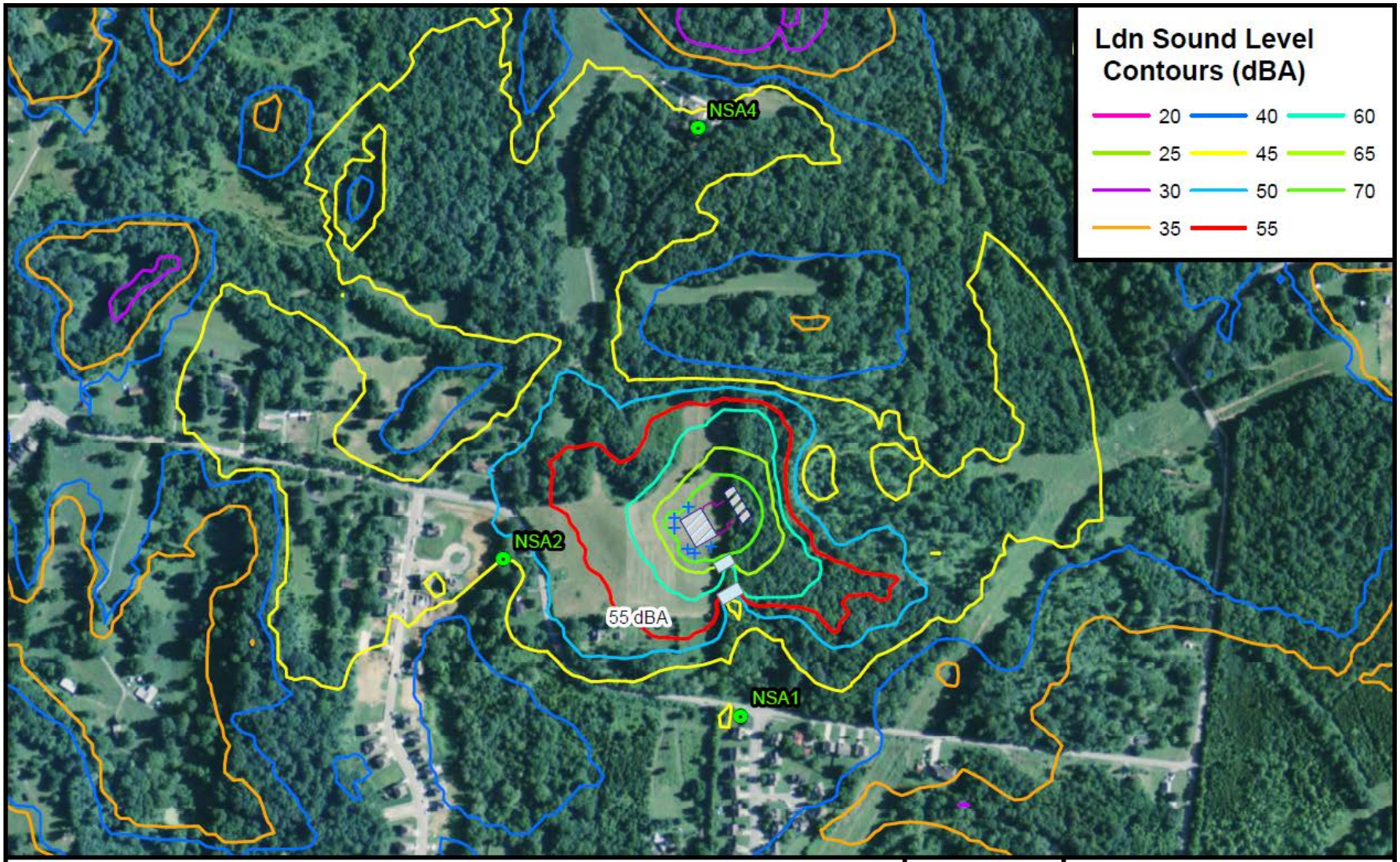


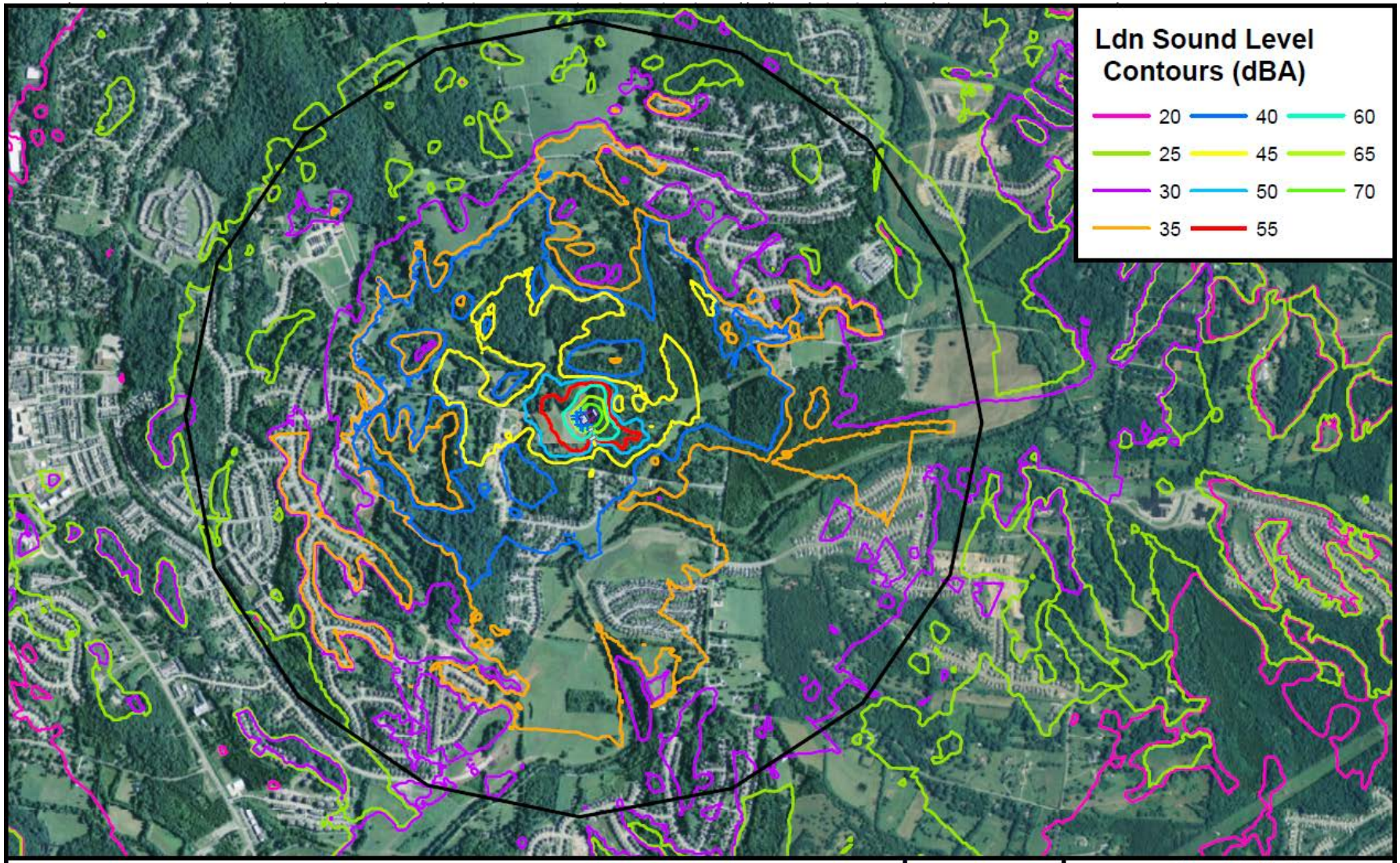
Area Sources
Buildings
Line Sources
Receiver
Point Sources

NORTH

500 250 0 500
Scale in Feet

BURNS McDONNELL

Figure 9.11-1
Columbia Gas
Gulf Xpres Pipeline
Cane Ridge Compressor Station
Sound Level Contours



Area Sources
Buildings
Line Sources
One Mile Radius
Point Sources

NORTH

1,750 875 0 1,750

Scale in Feet

BURNS McDONNELL

Figure 9.11-2
Columbia Gas
Gulf Xpres Pipeline
Cane Ridge Compressor Station
Sound Level Contours

In addition to the operational noise discussed above, pipeline blowdown events would also generate noise impacts at the MLV sites, and station blowdown events would generate noise at the compressor stations. Planned pipeline blowdown events can happen during inspections or maintenance and are conducted on the segment of pipeline between MLVs, requiring a segment of pipeline to be evacuated of natural gas. The duration of a blowdown depends on factors such as the extent of the maintenance activity and the gas pressure, and would generally last between 20 minutes and 2 hours. Estimated noise impacts during these times range between 35 and 65 dBA L_{eq} at the NSA closest to each compressor station. Planned events could allow for slower gas release and be scheduled for daytime hours, thus reducing the noise impacts. Unplanned pipeline blowdowns occur only in emergency situations. Unplanned events could occur at any time, but are typically infrequent and of short duration.

Based on the analyses conducted and our recommendation, we conclude that the GXP would not result in significant noise impacts on residents, and the surrounding communities.

4.11.3 Conclusions

4.11.3.1 Air Quality

4.11.3.1.1 Mountaineer XPress Project

Pipeline construction activities move through an area relatively quickly, and therefore construction emissions associated with the MXP pipeline would be intermittent and short-term. Similarly, emissions from the construction of the new and modified compressor stations would be intermittent and short-term. Particulate emissions would be spread over a relatively large area, and the dust control measures described in Columbia Gas' Fugitive Dust Control Plan would help decrease these emissions. Once construction activities in an area are completed, fugitive dust and construction equipment emissions would subside, and the impact on air quality due to construction would go away completely. Further, construction emissions are not estimated to exceed the General Conformity thresholds in areas of degraded air quality. Therefore, we conclude that the project's construction-related impacts would not result in a significant impact on local or regional air quality.

Emissions generated during operation of the pipeline portion of the MXP would be minimal, limited to those from maintenance vehicles and equipment and fugitive emissions. Columbia Gas submitted applications for construction and operation of each compressor station to the WVDEP. All new compressor stations associated with the MXP would require Title V permits for operation. The existing compressor stations would be required to update their Title V permits to include any changes. The White Oak, Lone Oak, Mount Olive, Elk River, and Sherwood Compressor Stations would be minor sources with respect to NSR and would not be subject to PSD permitting. The existing Ceredo Compressor Station is currently a PSD major source, but the changes proposed at this station are below the SER thresholds. All combustion turbines would use the SoLoNOx technology to reduce NOx emissions. The emergency engines would meet all NSPS JJJJ emission limits. Minimization of other pollutant emissions would be achieved with the use of natural gas fuel. Modeled impacts at the MXP compressor stations were all below applicable NAAQS standards. As with pipeline operations, any emissions resulting from operation of MXP's compressor stations would not have significant impacts on local or regional air quality.

Increases in emissions during the operating phase of the MXP would be minimal and would not have significant impacts on local or regional air quality.

4.11.3.1.2 Gulf XPress Project

Columbia Gulf submitted applications for construction and operation of each compressor station to the appropriate state agencies. All compressor stations associated with the GXP would require Title V permits for operation. All compressor stations associated with the GXP would be minor sources with respect to NSR and would not be subject to PSD permitting. All combustion turbines would use the SoLoNOx technology to reduce NOx emissions. The emergency engines will meet all NSPS JJJJ emission limits. Minimization of other pollutant emissions would be achieved with the use of natural gas fuel. Modeled impacts from the GXP compressor stations were all below applicable standards. Emissions resulting from operation of GXP's compressor stations would not have significant impacts on local or regional air quality.

Commentors expressed concerns about impacts on public health from operation of the new compressor stations. For a station compressing processed, transmission-quality gas using gas-fired turbines, the principal emissions of concern to public health are NOx. Potential exposures to NOx and all other criteria air pollutants were evaluated by modeling the proposed modified station's potential to emit and comparing the modeled concentrations to the NAAQS primary standards, which are set by EPA to protect the health of the general population, including sensitive subgroups.

4.11.3.2 Noise

NSAs near the MXP and GXP construction areas may experience an increase in perceptible noise, but the effect would be temporary and local. Noise mitigation measures that would be employed during construction include the use of sound-muffling devices on engines and the installation of barriers between construction activity and NSAs. Generally, nighttime noise would not increase during construction (except for HDD/Direct Pipe activity on the MXP). Proposed mitigation would reduce noise levels from this activity to below 55 dBA L_{dn}. Based on modeled noise levels, our recommendation (for Columbia Gas to develop a noise mitigation plan for the HDD/Direct Pipe construction), and the temporary nature of construction, we conclude that neither the MXP nor the GXP would result in significant noise impacts on residents or the surrounding communities during construction.

