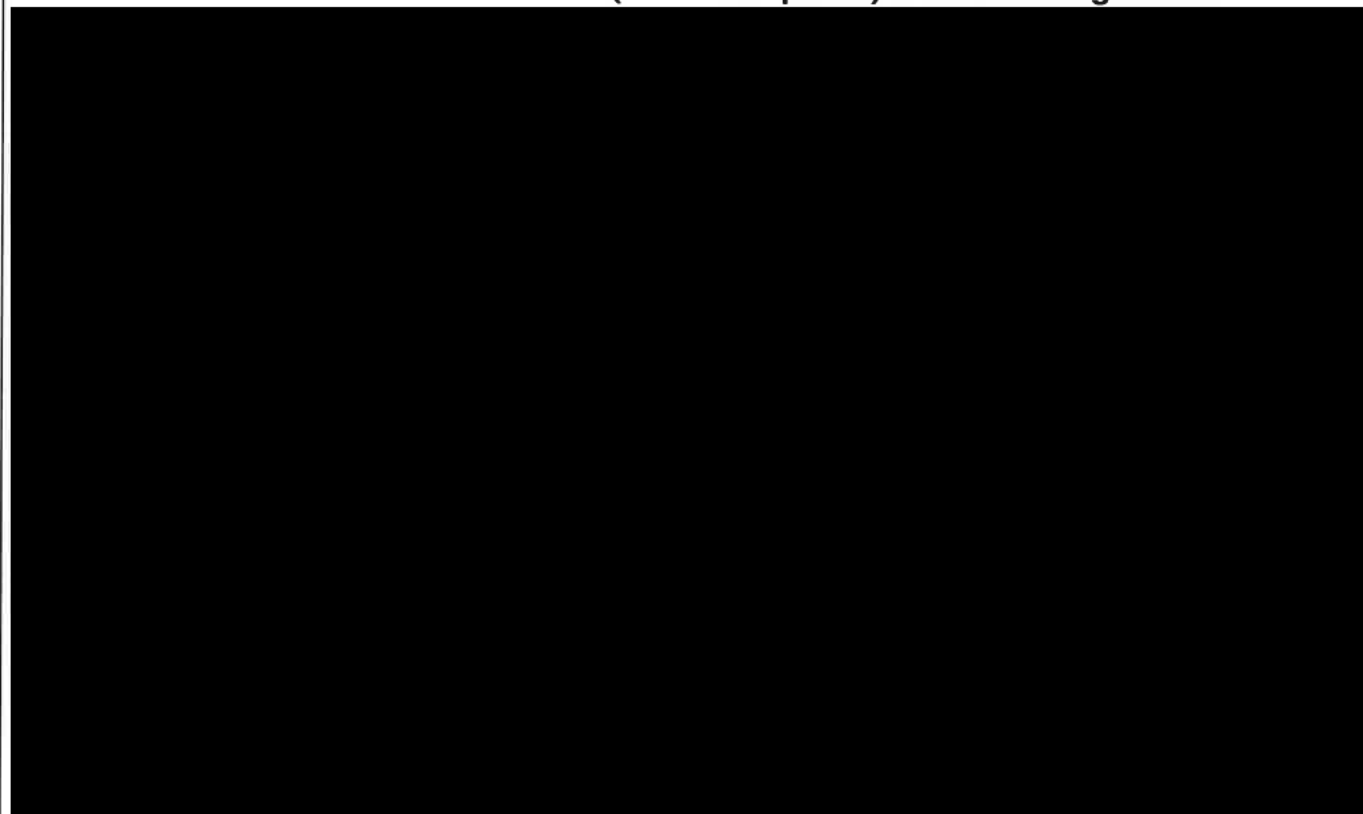


PORTAL ANABAT DATA

Project #: 593 Task #: 2 Biologists: Michael Nourse / Debra Wilson
Project Name: MVP Portal Name/#: P-DG-002
State: VA County: Montgomery USGS Quad: Quik
Camera #: Cloud Picture #s: Cloud GPS Unit #: SPAD Waypoint #: N/A
Latitude: [REDACTED] "N Longitude: [REDACTED] "W

Date	Start	End	Total time	ID #	CF Card #	Rain / Cold
4 Oct 2016	1830	2330	5 hours	0203	—	—
3 Oct 2016	1830	2330	5 hours	0203	—	—