Noise impacts would result from operation of the MXP and GXP facilities. None of the proposed facilities would exceed our criterion of 55 dBA L_{dn} (except for the existing Ceredo station). However, the modifications to the Ceredo Compressor Station are predicted to reduce noise levels at nearby NSAs. Noise from planned or unplanned blowdown events could exceed the noise criteria but would be infrequent and of relatively short duration. Using CadnaA modeling, which takes into account additional parameters such as area terrain, we performed additional noise modeling for the Cane Ridge Compressor Station and found the anticipated noise levels to be lower than Columbia Gulf had initially projected. Based on the analyses conducted, mitigation measures proposed, and our recommendations, we conclude that operation of the MXP and GXP would not result in significant noise impacts on residents or the surrounding communities.

4.12 RELIABILITY AND SAFETY

The transportation of natural gas by pipeline involves some incremental risk to the public due to the potential for an accidental release of natural gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

CH_4, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. CH_4 has an auto-ignition temperature of 1,000 °F and is flammable at concentrations between 5 and 15 percent in air. An unconfined mixture of CH_4 and air is not explosive; however, it may ignite if there is an ignition source. A flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

During public scoping for the MXP and GXP, commenters expressed concern related to the safe operating procedures of natural gas facilities in proximity to residences, businesses, and other areas where people may gather. This section of the EIS discusses some of the regulatory requirements for operation of natural gas facilities and measures that the Companies would implement to maintain the facilities in compliance with USDOT requirements.

4.12.1 Safety Standards

The USDOT is mandated to provide pipeline safety under 49 U.S.C. 601. The USDOT's PHMSA administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. PHMSA develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety.

PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local levels. The USDOT provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing, at a minimum, the federal standards. A state may also act as the USDOT's agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement actions. For the MXP and GXP, PHMSA inspectors would perform inspections on interstate natural gas pipeline facilities in West Virginia, Kentucky, Tennessee, and Mississippi.

Under a *Memorandum of Understanding on Natural Gas Transportation Facilities* dated January 15, 1993, between the USDOT and the Commission, the USDOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the Commission's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a Certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or certify that it has been granted a waiver of the requirements of the safety standards by the USDOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. The

Commission accepts this certification and does not impose additional safety standards other than USDOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the USDOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under the Commission's jurisdiction.

The Commission staff also participates as a member of the USDOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The USDOT pipeline standards are published in 49 CFR 190-199. Part 192 specifically addresses the minimum federal safety standards for transportation of natural gas by pipeline.

The pipeline and aboveground facilities associated with the MXP and GXP must be designed, constructed, operated, and maintained in accordance with the USDOT's *Minimum Federal Safety Standards* in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The USDOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

The USDOT also defines four area classifications, based on population density near pipeline facilities, and specifies more rigorous safety requirements for populated areas. A class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined below:

- **Class 1:** Location with 10 or fewer buildings intended for human occupancy.
- **Class 2:** Location with more than 10 but fewer than 46 buildings intended for human occupancy.
- **Class 3:** Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period.
- **Class 4:** Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. For example, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4 locations). Pipe wall thickness and pipeline design pressures; hydrostatic test pressures; MAOP; inspection and testing of welds; and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Class locations for the MXP and GXP have been

determined based on the relationship of the pipeline centerline to other nearby structures and manmade features. If a subsequent increase in population density adjacent to the rights-of-way results in a change in class location for the pipelines, the Companies would reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with the USDOT requirements for the new class location. Table 4.12-1 summarizes the class locations for the MXP pipeline facilities.

Table 4.12-1
Lengths of Area Classifications Crossed by the MXP Pipeline Facilities

Facility Name	Class 1 (miles)	Class 2 (miles)	Class 3 (miles)
New Pipeline Facilities			
MXP-100	147.35	8.25	2.55
MXP-200	5.97	0.00	0.00
X59M1 Tie-in	0.00	0.06	0.00
Replacement Pipeline Facilities			
SM-80 Replacement	0.00	0.00	0.24
SM-80 Loop Replacement	0.00	0.00	0.16

The totals shown in this table may not equal the sum of the addends due to rounding.

Table 4.12-2 summarizes the class locations for the GXP facilities.

Table 4.12-2
Area Classifications for the GXP Facilities

Compressor Station	Class Location
Grayson Compressor Station	Class 1
Leach C Meter Station	Class 2
Morehead Compressor Station	Class 2
Paint Lick Compressor Station	Class 2
Goodluck Compressor Station	Class 1
Cane Ridge Compressor Station	Class 1/Class 3
Clifton Junction Compressor Station	Class 1
New Albany Compressor Station	Class 1
Holcomb Compressor Station	Class 1

The USDOT regulations require operators to develop and follow a written Integrity Management Program (IMP) that contains all the elements described in 49 CFR 192.911 and addresses the risks on each transmission pipeline segment. Specifically, the rule establishes an IMP that applies to all high-consequence areas (HCA).

The USDOT has published rules that define HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an IMP to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate for the USDOT to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[47] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[48]; or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.

An "identified site" is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

In the second method, an HCA includes any area within a potential impact circle that contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs along its pipeline, it must apply the elements of its IMP to those sections of the pipeline within HCAs. The USDOT regulations specify the requirements for the IMP in Subpart O of Part 192, Gas Transmission Pipeline Integrity Management.

Table 4.12-3 lists the HCAs for the MXP-100. HCAs have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites.

Table 4.12-3
High Consequence Areas Crossed by the MXP Pipeline Facilities

Facility Name	Begin Milepost	End Milepost	Description
MXP-100	24.36	24.78	House Count > 20
	45.50	46.00	Church/Summer Camp
	145.71	148.02	Class 3 Potential Impact Circle
	148.02	148.12	House Count > 20
	160.30	161.87	Class 3 Potential Impact Circle
	162.90	163.01	House Count > 20

Three of the six MXP HCAs are areas with 20 or more buildings intended for human occupancy within the potential impact circle. Two of the remaining three HCAs are current Class 3 locations (included are the Class 1 and Class 2 areas adjacent to the Class 3 areas within the

47 The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in pounds per square inch (gauge) multiplied by the square of the pipeline diameter in inches.

48 The potential impact circle is a circle of radius equal to the potential impact radius.

potential impact radius), and one is an identified site (church/summer camp). No HCAs were identified on the MXP-200 pipeline.

Of the nine compressor stations proposed to be built or modified under the GXP, only the Cane Ridge Compressor Station site includes an HCA based on the class locations presented in table 4.12-2. During public scoping for the Cane Ridge Compressor Station site, there were numerous comments expressing concern about safety from the residents living around the site. As a portion of the compressor station site contains an HCA, the site must meet higher standards for safety including:

- Line Patrol, minimum two times per year. Sites without an HCA require a minimum patrol once per year.
- Leak Survey twice per year. Sites without an HCA require annual leak surveys.
- IMP that meets or exceeds the USDOT regulations, namely, by conducting in-line inspection assessments more frequently. For sections of the compressor station facility where in-line inspection is not possible (i.e., non-piggable), Columbia Gulf would employ Direct Assessment or additional pressure testing. Direct Assessment is defined in USDOT 49 CFR 192.903 as "an integrity assessment method that utilizes a process to evaluate certain threats (i.e., external corrosion, internal corrosion and stress corrosion cracking) to a covered pipeline segment's integrity. The process includes the gathering and integration of risk factor data, indirect examination or analysis to identify areas of suspected corrosion, direct examination of the pipeline in these areas, and post assessment evaluation." In addition, Columbia Gulf would follow any new guidelines and rules that are issued pertaining to inspection of non-piggable piping as they become available.

Additional patrols, surveys, and in-line inspections, and the implementation of a robust IMP are designed to minimize the potential risk associated with the Cane Ridge Compressor Station to the surrounding community by identifying and repairing hazard factors before an incident occurs.

The pipeline and aboveground facilities, including the compressor stations and associated discharge and suction piping, would be designed, constructed, operated, and maintained in accordance with the USDOT's Minimum Federal Safety Standards in 49 CFR 192. The general construction methods that Columbia Gas and Columbia Gulf would implement to ensure the safety of the projects are described in section 2.4.1.

The USDOT prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Each pipeline operator is required to establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, law enforcement, and public officials, and coordinating emergency response;

- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

The USDOT also requires pipeline operators place pipeline markers at frequent intervals along the pipeline rights-of-way, such as where a pipeline intersects a street, highway, railway or waterway, and at other prominent points along the route. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. Because the pipeline right-of-way is much wider than the pipeline itself, and a pipeline can be located anywhere within the right-of-way, state laws require excavators to call their state One-Call center well in advance of digging to locate underground utilities and ensure it is safe for the contractor to dig in that location.

Pipeline markers identifying the owner of the pipe and a 24-hour telephone number would be placed for "line of sight" visibility along the entire pipeline length, except in active agricultural crop locations and in waterbodies, in accordance with USDOT requirements.

In accordance with USDOT regulations, the proposed facilities would be regularly inspected for leakage as part of scheduled operations and maintenance, including:

- utilizing in-line inspection tools both inside and outside HCAs;
- physically walking and inspecting the pipeline corridor periodically;
- conducting fly-over inspections of the right-of-way as required;
- inspecting and maintaining MLVs and meter stations; and
- conducting leak surveys at least once every calendar year or as required by regulations.

During inspections, Columbia Gas employees would look for signs of unusual activity on the rights-of-way and would immediately respond to assess the nature of the activity and prescribed corrective action.

Cathodic protection[49] would be installed along the entire length of the new pipelines to prevent corrosion. Columbia Gas personnel would check the voltage and amperage at regular intervals, as well as the pipe-to-soil potentials and rectifiers. In addition, annual surveys would be completed, as described above.

Columbia Gas would install a data acquisition system at all compressor and regulator stations along the new system. If system pressure were to fall or rise outside of a predetermined range, an alarm is activated which is transmitted to Columbia Gas' Charleston Gas Control Center. The alarm would notify the Control Center that pressures at a specific station are not within the acceptable range. The Control Center would then notify field operations, specifying the pressure

[49] Cathodic protection is a technique to reduce corrosion (rust) of the natural gas pipeline that includes the use of an induced current and/or a sacrificial anode that corrodes preferentially.

drop and affected pipeline segments. Field operations can stop the flow of gas by selectively isolating the pipeline sections of concern until inspections have been completed and the issue has been resolved. This system would be monitored 24 hours a day, 365 days a year.

In addition, Columbia Gas' and Columbia Gulf's facilities include many equipment features that are designed to increase the overall safety of the system and protect the public from a potential system failure due to accidents or incidents beyond the Companies' control. 49 CFR 192 specifies that compressor stations must have an emergency shutdown system that can be manually operated from at least two points. In addition to manual shutdown points, the compressor stations would be equipped with a full range of automatic emergency detection and shutdown systems, including hazardous gas and fire detection alarm systems.

The Companies have facility construction crews available to respond in the event of an emergency. The Companies employ qualified and licensed personnel who could be immediately dispatched to the scene of an emergency should the need arise. Accordingly, the Companies also operate area and sub-area offices along the pipeline routes, and personnel from these offices could provide the appropriate response to emergencies and direct safety operations as necessary.

Safety standards specified in Part 192 require that each operator establish and maintain liaison with appropriate fire, law enforcement, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. The Companies would utilize the emergency procedures contained in their respective Emergency Operating Procedures Manual, which requires communication with emergency responders on an annual basis. Local contact phone numbers, external contact information, equipment or resources available for mobilization, and any specific procedures to be followed for the projects would be incorporated into the Emergency Operating Procedures Manual prior to commencement of pipeline operations.

Both Columbia Gas and Columbia Gulf would establish and maintain liaison with appropriate fire, law enforcement, and public officials in a variety of ways. Annual communications from both companies to officials in their respective areas of operation would include the following information:

- the potential hazards associated with Columbia Gas/Gulf facilities located in their service areas and prevention measures undertaken;
- the types of emergencies that could potentially occur on or near their respective facilities;
- the purpose of pipeline markers and the information contained on them;
- pipeline location information and the availability of the National Pipeline Mapping System;
- recognition of and response to pipeline emergencies; and
- procedures to contact Columbia Gas/Gulf for more information.

Both Companies' communications with local emergency responders may involve individual meetings, group meetings, or direct mailings. In addition, each company would perform periodic emergency exercises and mock emergency drills with local government, law enforcement, and emergency response agencies, subject to agency availability and willingness to participate.

Columbia Gas and Columbia Gulf would coordinate mutual response using their respective Incident Command System that would be used by all emergency responders. Both Companies would train their personnel on this system to understand their roles and responsibilities within the Incident Command System structure.

4.12.2 Pipeline Accident Data

The USDOT requires all operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following the discovery of an incident and to submit a report within 30 days to PHMSA. Significant incidents are defined as any leaks that:

- cause a death or personal injury requiring hospitalization;
- involve property damage, including cost of gas lost, of more than $50,000, in 1984 dollars[50];
- release 5 barrels or more of highly volatile liquid or other liquid releases of 50 barrels or more; or
- result in an unintentional fire or explosion.

During the 20-year period from 1996 through 2015, a total of 1,314 significant incidents were reported on the more than 300,000 total miles of natural gas transmission pipelines nationwide.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.12-4 provides a distribution of the causal factors as well as the number of each incident by cause from 1996 to 2015.

[50] $50,000 in 1984 dollars is approximately $115,609 in 2016 (BLS, 2016).

Table 4.12-4 Natural Gas Transmission Pipeline Significant Incidents by Cause (1996-2015) a/		
Cause	**Number of Incidents**	**Percentage**
Corrosion	311	23.7
Excavation b/	210	16.0
Pipeline material, weld, or equipment failure	359	27.3
Natural force damage	146	11.1
Outside force c/	84	6.4
Incorrect operation	42	3.2
All other causes d/	162	12.3
Total	**1,314**	**100.0**

Source: USDOT, 2016
a All data gathered from PHMSA Serious Incident files, June 29, 2016.
b Includes third-party damage.
c Fire, explosion, vehicle damage, previous damage, intentional damage.
d Miscellaneous causes or other unknown causes.

We received public comments regarding concerns with the possibility of a pipeline rupture near homes. The dominant causes of pipeline incidents from 1996 to 2015 were corrosion and pipeline material, weld, or equipment failure, constituting 51.0 percent of all significant incidents. The pipelines included in the data set in table 4.12-5 vary widely in terms of age, diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of significant incidents is strongly dependent on pipeline age. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process. Jones et al. (1986) compared reported incidents with the presence or absence of cathodic protection and protective coatings. The results of that study, summarized in table 4.12-5, indicated that corrosion control was effective in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the corrosion rate compared to unprotected or partially protected pipe. The data also indicate that cathodically protected pipe without a protective coating has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

Table 4.12-5 Incidents Caused by External Corrosion and Level of Protection (1970 through June 1984)	
Corrosion Control	Incidents per 1,000 Miles per Year
None – bare pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11
Source: Jones et al., 1986	

Outside force, excavation, and natural forces were the cause in 33.5 percent of significant pipeline incidents from 1996 to 2015. These result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geological hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.12-6 provides a breakdown of outside force incidents by cause.

Table 4.12-6
Outside Forces Incidents by Cause (1996-2015) a/

Cause	Number of Incidents	Percent of All Incidents
Third party excavation damage	172	13.1
Operator excavation damage	25	1.9
Unspecified excavation damage	4	0.3
Previous damage	9	0.7
Heavy rain/floods	74	5.6
Earth movement	32	2.4
Lightning	8	0.6
Temperature	9	0.7
High winds	10	0.8
Unspecified/other natural force	13	1.0
Vehicle (not engaged with excavation)	49	3.7
Fire/explosion	9	0.7
Previous mechanical damage	6	0.5
Fishing or maritime activity	7	0.5
Maritime equipment or vessel adrift	2	0.2
Intentional damage	1	<0.1
Electrical arcing from other equipment/facility	1	<0.1
Unspecified/other outside force	9	0.7
Total	**440**	**33.5**

Source: USDOT, 2016
a Excavation, Outside Force, and Natural Force from table 4.12-5.

Since 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities near pipelines. The One Call program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

4.12.3 Impact on Public Safety

The service incident data summarized in table 4.12-4 include pipeline failures of all magnitudes with widely varying consequences. Table 4.12-7 presents the incident-caused injuries and fatalities between 2006 and 2015. The data have been separated into employees and non-employees to better identify the impact on the general public.

Table 4.12-7 Injuries and Fatalities – Natural Gas Transmission Pipelines a/				
	Injuries		Fatalities	
Year	Employees	Public	Employees	Public
2006	2	1	2	1
2007	6	1	1	1
2008	3	2	0	0
2009	4	7	0	0
2010 b/	3	58	0	10
2011	1	0	0	0
2012	1	6	0	0
2013	0	2	0	0
2014	1	0	1	0
2015	1	13	4	2

Source: USDOT, 2016

a All data, unless otherwise noted, gathered from PHMSA Serious Consequences files, June 29, 2016.

b The National Transportation Safety Board Pipeline Accident Report for the Pacific Gas and Electric Company Natural Gas Transmission Pipeline Rupture and Fire, San Bruno, California, September 9, 2010 states that "As a result of the pipeline rupture and fire, 8 people were killed, 10 people sustained serious injuries, and 48 people sustained minor injuries," August 30, 2011.

Most fatalities from natural gas pipeline incidents are associated with local distribution pipelines. These pipelines are not regulated by the Commission; they distribute natural gas to homes and businesses after transportation through interstate transmission pipelines. In general, these distribution lines are smaller-diameter pipes and/or plastic pipes that are more susceptible to damage. In addition, local distribution systems do not have large rights-of-way and pipeline markers common to FERC-regulated interstate natural gas transmission pipelines. The proposed MXP pipelines evaluated in this document would be FERC-regulated.

The nationwide totals of accidental fatalities from various anthropogenic and natural hazards are listed in table 4.12-8; this information provides a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Furthermore, the fatality rate is much lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

Table 4.12-8 Nationwide Accidental Deaths in 2014 a/	
Type of Accident	**Annual No. of Deaths**
Motor vehicle	35,398
Poisoning	42,032
Falls	31,959
Drowning	3,406
Fire, smoke inhalation, burns	2,701
Other unintentional injuries	20,557
Floods b/	40
Lightning b/	26
Tornado b/	47
Natural gas distribution lines c/	18
Natural gas transmission pipelines c/	1

a All data, unless otherwise noted, reflect preliminary 2014 statistics from: U.S. Department of Health and Human Services, CDC, National Center of Health Statistics, National Vital Statistics System, 2016.

b U.S. Department of Commerce, NOAA, National Weather Service, 2016.

c USDOT, 2016.

4.12.4 Conclusion

The available data show that natural gas transmission pipelines continue to be a safe, reliable means of energy transportation. From 2006 to 2015, the rate of total fatalities for the nationwide natural gas transmission lines in service was less than 0.01 per year per 1,000 miles of pipeline. Using this rate, constructing a 171-mile-long pipeline system might result in a fatality (either an industry employee or a member of the public) on the pipeline every 606 years. The operation of the MXP and GXP would represent only a very slight increase in risk to the nearby public.

4.13 CUMULATIVE IMPACTS

4.13.1 Projects and Activities Considered

In accordance with NEPA, we considered the cumulative impacts of the MXP and GXP and other projects or actions in the area of each. As defined by the CEQ, a cumulative effect is the impact on the environment that results from the incremental impact of the proposed action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (CEQ, 1997). Although the individual impact of each separate project may be minor, the additive or synergistic effects of multiple projects could be significant.

The MXP and GXP project areas have undergone centuries of human settlement, farming, mining, and other activities as described generally below. The pre-contact and historical information was provided by Columbia Gulf and Columbia Gas in their respective Phase I Cultural Resources Survey Reports.

The MXP would be in western West Virginia. From the 1780s through the 1830s, one of the key activities in the MXP area was the construction of roads and railroads. During the middle of the 19th century, the opening of coal mines further expanded the need for railroads. As the railroads became more active, towns began growing along the rail lines. As industry began to spread, the need for coal spurred the development of coal mines. Drilling for crude oil and natural gas began around the same time. After the Civil War, sheep ranching for wool, which was more profitable than cattle ranching, spurred wool mills. By the late 1880s, with the expansion of railroads and the depletion of timber resources in the northeast and Great Lakes areas, large lumber companies tapped in to the mountainous forests of West Virginia. The timber boom of the late 1800s through early 1900s changed the scale by which resources would be extracted from West Virginia. Timber production in West Virginia peaked in 1909, and by the 1920s, nearly all the virgin timber was gone. The depletion of available lumber left the region needing an alternative fuel, and the cleared land was desirable to miners. From the end of the 1800s, mining of coal fields, mountaintop mining operations, and oil and gas extraction wells dominated the West Virginia landscapes through the 20th century.

The GXP, which consists of new facilities and modifications at existing facilities, would be in Kentucky, Tennessee, and Mississippi. The major activities that historically lead to what is now the typical Kentucky landscape included farming, logging, and underground and surface coal mining in the counties that would be affected by the GXP. Timber harvesting peaked between 1880 and 1920, and agricultural operations took over on the cleared land. Erosion of cropland along hillsides made it difficult, and many resorted back to the timber industry. In Wayne County, Tennessee, iron was mined through most of the 19th and into the 20th century. Agricultural operations were common within the valleys. In Davidson County, as Nashville was getting established, the main sources of revenue were cotton, corn, wheat, and pork. In the area between Antioch and Nolensville, there were numerous prosperous farms because the hilly terrain limited large-scale agricultural operations. By 1890, Davidson County had over 100,000 residents. Union County, Mississippi has been shaped by agriculture and farming and timber operations since the early 1800s. Cotton has been the leading crop, followed by soybean, corn, and livestock. Until the early 1800s, Grenada County, Mississippi was Choctaw land. Similar to Union County,

Granada County's landscape has been shaped by timber operations and agriculture. Grenada County prospered during the cotton boom, but now is one of the leading producers of corn in the state.

In order to understand the contribution of past actions to the cumulative impacts of the proposed action, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. In this analysis, we generally consider the impacts of past projects within the resource-specific geographic scopes as part of the affected environment (environmental baseline), which was described under the specific resources discussed throughout section 4.0. However, this analysis does include the present effects of past actions that are relevant and useful.

This cumulative impacts analysis includes other actions meeting the following three criteria:

- the action impacts a resource that is also potentially affected by the MXP or GXP;
- the action causes the impacts within all or part of the same geographic scope as the MXP or GXP; and
- the action causes this impact within all or part of the temporal scope for the potential impacts from the MXP or GXP.

As described in previous sections of this EIS, construction and operation of the MXP and GXP would temporarily and permanently affect the environment, with most (but not all) impacts generally localized and minimal. The MXP would result in impacts on geological resources, soils, wetlands, water resources, vegetation, wildlife habitat, special status species, some land uses, recreational and visual resources, socioeconomics, air quality, noise, and climate change. The GXP would result in impacts on a much smaller range of resources because of its limited scope. Impacts include soils, vegetation, some land uses, visual resources, air quality, noise, and climate change. Nevertheless, throughout the individual resource discussions in this EIS, we have determined that the MXP and GXP would have only minimal, generally localized, and temporary impacts on these resources, except for the MXP's long-term impacts on upland forested areas (in particular, CFAs and interior forest habitat) and habitat-related impacts on the cerulean warbler. Based on the minimization and mitigation measures described in the projects' respective ECS and SPCC Plan and other specialized plans including blasting plans, CPG's MSHCP, and adherence to our recommendations, we find that most of the impacts would be largely limited to areas of disturbance associated with the MXP rights-of-way, and both projects' construction workspaces and adjacent areas.

For some resources, the contribution to regional cumulative impacts is lessened by the expected recovery of ecosystem function. For example, vegetation communities would be cleared, but restoration would proceed immediately following construction. Additionally, we determined that certain air quality and noise impacts would be temporary during construction, but operational impacts on these resources would last for the life of the projects.

Table 4.13-1 summarizes the resource-specific geographic boundaries that were considered in this analysis and justification for each. Actions located outside these boundaries are generally not evaluated because their potential to contribute to a cumulative impact diminishes with increasing distance from the MXP and GXP. The geographic scope for analyzing some of the resources listed below is defined by the hydrologic unit code (HUC)-12 subwatershed(s) where the projects are proposed. A watershed is an area of streams, channels, and rivers that all drain into a common outlet. Based on our findings throughout the previous sections of this EIS and given the anticipated scale of impacts the MXP and GXP would have on aquatic resources, the natural, ecological boundaries of a HUC-12 subwatershed is the appropriate geographic scope for this analysis.

Table 4.13-1
Resource-Specific Geographic Regions for Determining Cumulative Impacts of the MXP and GXP

Resource(s)	Cumulative Impact Geographic Scope	Justification for Geographic Scope
Geological resources and soils	For geological resources, the area of disturbance of the MXP and GXP and other projects would be overlapping or immediately abutting one another, and involve excavation. Potential soils impact would be limited to within 0.25 mile of the MXP and/or GXP workspaces.	Impacts on geological resources and soils would be highly localized and primarily limited to the respective project footprints during active construction. Cumulative impacts would only occur if other geographically overlapping or abutting projects were constructed at the same time as the MXP/GXP.
Surface water, groundwater and aquatic resources	HUC-12 subwatershed boundary. (Note: Does not apply to GXP because of the limited scope of the disturbance associated with the new compressor stations; only ponds and ephemeral streams within the station site boundaries would be affected.)	Impacts on surface waters can result in downstream contamination or turbidity; therefore, the geographic scope used to assess cumulative impacts on water and aquatic resources includes the HUC-12 subwatersheds crossed by the MXP.
Wetlands	HUC-12 watershed boundary for the MXP. For the GXP, it is 0.25 mile due to the limited, mostly zero, impacts on wetlands from GXP facilities.	For similar reasons as above, contributions towards cumulative impact on wetlands were assessed within the HUC-12 subwatersheds.
Vegetation and wildlife	2 miles from the MXP; 0.5 mile from the GXP. For less-transient species, such as reptiles and amphibians, the geographic scope for both projects will be the area immediately within and abutting the project's construction areas.	Due to the transient nature of wildlife and the rural setting that exists for the majority of the MXP, we considered cumulative impacts on vegetation and wildlife within a 2-mile buffer of the pipeline routes. This allows us to consider impacts on interior forest habitat (and the wildlife therein) at a geographic scope appropriate for these resources (i.e., impacts can extend farther than just project footprint or abutting locations). Given the limited scope of the GXP, 0.5 mile was deemed appropriate.
Cultural resources	The area of potential effect of the MXP/GXP and other projects would be overlapping or immediately abutting one another and involve excavation, or within the viewshed.	Adverse impacts on cultural resources would not occur as a result of the MXP or GXP; therefore, the projects would not contribute to a cumulative impact on cultural resources.