SKETCH: AnaBat location (relative to portal) & surrounding habitat



LEGEND

⤵ trap
● portal
□ detector

COMMENTS

Portal just west of dirt trail; Detector at NW & SW edge of portal; trap anchored to maple east of portal



WEATHER DATA

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	N/A			2.5	1.5	1830	2330	Cloud	Cloud
Det	0061			—	—	11	11	11	11
Det	0203			—	—	11	11	11	11

Net Placement/Site Description: Trap over pondal, snailnets angled across

[illegible]

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back

2015



BAT CAPTURE DATA

Project #: 593
 Project Name: MVP
 State: VA
 GPS Unit #: lpad
 Permitted Biologist: Mike Mairose
 State Permit #: 056397
 Date: 4 Oct 2016
 Site Name/ID: P-06-002
 County: Montgomery
 Camera #: Mike's phone
 Other Field Staff: Renea Wilson
 Federal Permit #: —

Property of: Environmental Solutions & Innovations, Inc.
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WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1900	18	0	0	
1930	18	0	0	
2000	17	0	0	
2030	16	0	0	
2100	16	0	0	
2130	16	0	0	
2200	16	0	0	
2230	15	0	0	
2300	15	0	0	
2330	15	0	0	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap									
Det	0061			—	3	1830	2330	Cloud	Cloud
Det	0203			—	3	1830	2330	Cloud	Cloud
					3	1830	2330	Cloud	Cloud

Net Placement/Site Description: Trap over pasture, angled across

Capt #	Net/ Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #	Comments

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = T/L * Refer to table on the back



2015

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HABITAT ASSESSMENT

Project #: 593 Date: 11 October 2016 State: VA County: Giles
 Project Name: MVP Site Name/#: Williams Cave USGS Quad: Unknown
 Permitted Biologist: Mike Mairose Other Field Staff: Reneah Wilson State Permit #: 056397
 (full name) (full name) Federal Permit #:

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Picture #	Waypoint #
Trap	A				
Detector	0203				

Distance to closest water source (meters): 12 Type of water source: Stream
 Water source name: Sinking Creek

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS OR DETECTOR):

Bank Height: .3 meters Channel Width: 14 meters Stream Width: 11 meters * water was high due to rain
 Substratum: Bedrock ☒ Boulder ☒ Cobble ☒ Gravel ☒ Sand ☒ Silt/Clay
 Still Water Present (Y/N): Y Average Water Depth: .7 m or cm Clarity (H,M,L): M

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)
Platanus occidentalis Carya ovata
Quercus rubra Quercus muehlenbergii
Quercus alba Carya sp.
 Estimated dbh range: Lg: 65 Sm: 40 Estimated dbh range: Lg: 39 Sm: 15

Relative abundance of dominant vs. subdominant (ratio): 1:20

Estimated canopy closure: Closed ☒ Moderate Open
 Roost tree potential consists of: ☒ Large Trees Snags Neither
 Roost tree potential for the area is: High ☒ Moderate Low
 Roost potential comments: Snags and a few big trees
 Subcanopy clutter: Closed ☒ Moderate Open
 Subcanopy comprised largely of: Lower Branches of Canopy Trees ☒ Saplings ☒ Shrubs
 Common Subcanopy Species: Aesculus glabra Acer saccharum

Habitat Description: Partial tree on a steep slope that ends at Sinking Creek. A private road follows the top of the ridge. Several cow fields are visible in the stream

Check all that apply:

☒ Mature Upland Forest Recently Logged Forest Crop/Pasture Land Other
Young Upland Forest Forest Edge ☒ Stream/River
Mature Lowland Forest Woodlot Vernal Pool
Young Lowland Forest Old Field Deepwater Lake/Pond

Herbaceous Cover: Sparse ☒ Moderate Dense



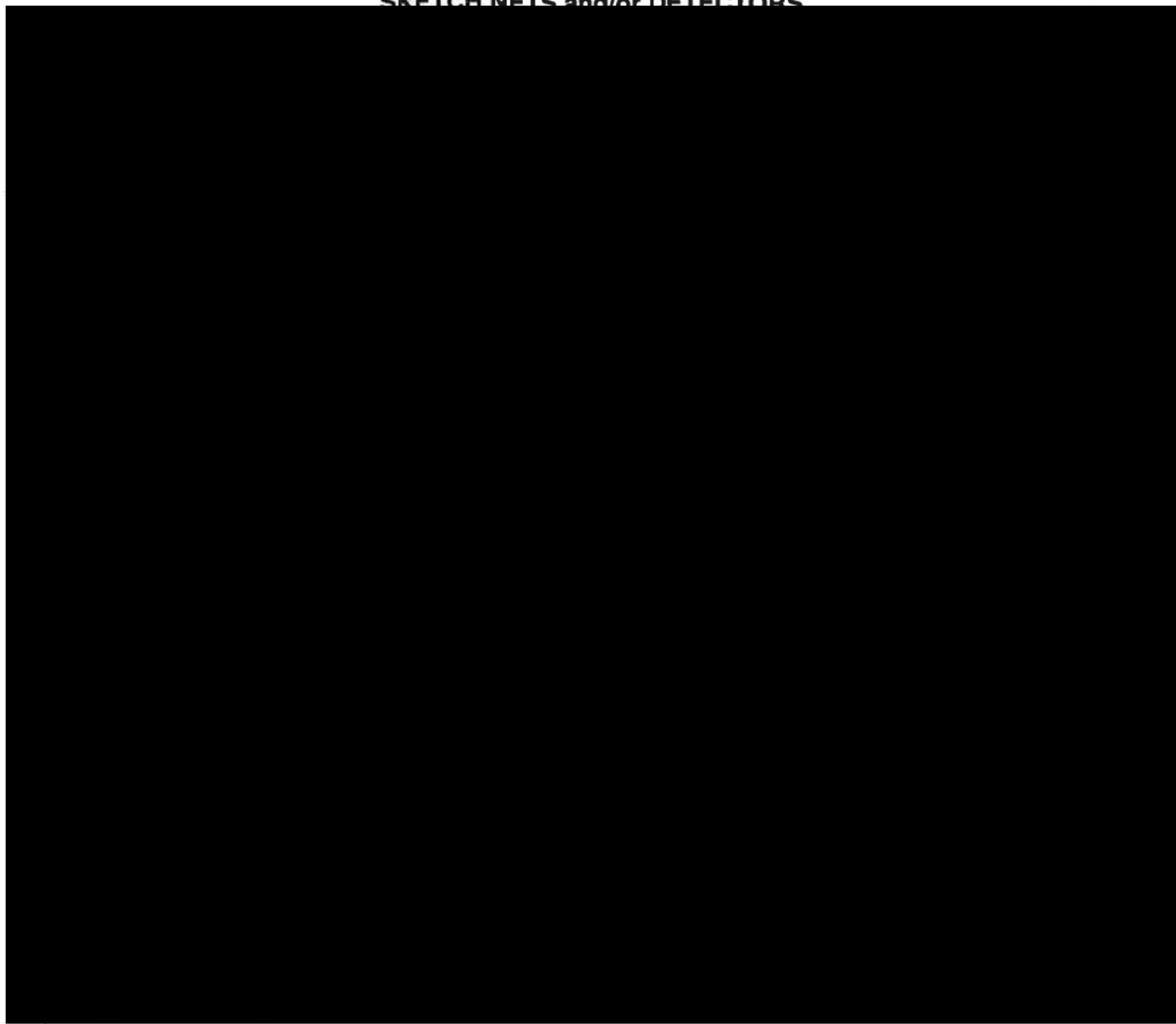
2015

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HABITAT ASSESSMENT (continued)

Project #: SG3 State/County: VA/Giles Site Name/#: Willow Initials: WMA

SKETCH NETS and/or DETECTORS



LEGEND

Net: 

Detector: 