Table 4.13-1 Resource-Specific Geographic Regions for Determining Cumulative Impacts of the MXP and GXP		
Resource(s)	**Cumulative Impact Geographic Scope**	**Justification for Geographic Scope**
Land use and special interest areas	0.5 mile from the project areas.	MXP/GXP impacts on general land uses would be restricted to the construction workspaces and the immediate surrounding vicinity; therefore, the geographic scope for land use and recreation is 0.5 mile from the centerline of the MXP rights-of-way or the MXP and GXP aboveground facility sites.
Visual resources	Viewshed varies based on topography and vegetation.	The geographic scope for assessing cumulative impacts on a viewshed includes the surrounding area from where a new facility would be visible. Therefore, the geographic scope would be limited to areas where clearing of mature trees or installation of new aboveground facilities would occur. We considered approximately 500 feet; however, that distance could be greater depending on surrounding topography.
Socioeconomics	Affected county.	Due to both projects' limited regional scope and relative short construction duration, the geographic area for assessing contributions to cumulative impact on socioeconomics, including traffic-related impacts, was evaluated on a county-wide basis.
Air quality – construction	0.25 mile from the project.	Due to the limited amount of emissions generated by construction equipment, the geographic scope used to assess potential cumulative impacts on air from construction activities was set at 0.25 mile from the MXP/GXP areas.
Air quality – operation	Air emission sources within a 31-mile (50-kilometer) radius of proposed sources of operational emissions such as gas-fired compressor stations	The geographic scope adopted the distance used by the EPA for cumulative modeling of large PSD sources during permitting and following 40 CFR 51, appendix W, section 4.1. We consider this a conservative geographic scope for the purpose of identifying other projects which could contribute to a cumulative impact on air quality.
Noise	NSAs that could be affected during construction and operation; up to 0.25 mile during construction and up to 1 mile during operation.	The geographic scope for assessing potential cumulative impacts on noise was determined to be areas within the immediate proximity of the construction activities (0.25 mile) and somewhat wider for compressor station operation (closest NSAs within about a 1-mile radius); if other projects would also affect these same NSAs.

We received numerous comments on the draft EIS regarding the absence of impacts from oil and gas operations in our cumulative impacts analysis. We recognize that oil and natural gas exploration and production activities are ubiquitous in many of the counties crossed by the MXP. Oil and natural gas exploration activities include improvement or construction of roads, preparation of a well pad, drilling and completion of wells, and construction of gathering systems and consequent rights-of-way. We have visited the MXP project areas and have observed the oil and gas operations that are in progress and under construction. During our scoping meetings and draft EIS comment sessions it was clear that such current exploration and production activities were a source of concern and frustration to those people directly and indirectly affected by these operations on a daily basis.

We performed a query online using the WVDEP's Oil and Gas Well Search. About 1,015 active oil and/or gas wells have been identified within 0.25 mile of the MXP. In the counties affected by the MXP, the number of active wells range from about 200 in Mason County to over 5,500 in Ritchie County. Commentors brought up several key concerns relating to oil and gas exploration activities: erosion, forest clearing, and air quality. We address these concerns in subsections 4.13.2.2.1 (Soils), 4.13.2.4.1 (Vegetation and Wildlife), and 4.13.2.9.1 (Air Quality), below. Table 4.13-2 lists the query results by county for oil and gas wells.

Table 4.13-2
Number and Status of Oil and Gas Wells within Counties Affected by the MXP

Status	Marshall County	Wetzel County	Tyler County	Doddridge County	Ritchie County	Calhoun County	Wirt County	Roane County	Jackson County	Putnam County	Mason County	Cabell County	Kanawha County
Abandoned Well	136	400	304	631	1,416	661	283	768	209	128	48	117	457
Active Well	**623**	**1,422**	**1,042**	**3,772**	**5,530**	**2,900**	**582**	**2,173**	**1,369**	**893**	**222**	**503**	**3733**
Future Use	5	1	0	12	20	2	0	1	0	2	1	2	8
Never Drilled	194	265	344	925	1,669	442	148	606	383	159	124	37	474
Never Issued	38	79	13	99	33	22	6	26	13	12	12	0	33
Permit Application	18	4	32	35	4	0	0	1	0	0	0	0	0
Permit Issued	211	271	281	597	268	2	6	18	20	1	0	0	14
Plugged	703	726	430	773	1,417	708	354	1,199	1,032	343	139	336	1690
Shut in **a/**	0	2	8	0	0	0	0	0	0	0	0	0	0
Under Construction	0	1	0	0	0	0	0	0	0	0	0	0	0
TOTAL WELLS	**1,928**	**3,171**	**2,454**	**6,844**	**10,357**	**4,737**	**1,379**	**4,792**	**3,026**	**1,538**	**546**	**995**	**6409**
County Area (mi^2)	312	361	261	320	454	281	235	484	472	350	445	288	911
Avg. wells per mi^2	6	9	9	21	23	17	6	10	6	4	1	3	7

a A "shut in" well is a well that is capable of producing but is not presently producing.

We note that the WVDEP's Office of Oil and Gas provides regulatory authority over these activities. The Office of Oil and Gas requires BMPs for the construction and operation of oil and gas production facilities as part of its permitting process. The BMPs are similar to those proposed by Columbia Gas and Columbia Gulf to minimize erosion and sedimentation, and impacts on wetlands, waterbodies, and other natural resources.

Tables 4.13-3 and 4.13-4 identify other past, present, and reasonably foreseeable future projects or actions that are being constructed or may be constructed within the geographic scope of each resource area and may cumulatively or additively impact resources that would be affected by the construction and/or operation of the MXP and GXP, respectively. These other projects and

actions were identified through conversations with local planning and zoning officials, publicly available information, aerial and satellite imagery, and through publicly filed reports from Columbia Gas and Columbia Gulf.

The temporal scope for cumulative actions includes past, present, and reasonably foreseeable projects and actions where the duration of time for construction, operation, and/or restoration overlaps with the timeframe for construction, operation, and restoration of the MXP and GXP. Construction is expected to start, for both MXP and GXP, during the second half of 2017, although this could be delayed based on when required permits may be issued. The MXP and GXP are both tentatively scheduled to be in-service November 2018. Revegetation of the project areas would be considered complete when 80 percent of the disturbed areas have vegetation cover that is consistent with that of the undisturbed vegetative adjacent to the construction areas. For herbaceous vegetation, we estimate it may take up to 3 growing seasons to achieve successful revegetation. For other actions affecting vegetation, the temporal scope for considering cumulative impacts on herbaceous vegetation, when combined with impacts from the MXP and GXP, would be from the start of clearing until successful revegetation. The temporal scope for cumulative impact on mature forest areas would be considerably longer; perhaps 25 - 50 years. Because Columbia Gas and Columbia Gulf would implement measures to confine exposed soil to the construction area through use of approved BMPs, the temporal scope for cumulative impact on soils would only extend from the moment soils are exposed during grading until stabilization has been achieved. As both noise and air emissions dissipate almost immediately, the temporal scope for air and noise impacts from construction of the projects is limited to concurrent construction. However, air and noise impacts from operation of the MXP and GXP would continue throughout the lifetime of the projects; thus, no temporal scope is used to define a limit of cumulative impacts.

The other actions considered in our cumulative impact analysis may vary from the MXP and GXP in nature, magnitude, and duration. These actions are included based on the likelihood of their impacts occurring within the same geographic and temporal scope as the impacts of the MXP or GXP; i.e., the other actions have recent past, current or ongoing impacts, or are "reasonably foreseeable." The other actions that would be expected to affect similar resources during the same temporal scope as the MXP and GXP were considered further. The anticipated cumulative impacts of the MXP and GXP and these other actions are discussed below, as well as any pertinent mitigation actions.

Table 4.13-3 Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project					
Project	**Location (County, State)**	**Description**	**Status**	**Location Relative to MXP**	**Resources with Potential Cumulative Effects**
FERC Jurisdictional Projects					
OPEN (Ohio Pipeline Energy Network) Project **a**/	Monroe County, OH	FERC-regulated project consisting of 76 miles of new 30-inch-diameter pipeline, construction of a new compressor station, upgrades to additional compressor stations, and associated pipeline support facilities in Ohio. (FERC Docket No. CP14-68)	Completed; in-service as of November 17, 2015.	OPEN's Colerain Compressor Station is 22.0 miles northeast of the approved Lone Oak Compressor Station.	Air (Operation)
Appalachian Gateway Project **a**/	Kanawha, Doddridge, Marshall, and Wetzel Counties, WV	FERC-regulated project consisting of 109 miles of new pipeline and compressor facilities in West Virginia and Pennsylvania. (FERC Docket No. CP10- 448)	Construction and restoration completed in January 2016.	Intersects the MXP at MP 5.0.	Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual
Ohio Valley Connector Project **a**/	Marshall and Wetzel Counties, WV	FERC-regulated project consisting of approximately 37 miles of pipeline from Wetzel County, WV to Monroe County, OH. (FERC Docket No. CP15-41)	Construction complete. In-service date of October 1, 2016.	Intersects the MXP at MP 19.2.	Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual
Utica Access Project **a**/	Kanawha County, WV	FERC-regulated project consisting of 4.8 miles of new 24-inch-diameter pipeline and associated facilities in Clay and Kanawha Counties, WV. (FERC Docket No. CP15-87)	In-service date of November 1, 2016.	The pipeline crosses within 0.1 mile of the proposed Elk River Compressor Station.	Vegetation, Wildlife, Land Use
Monroe to Cornwell Project **a**/	Doddridge, Kanawha, and Wetzel Counties, WV	FERC-regulated project including modifications to the L.L. Tonkin Compressor Station in Doddridge County (4.5 miles west of MXP MP 46.3); Cornwell Compressor Station in Kanawha County (2.7 miles east of Elk River Compressor Station); and Mockingbird Hill Compressor Station in Wetzel County. (FERC Docket No. CP15-7)	Project began construction in February 2016; completed and placed into service in October 2016.	Mockingbird Hill Compressor Station is 0.8 mile east of MXP MP 25.9, and 21.3 miles from the proposed Sherwood Compressor Station.	Groundwater, Water Resources, Vegetation, Wildlife, Air (operation)
SM80 MAOP Restoration Project **a**/	Wayne County, WV	FERC-regulated project consisting of the abandonment of certain sections of Line SM80 in Wayne County, WV, and upgrading a segment of the line and ancillary facilities to accommodate in-line inspection equipment. (FERC Docket No. CP15-549)	Construction began in February 2017. Anticipated to be complete during the spring of 2018.	About 0.1 mile southwest of the Ceredo Compressor Station.	Vegetation, Wildlife, Land Use

Table 4.13-3
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Rover Pipeline Project a/	Doddridge, Marshall, Tyler, and Wetzel Counties, WV	FERC-regulated project consisting of 830 miles of natural gas pipeline from Pennsylvania and West Virginia to distribution points in Ohio and Michigan. Majorsville Compressor Station. (FERC Docket No. CP15-93)	FERC Order issued on February 2, 2017. Construction underway.	Would cross area 10.0 miles north of MXP MP 0.0, and intersects at MP 48.0. Majorsville Compressor Station is 12.4 miles from Lone Oak Compressor Station.	Geological Resources, Soils, Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Socioeconomics, Air (operation), Air & Noise (construction)
Broad Run Expansion Project a/	Kanawha County, WV; Madison County, KY and Davidson County, TN	FERC-regulated project includes the construction of two new compressor stations in Kanawha County, WV, one new compressor station in Madison County, KY; and one new compressor station in Davidson County, TN. (FERC Docket No. CP15-77)	Construction began in December 2016 and is ongoing. Proposed in-service date is June 2018.	Rocky Fort and Tyler Mountain Compressor Stations are 20.0 miles east of MXP MP 151 and 17.5 miles south of the Mount Olive Compressor Station, respectively.	Socioeconomics, Air & Noise (operation)
Rayne XPress Expansion Project (RXP) a/	Carter, Menifee, and Montgomery Counties, KY	FERC-regulated project consisting of compression facilities, specifically the impacts of the Grayson Compressor Station in Carter County. (FERC Docket No. CP15-539)	FERC Certificate issued January 19, 2017. Construction underway, with an in-service date during 1st quarter of 2018.	The Grayson station is approximately 20.0 miles west of the Ceredo Compressor Station.	Air (operation)
Leach XPress Project (LXP) a/	Marshall County, WV	FERC-regulated project consisting of four new natural gas pipelines totaling 160 miles. (FERC Docket No. CP15-514)	FERC Certificate issued January 19, 2017. Construction underway, with an in-service date during 1st quarter of 2018.	The pipelines will intersect in Marshall County, WV, at MXP MP 0. The LXP will establish the Lone Oak Compressor Station (to be expanded by the MXP).	Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (operation)