X = force

COMMENTS

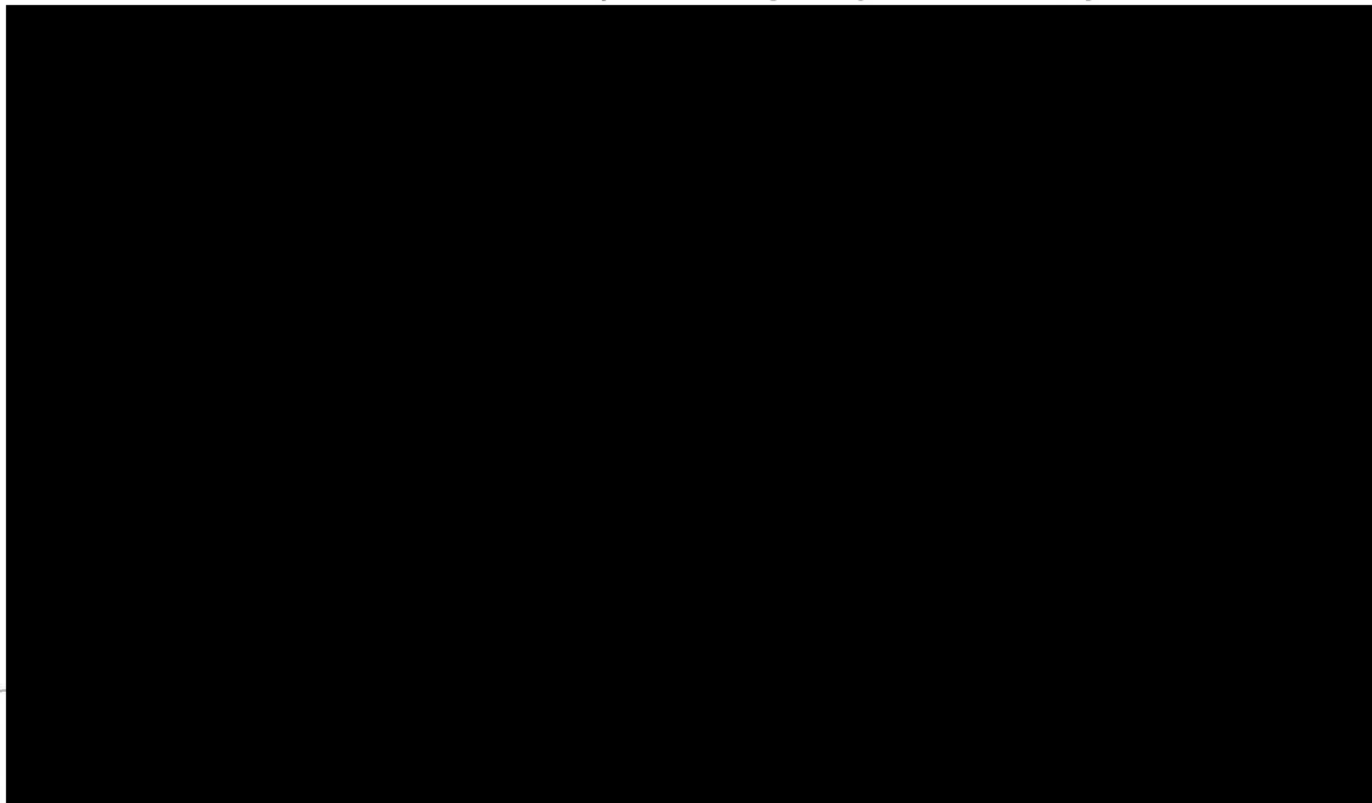


PORTAL ANABAT DATA

Project #: 593 Task #: 06 Biologists: Mike Mairase
Project Name: MVP Portal Name/#: Willow
State: VA County: Giles USGS Quad: Unknown
Camera #: Mike Mairase Picture #s: cloud / Mike's place GPS Unit #: IPAD Waypoint #: Willow
Latitude: [redacted] "N Longitude: [redacted] "W

Date	Start	End	Total time	ID #	CF Card #	Rain / Cold
11 Oct 2016	1830	2000	1.5 hrs	0203	—	Cold
12 Oct 2016	1800	23:15	5.25 hrs	0203	data lost due to anabat falling into creek	
13 Oct 2016	1807	23:15	5 hrs and 8 mins	0203	—	N/A

SKETCH: AnaBat location (relative to portal) & surrounding habitat



LEGEND

X = faces

COMMENTS

Cave is 1/2 up a very steep and
rocky slope.



Project #: 593
Project Name: MVP
State: VA
GPS Unit #: TRAD
Permitted Biologist: Mike Maurose (full name)
State Permit #: 056397

Wind Speed

[illegible]

COLLOID

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	A		[REDACTED]	1.5	2	1830	2015	Claro	Williams
Detector	0203		[REDACTED]	—	3	1830	2000	Claro	Williams
		°	"N						
		°	"N						

Net Placement/Site Description: Hard over Curve

[illegible]

1 Reproductive Condition: Female = NR/PG/L/PL; Male = $\uparrow/\downarrow$ * Refer to table on the back



Project #: 593
Project Name: MVP
State: VA
GPS Unit #: I8AD
Permitted Biologist: Mike Mairose
(full name)
State Permit #: 056397

Date: 12 Oct 2016
 Site Name#: Williams Cove
 County: Giles
 Camera #: Mike Place → C1000
 Other Field Staff: Renee Wilson
 (full name)
 Federal Permit #:

WEATHER DATA

WEATHER DATA				
Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1800	14.2	0	0	—
1830	13.8	0	0	—
1900	13.1	0	0	—
1930	11.5	0	0	—
2000	10.7	0	0	—
2030	10.3	0	0	—
2100	10.1	0	0	—
2130	9.9	0	0	—
2200	9.5	0	0	—
2230	9.5	0	0	—
2300	9.4	0	0	—
2330	9.4	0	0	—

Net/Trip/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxx x h)	Picture #	Waypoint #
Trip	A	[REDACTED]	[REDACTED]	1.5	2	1820	2320	Claud	Williams
Det	0203	N	N	-	3	1800	2320	c laud	williams
		O	O						
		"N	"W						

Net Placement/Site Description:

[illegible]

¹ Reproductive Condition: Female = NR/PG/LPL; Male = ↑/↓ * Refer to table on the back



BAT CAPTURE DATA

Project #: 593
Project Name: MVP
State: VA
GPS Unit #: TRAD → #2
Permitted Biologist: M. KeMairrose (full name)
State Permit #: 056397

WEATHER DATA

WEATHER DATA				
Time (xxxx h)	Temp (°C)	Wind Speed (estimated – see chart)	% Cloud Cover (estimated)	Comments
1800	14.7	0	0	
1830	14.2	0	0	
1900	13.1	0	0	
1930	12.7	0	0	
2000	12.1	0	0	
2030	11.6	0	15	
2100	11.1	0	15	
2130	10.9	0	0	
2200	10.7	0	0	
2230	10.6	0	0	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trawl	A	[REDACTED]	[REDACTED]	1.5	2	1800	2320	Cloud	Willowcove
Dredge	0203	[REDACTED]	[REDACTED]	-	3	1800	2320	Cloud	Willowcove
		"N	"W						
		"N	"W						

Net Placement/Site Description:

[illegible]

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = $\uparrow/\downarrow$

2015

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HABITAT ASSESSMENT

Project #: 593 Date: 16 Oct 2016 State: VA County: Giles
 Project Name: MVP Site Name/#: MLM-PO-0004 USGS Quad: —
 Permitted Biologist: Mike Maurose Other Field Staff: Rebecca Wilson State Permit #: 056397
 (full name) (full name) Federal Permit #: —

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Picture #	Waypoint #
Trap		[REDACTED] "N	[REDACTED] "W	Cloud	—
Det	0203	[REDACTED] "N	[REDACTED] "W	Cloud	—
		[REDACTED] "N	[REDACTED] "W		
		[REDACTED] "N	[REDACTED] "W		

Distance to closest water source (meters): 2 Type of water source: creek

Water source name: Sinking Creek

ESTIMATED WATER SOURCE CHARACTERISTICS (IF UNDER NETS OR DETECTOR):

Bank Height: 1 meters Channel Width: — meters Stream Width: 12 meters

Substratum: — Bedrock ☒ Boulder ☒ Cobble ☒ Gravel ☒ Sand ☒ Silt/Clay

Still Water Present (Y/N): N Average Water Depth: — m or cm Clarity (H,M,L): —

VEGETATION:

Dominant Canopy Species (> 40 cm/16" dbh)

Quercus rubra

Acer saccharum

Platanus occidentalis

Subdominant Canopy Species (< 40 cm/16" dbh)

Acer saccharum

Carya sp.