Table 4.13-3
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
WB XPress Project a/	Kanawha County, WV	FERC-regulated project consisting of about 30 miles of various diameter pipelines, modifications to seven existing compressor stations, construction of two new compressor stations, and uprating the MAOP on various segments of the Columbia system. (FERC Docket No. CP16-38)	Construction planned to begin in late summer 2017 with an in-service date of late 2018 or early 2019. (The WBX EA was issued in March 2017, and the FERC certificate is still in process.)	Project would establish the Elk River Compressor Station (to be expanded by the MXP).	Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (operation)
Gulf XPress Project a/	Carter, KY	FERC-regulated project consisting of seven new compressor stations, installing additional compression at the Grayson Compressor Station (Carter County, KY), as well as limited pipeline looping, system modifications, and related facilities. (FERC Docket Number CP16-361; analyzed alongside MXP in this draft EIS)	Application filed in April 2016; construction to begin 4th quarter of 2017; anticipated in-service date is November 1, 2018.	The Grayson Compressor Station is about 20.5 miles west of the Ceredo Compressor Station.	Air (operation)
Supply Header Project a/	Doddridge and Wetzel Counties, WV	FERC-regulated project comprising approximately 38 miles of pipeline connecting supplies in West Virginia, Ohio, and Pennsylvania to the Atlantic Coast Pipeline. The TL-635 line is almost entirely within 5 miles of the MXP, and TL- 636 is 75 miles away. The project also includes the Burch Ridge Compressor Station and the Mockingbird Hill Compressor Station (FERC Docket No. CP15-555)	Application filed in September 2015; pipeline construction anticipated for 2017-2019; in-service date scheduled for late 2019.	Five miles east and roughly parallels the MXP from MP 25.0 to 50.0. The Mockingbird Hill Compressor Station is 21.3 miles northeast of the Sherwood Compressor Station. The Burch Ridge Compressor Station is 15.0 miles south of the Lone Oak Compressor Station.	Groundwater, Water Resources, Socioeconomics, Air (operation)
Mountain Valley Pipeline Project a/	Doddridge and Wetzel Counties, WV	FERC-regulated project consisting of 294 miles of new 42-inch-diameter pipeline extending from northwestern West Virginia to southern Virginia and the Bradshaw Compressor Station (FERC Docket No. CP16-10)	Application filed with FERC in October 2015. FEIS issued in July 2017. Construction anticipated 4th quarter	The pipeline route is 6.5 miles east of MP 5.7 of the MXP-200 pipeline. The Bradshaw Compressor Station is 22.5 miles	Groundwater, Water Resources, Socioeconomics, Air (operation)

Table 4.13-3 Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project					
Project	**Location (County, State)**	**Description**	**Status**	**Location Relative to MXP**	**Resources with Potential Cumulative Effects**
			of 2017; targeted in-service date of late 2018.	from the Sherwood Compressor Station.	
Non-jurisdictional Projects (related to the MXP)					
MarkWest Pipeline	Doddridge County, WV	MarkWest Energy Partners would construct an approximately 2.4-mile-long 26- or 36-inch-diameter pipeline from the existing MarkWest Gas Processing Facility to the proposed Columbia Gas Sherwood Compressor Station. Non-jurisdictional facility for the MXP.	Construction anticipated to begin while Sherwood Compressor Station is under construction.	Interconnects with Columbia Gas' proposed Sherwood Compressor Station at approximate MP 50.7.	Geology, Soils, Water Resources, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
White Oak Electric Power Line	Calhoun County, WV	For serving Columbia Gas' proposed White Oak Compressor Station, Mon Power proposes to install 1,400 feet of new power line, convert a 7.5-mile-long segment of single phase power line to 3-phase, convert a 2.9-mile segment of 2-phase power line to 3-phase, and potentially upgrade another 2.6 miles of existing 3-phase. Non-jurisdictional facility for MXP.	Construction anticipated to begin while the White Oak Compressor Station is under construction.	Delivers electricity to Columbia Gas' proposed White Oak Compressor Station at approximate MP 82.2.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
MXP-100 tie-in with LEX Power Line	Marshall County	Installation of approximately 340 feet of new single phase power line, which would require an approximately 30-foot-wide right-of-way in order to service the proposed MXP-100 pipeline tie-in with LEX. Non-jurisdictional facility for the MXP.	Initial planning phase with local electrical service provider.	Delivers electricity to Columbia Gas' proposed MXP-100 tie-in with LEX at MP 0.0.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
MXP-200 tie-in with Line 1983 Power Line	Doddridge County	Installation of approximately 1,500 feet of new single phase power line, which would require an approximately 30-foot-wide right-of-way in order to service the proposed MXP-200 pipeline tie-in with Line 1983. Non-jurisdictional facility for the MXP.	Initial planning phase with local electrical service provider.	Delivers electricity to Columbia Gas' proposed MXP-200 tie-in with Line 1983 at MP 6.0 (MXP-200).	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
Ripley Regulator Station Power Line	Jackson County	Installation of approximately 1,600 feet of new single phase power line, which would require an approximately 30-foot-wide right-of-way in order to service the proposed Ripley Regulator Station. Non-jurisdictional facility for the MXP.	Initial planning phase with local electrical service provider.	Delivers electricity to Columbia Gas' proposed Ripley Regulator Station at approx. MP 124.9.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)

Table 4.13-3
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Non-FERC Energy Projects					
MarkWest Sherwood Gas Processing Facility Expansion **b**/	Doddridge County, WV	MarkWest Energy Partners, cryogenic gas processing plant	Gas processing plant under construction	Approximately 2.3 miles east of MXP MP 49.0 and 2.5 miles northeast of the Sherwood Compressor Station.	Groundwater, Water Resources, Vegetation, Wildlife, Socioeconomics, Air & Noise (operation)
Majorsville, WV, and Clarington, OH, Point of Receipt Facilities **c**/	Marshall County, WV	The locations of the Point of Receipt facilities have not been defined; however, the Majorsville Point of Receipt is planned near the MarkWest Plant, and the other will be located near Clarington, OH.	Estimated construction date of 2016-2017.	Near MXP MP 49.0.	Socioeconomics
Moundsville Power Plant **d**/	Marshall County, WV	Moundsville Power, LLC proposes to construct a 549-megawatt natural-gas-powered electrical generating plant in Marshall County, WV (located approximately 3 miles south of Moundsville, between the Ohio River, SR 2, and the Moundsville Golf Course).	Estimated construction schedule of 2015-2018.	Six miles northwest of MXP MP 0. Approximately 15.0 miles west of the Lone Oak Compressor Station.	Socioeconomics, Air (operation)
Southeast Cabell County Area Improvements Project **e**/	Cabell County, WV	American Electric Power's subsidiary Appalachian Power is planning a new 4-mile-long, 138-kilovolt electric transmission line and a new substation.	Construction kicked off late 2016, with completion at the end of 2017.	Approximately 1.5 miles southeast of MXP MP 162.0.	Groundwater, Water Resources, Vegetation, Wildlife, Socioeconomics
All other Projects (roads, bridges, subdivisions, etc.)					
Putnam Business Park **f**/	Putnam County, WV	Business park for light industrial businesses. Construction will occur in three phases. Located in Putnam County between Kanawha River and Route 35 in Frazier's Bottom.	Utility expansions are currently underway. Construction on Phase I began in spring 2016. Phases II and III will be added as contracts are issued. All major grading completed in 2016.	The MXP would cross the property between MPs 146.7 and 147.9.	Geological Resources, Soils, Groundwater, Water Resources, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)

Table 4.13-3
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Mountaineer XPress Project

Project	Location (County, State)	Description	Status	Location Relative to MXP	Resources with Potential Cumulative Effects
Tanyard Station Plaza g/	Cabell County, WV	Commercial real estate development in Barboursville, WV comprised of 144,000 square feet of retail space, hotels, restaurants, banks, and a gas station. The site is a 50-acre plot at the intersection of U.S. 60 and Big Ben Bowen Highway.	Planned to be open by spring of 2017.	Approximately 2.3 miles north-northwest of the SM80 pipeline replacement.	Socioeconomics
Meighen Bridge Replacement h/	Marshall County, WV	Bridge replacement for County Route 7/4 over Fish Creek; associated with WVDOT District 6.	Construction began in 2016 and is expected to be complete in 2019.	Approximately 1.7 miles west of MXP MP 5.9.	Vegetation, Wildlife, Socioeconomics
Antero Sandstrom Facility i/	Doddridge County, WV	60,000-barrel-per-day advanced wastewater treatment facility that will allow Antero to treat and reuse flowback and produced water rather than using injection wells for permanent disposal.	Planned to be in service by the end of 2017.	Approximately 9.0 miles west of MXP MP 49.4, 8.8 miles west of the Sherwood Compressor Station, and 22.5 miles northeast of the White Oak Compressor Station.	Socioeconomics, Air (operation)
Alexander's Place j/	Putnam County, WV	A major 101-lot, single-family residential subdivision on the north side of Putnam Business Park Drive, County Route 35/29, 0.48 mile southwest of Route 817, Fraziers Bottom, WV. (See Tax Map 162, parcel 95.)	Still in the planning/permitting phases. Construction is not yet scheduled.	About 4.5 miles northwest of MXP MP 146.3.	Socioeconomics

Sources:
a FERC eLibrary, 2016
b Gas Processing News, 2015
c Columbia Gas Transmission, 2016
d Clutter, Crissy, 2016
e West Virginia Transmission Company, 2016
f West Virginia Development Office, 2016
g Tanyard Station, 2016
h West Virginia Division of Highways, 2016
i Antero Resources, 2016
j Dave Hobba Builder, 2016

Table 4.13-4 Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Gulf XPress Project					
Project	**Location (County, State)**	**Description**	**Status**	**Location Relative to GXP**	**Resources with Potential Cumulative Effect**
FERC Jurisdictional Projects					
Broad Run Expansion Project **a/**	Davidson County, TN	FERC-regulated project consisting of compressor station construction and modifications, specifically the impact of Compressor Station 563. (FERC Docket No. CP-15-77)	Construction began in December 2016, with an in-service date of June 2018.	Compressor Station 563 is 24.1 miles northwest of the Cane Ridge Compressor Station site.	Socioeconomics, Air (operation)
Mountaineer XPress Project	Wayne County, WV	Part of the scope includes installing additional compression at the Ceredo Compressor Station (FERC Docket No. CP16-357; analyzed alongside GXP in this DEIS).	Application filed in April 2016; construction to begin second half of 2017; anticipated in-service date is November 1, 2018.	The Ceredo Compressor Station is about 20.5 miles east of the Grayson Compressor Station site.	Air (operation)
Rayne XPress Project **a/**	Carter, Menifee, and Montgomery Counties, KY	FERC-regulated project consisting of the construction and operation of compression facilities, specifically the impacts of the Grayson Compressor Station in Carter County. (FERC Docket No. CP15-539)	FERC Certificate issued January 19, 2017. Construction expected to begin 1st quarter 2017, with an in-service date during 1st quarter of 2018.	The project will establish the Grayson Compressor Station (to be expanded by the GXP).	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (operation)
Non-jurisdictional Projects (related to the GXP)					
Cane Ridge Electric Power Line	Davidson County, TN	Nashville Electric Service to extend new electric line in to Columbia Gulf's proposed Cane Ridge Compressor Station. Non-jurisdictional facility for the GXP.	Early planning phases. Construction of power line would likely begin once the Cane Ridge Compressor Station is under construction.	Approximately 200 feet in length to connect with the compressor station.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
Clifton Junction Electric Power Line	Wayne County, TN	Tennessee Valley Electric Cooperative to extend electric lines for approximately 3,500 feet in to Columbia Gulf's proposed Clifton Junction Compressor Station. Non-jurisdictional facility for the GXP.	Early planning phases. Construction of power line would likely begin once the Clifton Junction Compressor Station is under construction.	Approximately 3,500 feet in length to connect with the compressor station.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)

Table 4.13-4
Past, Present, and Reasonably Foreseeable Future Actions with Potential for Cumulative Impacts when Combined with the Gulf XPress Project

Project	Location (County, State)	Description	Status	Location Relative to GXP	Resources with Potential Cumulative Effect
Goodluck Electric Power Line	Metcalfe County, KY	Tri County Electric Company to extend 380 feet of new electric line in to Columbia Gulf's proposed Goodluck Compressor Station. Non-jurisdictional facility for the GXP.	Early planning phases. Construction of power line would likely begin once the Goodluck Compressor Station is under construction.	Approximately 380 feet in length to serve compressor station.	Soils, Vegetation, Wildlife, Land Use, Visual, Socioeconomics, Air & Noise (construction)
All other Projects (roads, bridges, subdivisions, etc.)					
Phase 2 of the Delvin Downs Residential Development **b**/	Davidson County, TN	Additional 27 single-family housing lots to an existing residential subdivision on 9.3 acres.	Major land disturbing impacts complete. Area was graded, streets and curbs installed in 2016. All homes will likely be sold/constructed before GXP begins construction.	Adjacent to the Cane Ridge Compressor Station site.	Land Use, Socioeconomics, Noise (construction)
New County Jail **c**/	Rowan County, KY	Construction of a new 292-bed correctional facility	Currently under construction and expected to be complete in early 2018.	Three miles southeast of the Morehead Compressor Station site.	Socioeconomics
Nashville International Airport Improvements **b**/	Davidson County, TN	Approximately $30 million worth of upgrades to airport facilities.	Under construction. Improvements will continue through 2021.	Six miles north of Cane Ridge Compressor Station site.	Socioeconomics
Morehead State University Improvements **d**/	Rowan County, KY	$300 million in upgrades to existing facilities and construction of new facilities between 2016 and 2020. All upgrades to take place on campus and university-owned land.	Construction kicked-off in 2016 and will be complete in 2020.	Approximately 3.5 miles southeast of the Morehead Compressor Station site.	Socioeconomics
Kentucky State Route 32 Reconstruction **e**/	Rowan County, KY	Reconstruction of Kentucky SR 32 between Ellicottville and Kentucky SR 7.	Plan approved in 2013. No further updates.	Eleven miles east of the Morehead Compressor Station site.	Socioeconomics
Antioch Mixed Use Development **f**/	Davidson County, TN	300 acres mixed-use development including medical offices, commercial use, and general office use.	Construction has begun on this multi-phase project. Completion date is unknown.	Two miles northeast of the Cane Ridge Compressor Station site.	Socioeconomics

Sources:
a FERC eLibrary, 2016.
b The Tennessean, 2016a.
c Rowan County, 2016a.
d Rowan County, 2016b.
e Rowan County, 2016c.
f The Tennessean, 2016b.

4.13.2 Potential Cumulative Impacts of the Proposed Actions

In the following analysis, we discuss the potential cumulative impacts associated with the MXP and the GXP in conjunction with the other projects listed in tables 4.13-2, 4.13-3, and 4.13-4.

4.13.2.1 Geological Resources

Construction of the MXP and GXP would require excavation within the project areas, resulting in minor and temporary impacts on geological resources. For the MXP or GXP to contribute to a cumulative impact on geological resources, other projects/actions would need to also involve excavation or significant grading in an area that overlaps or directly abuts the active construction footprint of MXP or GXP (geographic scope) and within the same timeframe (temporal scope).

4.13.2.1.1 Mountaineer XPress Project

The MXP facilities are expected to have a temporary, but direct, impact on near-surface geologic resources. Other projects that require significant excavation would also have temporary, direct impacts on near-surface geologic resources. Because the direct effects of the MXP would be highly localized, cumulative impacts would only be expected if other projects were constructed immediately adjacent to or within the footprint of the MXP.

The main impacts of the MXP on geological resources would result from excavations on steep slopes (areas that are highly susceptible to landslides) and in areas with existing mineral resources (mines, quarries, or oil and gas wells). However, as discussed in section 4.1.5.1, impacts from the MXP on geological conditions are anticipated to be minor and temporary, lasting only during construction.

The following projects listed in tables 4.13-2 and 4.13-3 have potential to result in a cumulative impact on geological resources when combined with minor geological resource impacts resulting from construction of the MXP:

- MarkWest Pipeline where it intersects the MXP MP 50.7 at the Sherwood Compressor Station;
- Putnam Business Park construction near MXP MP 147;
- Rover Pipeline Project where it intersects the MXP at MP 48; and
- Construction of newly permitted oil and gas wells within 0.25 mile of the MXP.

Of the three projects, both the Rover Pipeline Project and MarkWest Pipeline would involve overlapping construction in an area potentially prone to geologic impact. The worst case would be for the two rights-of-way to intersect on a ridgeline with steep slopes on either side. While some level of cumulative impact is likely in this scenario, we would expect it to be limited to a relatively small area and therefore subject to close monitoring. Further, because both the Rover Pipeline Project and the MXP are regulated by the Commission, both would be required to adhere to strict construction standards and robust mitigation (e.g., see our discussion, including

our recommendation, in section 4.1). The MarkWest Pipeline would be held to similar standards for construction of linear facilities on steep slopes through its stormwater permit issued by WVDEP – Division of Water and Waste Management.

Overall, the MXP would result in temporary and minor impacts on existing geological conditions and would not have a significant contribution towards cumulative impact from other past, present, and reasonably foreseeable future projects and actions on geological resources. Ground-disturbing impacts associated with the other projects listed in tables 4.13-2 and 4.13-3 would be highly localized and limited to these projects' footprints. Only the MarkWest Pipeline has the likelihood of sharing a geographic and temporal footprint with the MXP. In the area where the MarkWest Pipeline would connect to the proposed Sherwood Compressor Station, the topography is relatively flat, minimizing the potential for cumulative impact on geological resources.

Although the other two projects may have abutting footprints with the MXP, for the MXP to contribute to a cumulative impact on geological resources, construction would need to occur within the same timeframe as these other projects. As currently scheduled, the Rover Pipeline Project's active construction would be completed prior to the start of MXP construction. However, even if the schedules were to overlap, any cumulative effect would be minimal, given the limited intersection of the Rover Project and the MXP, and the FERC-required minimization measures that would be applied to both. Earth moving and any other below-grade construction activities associated with the Putnam Business Park have occurred in a relatively level area and were completed for Phase I in 2016. There are 11 acres of developable property surrounding the MXP MLV-10, which at some point in the future, could undergo construction. These 11 acres have steeper terrain; however, similar to the Phase I areas, this location was previously graded/leveled; therefore, it is unlikely that the MXP would contribute to a cumulative impact on geological resources in this area.

4.13.2.1.2 Gulf XPress Project

Impacts from the GXP on geological conditions are anticipated to be localized to the project footprint, minor, temporary, and sustained only during construction. No other past, present, or reasonably foreseeable future projects listed in table 4.13-3 share the geographic and/or temporal scope for cumulative impact on geologic resources with the GXP. Therefore, the GXP would not contribute to cumulative impact on geologic resources.

4.13.2.2 Soils

The MXP and GXP would require grading during construction, which would leave exposed soils vulnerable to erosion and sedimentation. For the MXP or GXP to contribute to cumulative impact on soils, other projects/actions would need to also result in soil exposure within an area that overlaps or directly abuts the active construction footprint (geographic scope) and occurs within the same timeframe (temporal scope) that soils would be exposed. For the MXP, we expanded the geographic scope to 0.25 mile due to steep topography and the potential for some off-right-of-way impacts (e.g., from erosion or run-off).

4.13.2.2.1 Mountaineer XPress Project

Cumulative impact on soils associated with the MXP would be limited primarily to the combined impacts of earth-disturbing projects located within the same geographic scope but also up to 0.25 mile away within the same HUC-12 subwatershed. The temporal scope for cumulative impact on soils is limited to a window of construction occurring the same time as MXP or construction recently completed (with final stabilization not yet achieved). While the MXP facilities would have direct impacts on soil resources, the impacts would be minor, localized, and temporary, limited primarily to the period of construction (see our discussion in section 4.2.12.1). The following projects listed in tables 4.13-2 and 4.13-3 have potential to result in a cumulative impact on soils when combined with the minor impacts on soil resources resulting from construction of the MXP:

- MarkWest Pipeline;
- White Oak Electric Power Line;
- Putnam Business Park construction near MXP MP 147;
- Rover Pipeline Project where it intersects MXP at MP 48;
- MXP-100 tie-in with LEX Power Line;
- MXP-200 tie-in with Line 1983;
- Ripley Regulatory Station Power Line; and
- Construction of newly permitted oil and gas wells.

These projects may share the same geographic and temporal scope of the MXP. The above-listed projects also would likely require excavation and grading and thus result in temporary, direct impacts on soils. Like the MXP, the duration and effect of impacts on soils from these projects would be minimized by the implementation of erosion controls and restoration measures such as seeding and or planting of vegetation that could establish itself quickly.

Thus, construction of other projects in table 4.13-3, in conjunction with the MXP, could contribute to cumulative impacts on soil resources, but this would be avoided or minimized by Columbia Gas' implementation of its ECS and additional mitigation measures when required by state or federal jurisdictions. Our third-party monitors would be in the field, monitoring active construction on a continuous basis. Additionally, we would regularly inspect the project area, both during and following construction, to verify that erosion and sediment controls were implemented. Similar protocols would be in place for the FERC-jurisdictional Rover Project.

In areas where construction of the other projects occurs concurrently with the MXP, and within the same geographic scope, impacts on soils are anticipated to be minor and temporary during project construction and not anticipated to contribute to long-term or significant impacts (assuming adequate erosion controls and containment measures are implemented on the non-FERC-regulated projects). Impacts also would be minimized assuming mitigation measures are implemented to achieve adequate restoration of disturbed areas. We anticipate that construction and restoration activities as well as operation and maintenance activities for non-FERC-regulated projects would be monitored throughout the process to verify compliance with local and state

erosion control and restoration requirements. Consequently, any contribution to a cumulative impact on soil resources from the MXP would likely be minor, temporary, and limited to construction activities only.

4.13.2.2.2 Gulf XPress Project

The GXP would likely result in negligible cumulative impact on soil resources when combined with soil impacts from construction of the following projects (listed in table 4.13-3):

- Goodluck Electric Power Line;
- Cane Ridge Electric Power Line;
- Clifton Junction Electric Power Line; and
- RXP (at the Grayson Compressor Station).

Minimal impacts on soil resources are expected from construction and operation of the GXP and its non-jurisdictional facilities. Additionally, the initial construction of the Grayson Compressor Station, proposed under the RXP, would be held to the same level of erosion and sedimentation control standards as the GXP. Application of the measures included in Columbia Gulf's ECS, which would also be applied to the RXP, would minimize the duration and severity of cumulative impact on soils. Additionally, we would regularly visit the project area, both during and following construction, to verify that erosion and sediment controls were implemented. Therefore, the GXP would not have a significant contribution to cumulative soil impacts associated with other past, present, and reasonably foreseeable projects.

4.13.2.3 Water Resources

For the MXP or GXP to contribute to a cumulative impact on groundwater, surface water, wetlands, or aquatic resources, other unrelated projects/actions also must result in impacts on those water resources within the same geographic and temporal scopes. For the MXP, the water resources geographic scope is the HUC-12 subwatershed where the pipeline facilities associated with the MXP would be installed. Operation of the MXP pipelines would not result in a permanent impact on water resources. Also, neither the MXP nor the GXP would contribute to a cumulative impact on water resources during construction or operation of aboveground facilities.

4.13.2.3.1 Mountaineer XPress Project

Table 4.13-5, lists the HUC-12 subwatersheds crossed by the proposed MXP pipelines and aboveground facilities. It also provides the location by milepost, number of perennial streams crossed by the MXP within the subwatershed, and lists other past, present, or reasonably foreseeable future projects analyzed in this cumulative impacts analysis which also occur within the subwatershed.