Estimated dbh range: Lg: 60 Sm: 40

Estimated dbh range: Lg: 39 Sm: 15

Relative abundance of dominant vs. subdominant (ratio): 1:20

Estimated canopy closure: — Closed ☒ Moderate — Open

Roost tree potential consists of: ☒ Large Trees — Snags — Neither

Roost tree potential for the area is: — High ☒ Moderate — Low

Roost potential comments: Few large trees, snags

Subcanopy clutter: — Closed ☒ Moderate — Open

Subcanopy comprised largely of: — Lower Branches of Canopy Trees ☒ Saplings ☒ Shrubs

Common Subcanopy Species: Acer negundo Aesculus glabra

Habitat Description: Portal lies on steep slope that ends at sinking creek;
cow pasture runs parallel to creek

Check all that apply:

— Mature Upland Forest — Recently Logged Forest — Crop/Pasture Land — Other —
— Young Upland Forest ☒ Forest Edge ☒ Stream/River —
— Mature Lowland Forest — Woodlot — Vernal Pool —
☒ Young Lowland Forest — Old Field — Deepwater Lake/Pond —

Herbaceous Cover: — Sparse ☒ Moderate — Dense



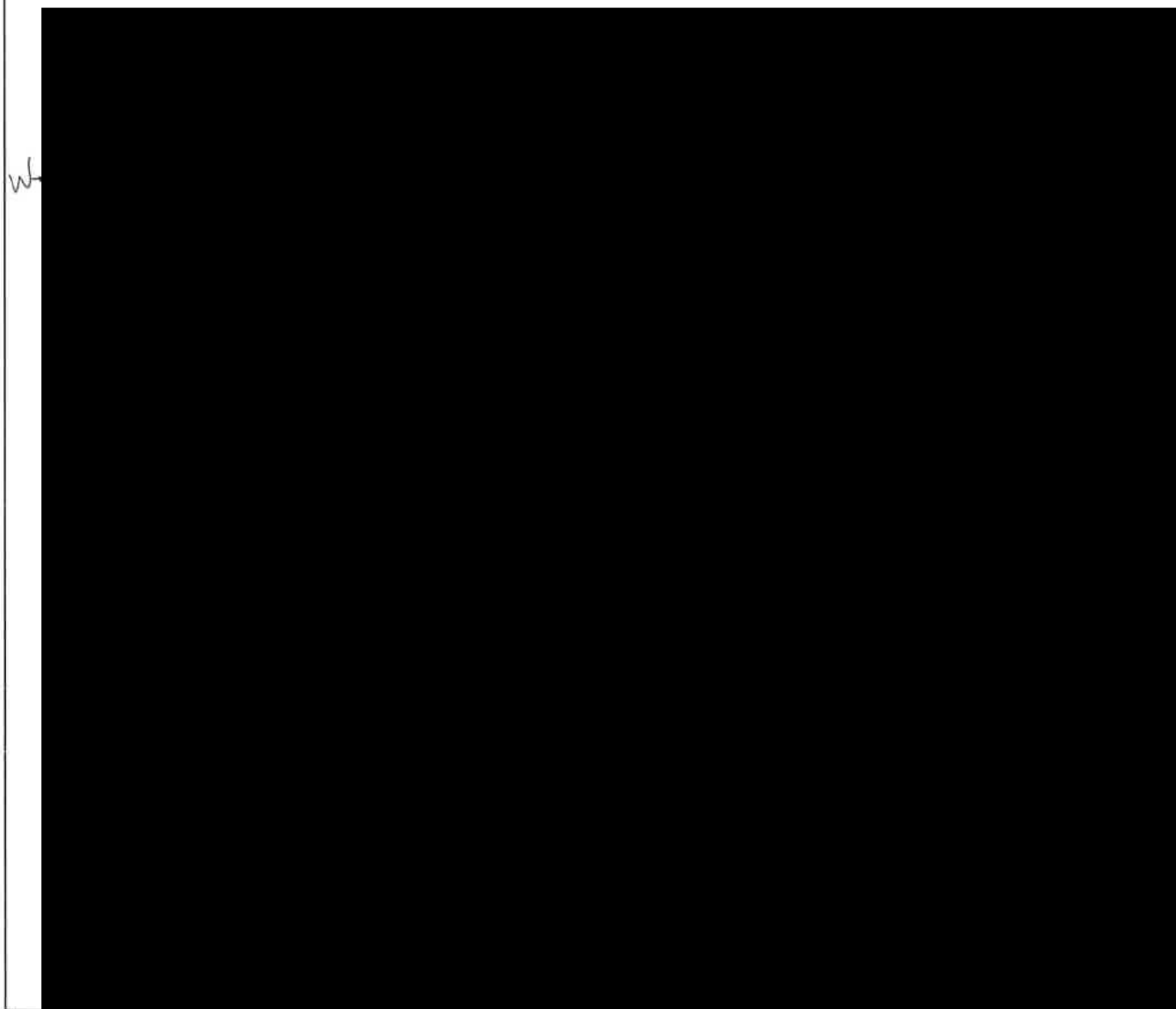
2015

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HABITAT ASSESSMENT (continued)

Project #: 593 State/County: VA / Giles Site Name/#: MLM-PO-004 Initials: EW

SKETCH NETS and/or DETECTORS



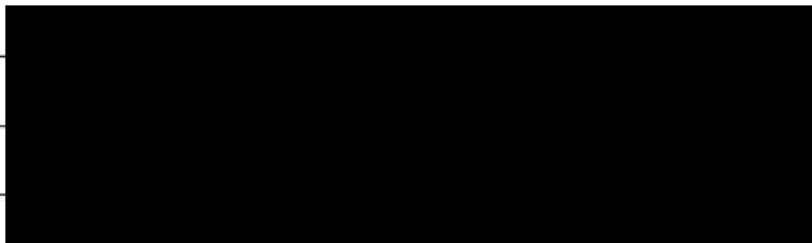
LEGEND

Net: ● — ●

Detector:

X - forested

COMMENTS



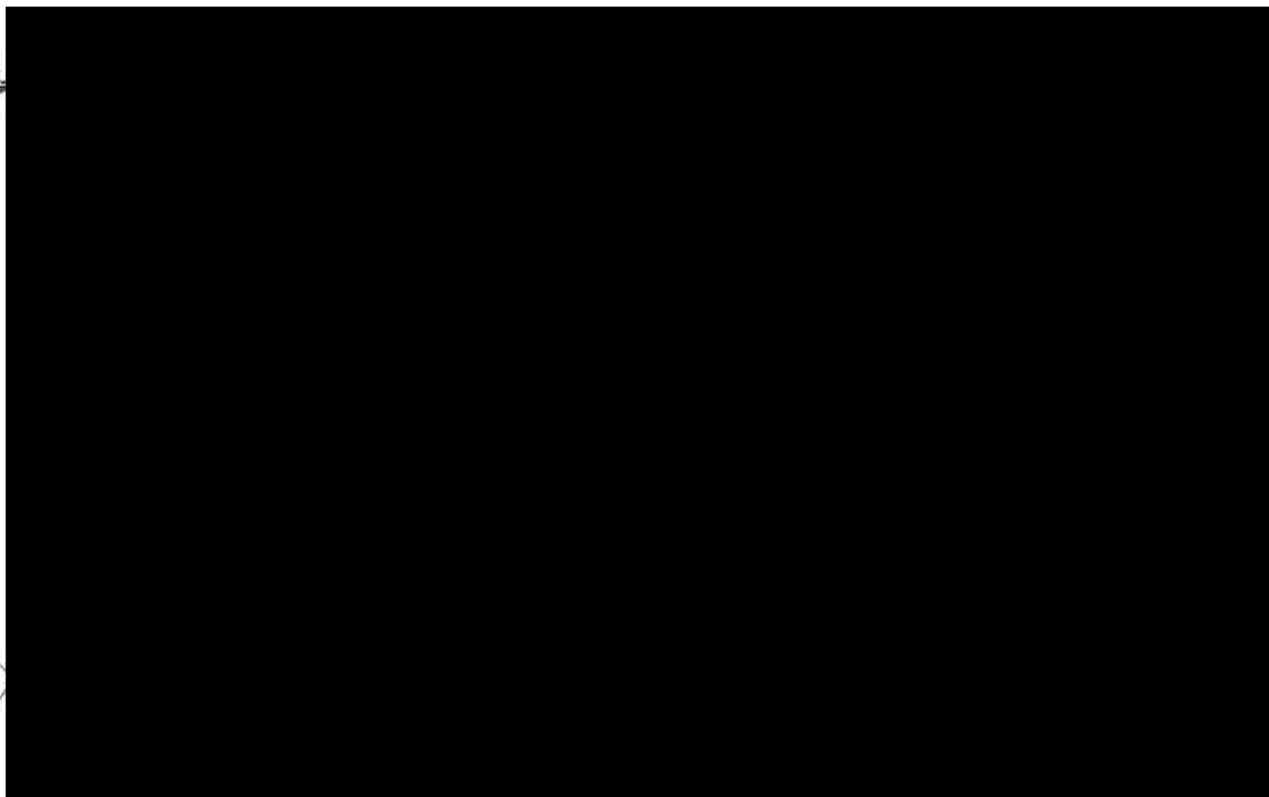
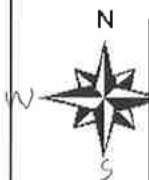