Table 4.13-5
HUC-12 Subwatersheds Traversed by the MXP Pipelines and Aboveground Facilities

Subwatershed	HUC-12 Code	Starting Milepost	Ending Milepost	Number of Perennial Streams Crossed	Other Projects within subwatershed a\	Within same Temporal Scope as the MXP?
MXP-100						
Lower Fish Creek	050301061105	0.0	1.5	1	• LXP, • MXP-100 tie-in with LEX Power Line, • Monroe to Cornwell Project	Yes Yes No
Middle Fish Creek	050301061104	1.5	2.0	5	• Appalachian Gateway Project	No
		2.2	7.5			
		8.0	8.3			
Grave Creek	050301060802	2.0	2.2	0	---	---
Lynn Camp Run	050301061103	7.5	8.0	2	---	---
		8.3	15.4			
Little Fishing Creek	050302010205	15.4	20.3	2	• Ohio Valley Connector Project	No
Upper Fishing Creek	050302010204	20.3	32.3	3	• Supply Header Project	Yes
Indian Creek	050302010501	32.3	36.4	3		
Outlet McElroy Creek	050302010303	36.4	37.4	2		
		40.1	40.4			
Headwaters McElroy Creek	050302010301	37.4	40.1	1	---	---
		40.4	41.5			
Flint Run	050302010302	41.5	45.3	2	• Supply Header Project	Yes
Buckeye Creek	050302010402	45.3	49.1	1	• Rover Pipeline Project	Yes
Nutter Fork-Middle Island Creek	050302010404	52.8	55.1	1	• MarkWest Sherwood Processing Facility Expansion • Mark West Pipeline	No Yes
Arnold Creek	050302010405	55.1	57.5	0	---	---
White Oak Creek-South Fork Hughes River	050302031002	57.5	60.7	1	---	---
Middle Fork	050302031001	60.7	61.0	1	---	---
		62.1	62.7			
		63.0	64.4			

Table 4.13-5 HUC-12 Subwatersheds Traversed by the MXP Pipelines and Aboveground Facilities						
Subwatershed	**HUC-12 Code**	**Starting Milepost**	**Ending Milepost**	**Number of Perennial Streams Crossed**	**Other Projects within subwatershed a**	**Within same Temporal Scope as the MXP?**
		64.9	65.7			
White Oak Creek-South Fork Hughes River	050302031002	61.0	62.1	0	---	---
		62.7	63.0			
		64.4	64.9			
Slab Creek-South Fork Hughes River	050302031004	65.7	71.8	2	---	---
Grass Run-South Fork Hughes River	050302031008	71.8	78.3	6	---	---
		80.2	81.5			
Leatherbark Creek	050302031006	78.3	80.2	1	---	---
Cole Run-Leading Creek	050302031206 **b**	81.5	86.6	3	---	---
Macfarlan Creek – South Fork Hughes River	050302020603 **b**	82.3	82.3	1	---	---
Straight Creek-Little Kanawha River	050302031207	86.6	92.6	5	---	---
		92.7	92.9			
Lee Creek-Little Kanawha River	050302031210	92.6	92.7	1	---	---
		92.9	95.2			
Spring Creek	050302030702	95.2	99.2	5	---	---
Reedy Creek	050302030803	99.2	101.8	2	---	---
		102.3	102.6			
Left Fork Reedy Creek	050302030801	101.8	102.3	4	---	---
		102.6	108.6			
Little Mill Creek	050302020601	108.6	116.2	2	---	---
Elk Fork	050302020602	116.2	120.1	5	---	---
Tug Fork	050302020604	120.1	122.8	1	---	---
Grasslick Creek	050302020603 **c/**	122.8	126.4	1	• Ripley Regulator Station Power Line	Yes
Parchment Creek	050302020606	126.4	129.1	1	---	---
Headwater Thirteenmile Creek	050500080501	129.1	131.6	3	---	---
Outlet Thirteenmile Creek	050500080502	131.6	134.7	2	---	---

Table 4.13-5
HUC-12 Subwatersheds Traversed by the MXP Pipelines and Aboveground Facilities

Subwatershed	HUC-12 Code	Starting Milepost	Ending Milepost	Number of Perennial Streams Crossed	Other Projects within subwatershed a\	Within same Temporal Scope as the MXP?
Outlet Eighteen Mile Creek	050500080402	134.7	143.7	12	---	---
Buffalo Creek- Kanawha River	050500080308	143.7	147.7	6	• Putnam Business Park	No
Hurricane Creek	050500080306	147.7	148.9	3	---	---
		149.5	149.6			
		152.8	155.9			
Five and Twenty Mile Creek	050500080307	148.9	149.5	0	---	---
		149.6	152.8			
Mud Creek- Mud River	050701020307	155.9	162.1	4	---	---
Charley Creek- Mud River	050701020306	162.1	164.5	1	• Southeast Cabell County Area Improvements Project	Yes
MXP-200						
Meathouse Fork	050302010403 **d/**	0.0	6.0	3	• MarkWest Sherwood Processing Facility Expansion • Mark West Pipeline • MXP-200 tie-in with Line 1983	No Yes Yes
Toms Fork	050302010401	3.2	4.6	1	---	---
X59M1 Line						
Grasslick Creek	050302020603	0.0	0.1	0	---	---
SM80 Line Replacement						
Smith Creek – Guyandotte River	050701020402	21.0	21.2	0	---	---
SM80 Loop Line Replacement						
Davis Creek – Guyandotte River	050701020403	20.6	20.8	0	---	---
Lone Oak Compressor Station						
Upper Wheeling Creek	050301060601	n/a	n/a	0	---	---
Middle Grave Creek	050301060801	n/a	n/a	0	---	---
Ceredo Compressor Station						
Lower Twelvepole Creek	050901020305	n/a	n/a	0	---	---

Table 4.13-5
HUC-12 Subwatersheds Traversed by the MXP Pipelines and Aboveground Facilities

Subwatershed	HUC-12 Code	Starting Milepost	Ending Milepost	Number of Perennial Streams Crossed	Other Projects within subwatershed a\	Within same Temporal Scope as the MXP?
Elk River Compressor Station						
Morris Creek – Elk River	050500070906	n/a	n/a	0	---	---

a. Oil and gas wells identified in table 4.13-2 are not included in this table, but those within 0.25 mile of the MXP are considered in our text analysis.
b. White Oak Compressor Station is included within this subwatershed.
c. Mount Olive Compressor Station is included within this subwatershed.
d. Combined (MXP-100 + MXP-200) perennial stream crossings within the Meathouse Fork subwatershed are listed under MXP-200

n/a – not applicable
(---) in a cell means none identified

As listed above, in addition to any newly permitted oil or gas wells present within each HUC-12 subwatershed, there are 12 other past, present, or reasonably foreseeable future actions/projects are located within the same HUC-12 subwatershed as portions of MXP that would involve ground disturbance or excavation; therefore, they could result in cumulative impacts on groundwater, surface water, wetlands, and/or other aquatic resources. Further, there are nine subwatersheds that have more than one other project that has, is, or will be occurring within the same temporal scope as the MXP. The 12 past, present, or reasonably foreseeable future actions/projects that also occur in subwatersheds crossed by the MXP include:

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Monroe to Cornwell Project (in the area of the MXP MP 0.8);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- Supply Header Project (where it parallels five miles east of the MXP between MP 25.0 – 50.0);
- MarkWest Pipeline;
- MarkWest Sherwood Processing Facility Expansion;
- MXP-100 tie-in with LEX Power Line;
- MXP-200 tie-in with Line 1983;
- Ripley Regulatory Station Power Line; and
- Putnam Business Park (near MXP MP 146.7 – 147.9).

Groundwater

Impact on groundwater associated with the MXP could occur from the clearing of vegetation, excavation of the pipeline trench and facility foundations, blasting, dewatering of the trench and bore pits, soil mixing and compaction, and hazardous material handling. These impacts would be minimized through the implementation of erosion controls, topsoil segregation, measures to avoid or reduce soil compaction, and revegetation of all disturbed areas contained in Columbia Gas' ESC, as well as through the implementation of measures outlined in Columbia Gas' SPCC Plan and Blasting Plan.

The above-listed projects would result in temporary impacts on groundwater through the processes of excavation, blasting, temporary and permanent removal of vegetation, and any deep drilling operations, and due to being within the defined geographic scope for groundwater, were considered for cumulative impact with the MXP. However, construction of the Appalachian Gateway, Ohio Valley Connector, Monroe to Cornwell, and Putnam Business Park Projects was completed in 2016; therefore, they are outside the temporal scope for cumulative impacts on groundwater when combined with the MXP. The MarkWest Gas Processing Facility Expansion Project will be completed prior to construction beginning on the MXP, so for the same reasons as

above, it is unlikely that MXP, when combined with the facility expansion, would result in a cumulative impact on groundwater.

Depending on the timing for construction of the other remaining projects in the list above, there is a likely potential for the MXP, when combined with these other projects, to contribute to a minor cumulative impact on groundwater due to excavations, possible blasting, and the permanent removal of mature vegetation within the same HUC-12 subwatershed. Impacts on groundwater from these projects, individually and cumulatively, would not be significant because construction activities (including water withdrawals for hydrostatic testing or other uses) are expected to be conducted in accordance with all applicable state, federal, and local permit requirements. As a result, the MXP would only have a temporary and minor contribution to overall cumulative impacts combined with other past, present, and reasonably foreseeable future projects and actions on groundwater resources.

Surface Water

Construction and operation of the MXP would mainly result in only short-term impacts on surface water resources (see section 4.3). These impacts, such as increased turbidity, would return to baseline levels over a period of days or weeks following construction. Longer-term impacts could also occur until adjacent disturbed areas are stabilized through revegetation. Columbia Gas would minimize these effects by implementing specific waterbody construction and mitigation measures, including temporary and permanent erosion controls contained in its ESC, SPCC Plan, HDD Contingency Plan, and Unanticipated Discovery of Contaminants Plan, and by complying with applicable federal and state permits requirements.

As described above (groundwater), there are eight projects within the geographic scope (HUC-12 subwatershed) of the MXP with the likelihood also to occur within the same temporal scope, meaning a cumulative impact on surface waters could occur from one or more of these projects. Also, any recently constructed or reasonably foreseeable future oil or gas wells that may occur within the same HUC-12 subwatershed, combined with the MXP, would result in cumulative impact on surface waters. However, the MXP is most likely to contribute to a cumulative impact on surface water when combined with the Rover Pipeline Project or the LXP. If the Rover Pipeline Project is still under construction around the same time as the MXP at MP 48.0, there would be minor cumulative impact on surface waters in this area, specifically to Buckeye Creek, which is less than a mile from this intersection of the two projects. Buckeye Creek (at MP 48.7) is classified as a high quality water (for trout stocking). If the LXP and MXP are constructed within the same temporal scope within the area of MP 0.0, there would be minor cumulative impact on nearby surface waters as well; although no streams in this area are known to hold a special designation. Additionally, construction of any non-jurisdictional powerlines to MXP facilities would result in impacts on waters within the same HUC-12 subwatersheds.

The above-listed projects would individually result in temporary impacts on surface water mostly through the linear construction activities across streams and temporary erosion and sedimentation of exposed soils. For these reasons, we anticipate that the MXP, when combined with these other projects, would only have a minor and temporary contribution to an overall minor short-term cumulative impact on surface waters.

Wetlands

Impact on wetlands resulting from construction of the MXP would be generally localized and short-term (see discussion in section 4.4.2). The 12 other projects listed above could be required by the terms and conditions of their respective CWA section 404 authorization and state permits to provide compensatory mitigation for unavoidable wetland impacts. These other projects would take steps to avoid and minimize wetland impacts through implementing a wetland construction plan, mitigation measures, and BMPs, resulting in only minor impacts on wetlands.

Of the 7.5 acres of wetlands affected by construction of the MXP, only 0.5 acre are PSS and 0.5 acre are PFO wetlands. Only 0.2 acre of PFO would be permanently maintained as part of the pipeline right-of-way. The remaining 0.3 acre would be allowed to return to forested vegetation, although reforestation would likely take over 25 years. Because Columbia Gas would implement its ESC and SPCC Plan, restore forested and scrub-shrub wetlands to pre-construction conditions within temporary workspaces, and provide compensatory mitigation for unavoidable impacts on wetlands, we conclude that the impact on wetlands from the MXP would only have a minor contribution to overall minor and temporary cumulative impacts on wetlands when combined with the other 12 projects. As with surface water impacts, the greatest possibility of the MXP contributing to even a minor cumulative impact on wetlands is in combination with either the LXP or Rover Pipeline Projects. All FERC-regulated natural gas projects are held to similar robust standards for construction at wetlands and waterbodies, erosion control, and measures for avoiding, containing, and cleanup of hazardous materials. The non-FERC-regulated projects also would be expected to conform with state and local NPDES requirements, at a minimum. Therefore, any cumulative impacts on water resources are expected to be minor.

4.13.2.3.2 Gulf XPress Project

No past, present, or reasonably foreseeable future project have been identified that could contribute to an impact on water resources within the same geographic and temporal scope as the GXP.

4.13.2.4 Vegetation and Wildlife

Construction activities associated with the MXP and GXP would result in temporary and permanent impacts on vegetation and temporary impacts on wildlife. The geographic scope for analyzing a cumulative impact on vegetation and wildlife is 2 miles from the project area for MXP and 0.5 mile for GXP. For the MXP or GXP to contribute to a cumulative impact on vegetation and wildlife, other projects/actions within the appropriate geographic scope would need to also result in impacts on vegetation and wildlife. The temporal scope considered for both projects is from the start of construction activities through 1 year after operation begins when herbaceous vegetation should have become completely reestablished. Shrubs and smaller woody vegetation could take up to about 5 years to recover once stabilization has been achieved; mature forests within temporary workspaces would take much longer to approach preconstruction conditions (20 - 50 years). Also, highly transient wildlife, such as deer, are expected to return to the project areas shortly after construction is completed, in which case 1 year is a conservative estimate for analyzing the temporal scope of cumulative impacts on wildlife.

4.13.2.4.1 Mountaineer XPress Project

The following 17 past, present, and/or reasonably foreseeable future projects are within 2 miles of proposed MXP facilities and may involve construction activities that directly or indirectly affect vegetation and wildlife:

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Utica Access Project (in the vicinity of the MXP Elk River Compressor Station);
- Monroe to Cornwell Project (in the area of the MXP MP 0.8);
- SM80 MAOP Restoration Project (in the vicinity of the MXP Ceredo Compressor Station);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- WBX (Elk River Compressor Station);
- MarkWest Pipeline;
- White Oak Electric Power Line;
- Meighen Bridge Replacement;
- MXP-100 tie-in with LEX Power Line;
- MXP-200 tie-in with Line 1983;
- Ripley Regulatory Station Power Line;
- Sherwood Processing Facility Expansion;
- Southeast Cabell County Area Improvements Project; and
- Putnam Business Park (near MXP MP 146.7 – 147.9).