PORTAL ANABAT DATA

Project #: 593 Task #: 06 Biologists: Mike Mairose
Project Name: MVP Portal Name/#: MLM-PO-0004
State: VA County: Giles USGS Quad: unknown
Camera #: NA Picture #s: Cloud GPS Unit #: iPAD Waypoint #: —
Latitude: [REDACTED] "N Longitude: [REDACTED] "W

Date	Start	End	Total time	ID #	CF Card #	Rain / Cold
16 Oct 2016	1810	2315	5hrs 10min			—
17 Oct 2016	1810	2315	5hrs 10min			—

SKETCH: AnaBat location (relative to portal) & surrounding habitat



LEGEND

X - forested
— - trap

□ Detector

COMMENTS



2015



BAT CAPTURE DATA

Project #: 593
 Project Name: MVP
 State: VA
 GPS Unit #: IPAD
 Permitted Biologist: Mike Mairose
 State Permit #: 056397
 Date: 16 Oct 2016
 Site Name/ID: MLM_PO_0004
 County: Giles
 Camera #: Mikes phone
 Other Field Staff: Renee Wilson
 Federal Permit #: —

Property of: Environmental Solutions & Innovations, Inc.
 4525 Este Avenue, Cincinnati, OH 45232 (Phone: 513-451-1777)

WEATHER DATA

Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1800	22	0	35	—
1900	17	0	15	—
1930	16.3	0	0	
2000	15.2	0	0	
2030	14.7	0	0	
2100	14.1	0	0	
2130	14.1	0	0	
2200	13.9	0	0	
2230	13.6	0	0	
2300	13.5	0	0	
2330	13.5	0	0	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
Trap	—			—	—	1810	2315	Cloud	—
Det	0203			—	3	1810	2315	Cloud	—
		° ' "N	° ' "W						
		° ' "N	° ' "W						

Net Placement/Site Description: Harp trap over portal, anabat sampling across portal

Capt #	Net/ Trap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ¹	Wt (g)	RFA (mm)	Belly (F/M/E)	Wing Index* (0-3)	Picture # /Guano/Hair Sample/Band #	Comments

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = ↑/↓ * Refer to table on the back



Project #: 593
Project Name: MVP
State: VA
GPS Unit #: ICAD
Permitted Biologist: Mike Mairose
(full name)
State Permit #: 056397

BAT CAPTURE DATA

WEATHER DATA				
Time (xxxx h)	Temp (°C)	Wind Speed (estimated - see chart)	% Cloud Cover (estimated)	Comments
1830	16.4	0	0	
1900	16.1	0	0	
1930	15.2	0	0	
2000	14.8	0	0	
2030	14.5	0	0	
2100	13.7	0	0	
2130	13.5	0	0	
2200	13.4	0	0	
2230	13.1	0	0	
2300	13.0	0	0	
2330	12.8	0	0	

Net/Trap/ Detector	Net/Trap/ Detector #	Latitude	Longitude	Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxx h)	Picture #	Waypoint #
Trap	—		[REDACTED]	—	—	1810	2310	Cloud	—
Det	0203		[REDACTED]	—	3	1810	2310	Cloud	—
		N	W						
		"N	"W						

Net Placement/Site Description:

[illegible]

¹ Reproductive Condition: Female = NR/PG/L/PL; Male = $\uparrow/\downarrow$ * Refer to table on the back