In addition to the other projects listed above, any existing active or newly permitted oil or gas wells present within 2 miles of the MXP, would contribute towards cumulative impacts on vegetation and wildlife. The construction activities associated with clearing, grading, removal of vegetation, and the potential for the establishment of invasive plant species occurring during the same geographic and temporal scope can result in cumulative impacts. In addition, changes in these environments can also cause alteration of wildlife habitat, displacement of wildlife, and other secondary effects such as forest fragmentation. To account for both direct and indirect effects of the MXP, the geographic scope includes a 2-mile buffer around the pipelines and related facilities. Much of the impact on vegetation from the MXP would be temporary impacts on herbaceous vegetation. However, there would be long-term impacts on almost 800 acres of forested uplands.

Vegetation

The major upland vegetation cover types affected by the MXP include agricultural lands, open lands, and forest. Throughout construction and operation of the MXP, Columbia Gas would

abide by its ECS to minimize impacts on vegetation resources. Columbia Gas' ECS is based off FERC's Plan and Procedures; and it takes into account the Commission's approved methods for revegetation of areas disturbed during construction. However, as noted in section 4.5.6.1, we concluded that impacts on upland forests, specifically large CFAs, would be significant.

While construction of most of the projects listed above would likely be complete before the construction of the MXP commences; they, along with the MXP would result in both long term and permanent impacts on vegetation as cleared forested areas in temporary workspaces would take perhaps 20 to 50 years or more to recover and wooded areas within the facility footprints would remain cleared for the lifetime of the facility. Because the long-term recovery time for mature forests to regrow within temporary workspaces, and due to the permanent removal of mature forest areas within CFAs, all the 14 projects listed above would be constructed within the same temporal scope for cumulative impact on vegetation as the MXP. The acreage of forest that has been cleared and would likely be cleared for the development of future wells could be considered significant. Likewise, we concluded that the proposed MXP would also result in a significant impact on core forest areas; which would mean the MXP's contribution towards cumulative impacts on core forest areas would also be considered significant. There is currently no federal or state regulation that limits forest clearing in West Virginia.

The following is the estimated upland forest impacts from some of the other FERC-jurisdictional projects within the MXP geographic scope. Because these other projects are FERC-regulated projects, we have used a 150-foot-wide construction corridor to conservatively cover any TWS, ATWS, or access roads that also could occur within the geographic scope of MXP:

- Appalachian Gateway Project – 65 acres
- Ohio Valley Connector Project – 72 acres
- Utica Access Project – 70 acres
- Monroe to Cornwell Project – 13 acres
- Rover Pipeline Project – 70 acres
- Leach XPress Project – 55 acres
- WB XPress Project – N/A because the land that would be cleared would not change.

Ultimately, the other FERC-jurisdictional project affected upland forests within the same geographic scope as the MXP, would not contribute significantly towards cumulative impacts within the same geographic scope (2-mile radius of MXP). Forest clearing from past, present, and reasonably foreseeable future oil and gas wells, however, could contribute significantly towards cumulative impacts on forested areas.

Wildlife

Similar to vegetation, cumulative effects to wildlife would occur where projects are constructed in the same general time frame and proximity, which could represent permanent or

long-term loss of habitat types important to wildlife. Impacts on wildlife resources are related to vegetation, as a loss of vegetation results in the alteration of available habitat and ecosystem structure, which results in the temporary or permanent displacement of wildlife, increased population stress, predation, and mortality of some individuals (see discussion in section 4.6.1.1.1). Columbia Gas would reduce the potential for impacts on wildlife and wildlife habitat from the MXP by minimizing the amount of forested land that would be permanently maintained as rights-of-way, and facilitating successful revegetation. By allowing riparian areas to permanently revegetate across the pipeline rights-of-way at each waterbody crossing, except for a 10-foot-wide corridor centered over the pipeline that would be maintained in an herbaceous state, Columbia Gas would be reducing long-term impacts to the wildlife that rely on riparian area habitats. Further, Columbia Gas would install escape ramps about every 50 feet within the excavated trench to provide a wildlife exit.

Impacts on wildlife resources as a result of the 17 projects listed above, and any existing active or newly permitted oil or gas wells present within 2 miles of the MXP, would be similar to those associated with the MXP, including temporary displacement and stress on individuals during construction and long-term impacts as a result of the permanent alteration of the landscape, and available habitat, edge effects, and fragmentation of large core forest habitat areas. The pipeline projects that cross through the same subwatershed as the MXP are expected to have similar short-term disturbances on aquatic wildlife, and similar short- and long-term impacts on terrestrial wildlife as a result of maintaining permanent rights-of-way. Potential impacts by other projects on migratory birds would be similar to those described for the MXP. Impacts would include the temporary loss of habitat during initial clearing, prolonged loss of habitat due to the long recovery time for trees to become reestablished in disturbed areas, and the long-term loss of habitat as a result of ongoing maintenance activities. Construction of the Putnam Business Park and Sherwood Processing Facility would include temporary, construction-related impacts, and long-term or permanent displacement of wildlife as a result of the permanent structures and change in land use.

Impacts on large CFAs, particularly those within the temporary and permanent footprints of the Appalachian Gateway, Ohio Valley Connector, Utica Access, Monroe to Cornwell, Rover Pipeline, LXP, and the WBX Projects, where CFAs are large enough to provide suitable habitat for the cerulean warbler and other forest-dependent migratory birds, that are also classified as Priority 1 species in the SWAP, could be significant on suitable habitat due to cumulative forest fragmentation. We have recommended Columbia Gas prepare a Migratory Bird Plan and consider special mitigation measures for minimizing impacts on large CFAs in the MXP area.

The other FERC-regulated projects listed in table 4.13-3 would be required to implement similar measures and restrictions as the MXP to minimize impacts on wildlife and wildlife habitat. In addition, we expect that any projects constructed in the MXP area would be required to restore some vegetation cover to disturbed areas unless they are covered by buildings or impervious surfaces. Once construction is completed and the area is restored, most wildlife displaced during construction of any of the projects would return to the newly disturbed areas and adjacent, undisturbed habitats. However, we are still evaluating the significance of the MXP on large CFAs that are considered suitable habitat for the cerulean warbler. Without implementation of a Migratory Bird Plan and without special mitigation measures within cerulean warbler habitat, impacts on these habitat areas by MXP in combination with other projects listed above, could be significant.

4.13.2.4.2 Gulf XPress Project

Construction of the GXP would result in impacts on about 191 acres of vegetated lands. This total includes about 163 acres of agricultural land, 17 acres of forested land, and 9 acres of open land. The primary impact from construction and operation would be on agricultural land. Impacts on forested and non-forested vegetation types would be minor, and mitigated through adherence to the measures described in Columbia Gulf's ECS.

There are four past, present, and/or reasonably foreseeable future projects located less than 0.5 mile from proposed GXP facilities that may involve construction activities that directly or indirectly affect vegetation and wildlife: the Grayson Compressor Station associated with the RXP, and three GXP non-jurisdictional power lines (Goodluck, Cane Ridge, and Clifton Junction Compressor Stations power lines). The GXP Grayson Compressor Station modifications would be constructed on a site that would have been previously disturbed by the RXP. The cumulative impact on vegetation and wildlife from the addition of a compressor unit on a previously disturbed area at the approved Grayson Compressor Station, as proposed under GXP, would be negligible.

The new non-jurisdictional power lines for Goodluck, Cane Ridge, and Clifton Junction Compressor Stations would be relatively short at 380 feet, 200 feet, and 3,500 feet, respectively. We anticipate the non-jurisdictional power lines to be sited so that they would require the least amount of tree-clearing as possible while still maintaining a reasonably direct route. Taking into account the short length of the three non-jurisdictional power lines, the minimal tree clearing required for the construction of the compressor stations, and the short duration for construction, cumulative impacts on vegetation and wildlife from the GXP combined with those from the non-jurisdictional power lines, would be noticeable but minor.

4.13.2.5 Threatened and Endangered Species and Other Special Status Species

The species discussed in section 4.7 could potentially be affected by construction and/or operation of other past, present, and reasonably foreseeable future projects occurring within the same area as the MXP and the GXP. Prior to construction, Columbia Gas and Columbia Gulf, and all projects that have a federal nexus (i.e., receive federal funding or are subject to federal permitting) are required under the ESA to consult with appropriate federal, state, and local agencies to evaluate the types of species that may be found in the area of the projects, identify potential impacts from construction and operation of the projects to any species identified, and implement measures to avoid, minimize, or mitigate impacts on special status species and their habitat. Projects that do not have a federal nexus are also required to comply with the ESA; however, review of these projects is covered under section 10 of the ESA. These projects may not harm or otherwise take a federally listed species unless the project proponent has an incidental take permit issued by the USFWS. Regarding critical habitat, however, private landowners who take actions on their land that do not have a federal nexus are not required to obtain a permit.

Under the ESA, cumulative effects to federally listed species and critical habitat only take into account the effects of future state or private projects, not federal activities that are reasonably expected to occur within the project action area. Cumulative effects, under the ESA, are considered in the agency consultation and effect determinations, and in the development of appropriate mitigation. A project can only be authorized for construction if it complies with

section 7 of the ESA, meaning that any impacts (direct, indirect, or cumulative) would not threaten the continued existence of any federally listed species.

4.13.2.5.1 Mountaineer XPress Project

Habitat and population assessments are still ongoing for some identified species within the MXP project area. West Virginia has no state endangered species legislation; therefore, the only species listed as threatened or endangered in the state are those listed as such by the federal government. Therefore, no contribution to cumulative impacts on state-listed species could occur. However, all native freshwater mussels are protected in West Virginia, in addition to the nine federally listed mussel species known to occur in the state.

The USFWS West Virginia Field Office has been working with Columbia Gas since 2015 to address the MXP's potential impacts on federally listed species and their habitats and to develop AMMs for these resources. In a letter to Columbia Gas dated September 8, 2016, the USFWS acknowledged Columbia Gas' ongoing efforts to avoid or mitigate project impacts on the NLEB and Indiana bat, but in the same letter expressed concerns regarding stream crossings and potential adverse effects to the federally endangered snuffbox and clubshell mussels and their habitat. Columbia Gas is working with the USFWS and state agencies to develop acceptable plans that would avoid or mitigate impacts on USFWS trust resources. If the MXP is approved, Columbia Gas would implement the AMMs or other approved measures to protect federally protected species. Therefore, it is reasonable to assume the MXP would have a USFWS determination of *no effect* or *not likely to adversely affect* federally protected species before construction begins. However, if it is determined that the MXP would adversely affect a federally listed species, FERC will submit a request for formal consultation to comply with section 7 of the ESA. In response, the USFWS would issue a BO as to whether the federal action would likely jeopardize the continued existence of a listed species.

Cumulative impacts on federally listed and other special status species that are discussed in section 4.7 of this EIS could potentially be affected by construction and operation of other projects occurring within the same area as the MXP. Columbia Gas, as well as the other companies who have constructed, are constructing, or are proposing the projects listed in table 4.13-3 are required to consult with the appropriate federal, state, and local agencies to evaluate plant and animal species that may be found in the area of the projects. Additionally, they are required to identify potential impacts from construction and operation of the projects to any special status species identified, and implement measures to avoid, minimize, or mitigate impacts on those species within the MXP area.

Consultation with the USFWS, pursuant to section 7 of the ESA, is ongoing. We expect all other activities (federal, state, and private) would comply with the ESA, thereby also preventing or appropriately minimizing or mitigating for impacts. Consequently, we conclude that the MXP, in combination with the other projects in the geographic scope, would not contribute significantly to cumulative impacts (under NEPA) nor cumulative effects (under the ESA) to federally listed species. Consequently, until consultations on sensitive mussel species are complete, we conclude some of the other projects, in combination with the MXP, could have a minor cumulative impact on sensitive mussel species.

4.13.2.5.2 Gulf XPress Project

Habitat and population assessments are complete for protected species within the GXP project areas. Based on implementation of the MSHCP, surveys completed to date, projected impacts of the GXP, and proposed mitigation measures, consultation with the USFWS resulted in a determination that the GXP would have either *no effect* or would be *not likely to adversely affect* federally listed species. Columbia Gulf and FERC have completed all applicable ESA section 7 consultations for the GXP. As such, the GXP would not contribute to cumulative impacts (under NEPA) nor cumulative effects (under the ESA) to federally listed species.

Similarly, consultations on all state-listed species that could occur within the project vicinity in Kentucky, Tennessee, and Mississippi are complete. Since the GXP is unlikely to impact state-listed species, it is also unlikely that the GXP would contribute to a cumulative impact on state-listed species.

4.13.2.6 Land Use and Special Interest Areas

Impacts on land use or special interest areas would be confined to the construction workspaces and immediate surrounding areas for both the MXP and GXP. Therefore, the geographic scope for assessing potential cumulative impact on land use was 0.5 mile from the project footprints.

4.13.2.6.1 Mountaineer XPress Project

Construction of the MXP would result in land use impacts on forested land, agricultural land, open land, developed land, open water, and wetlands (see discussion in section 4.8.1.1.1). Many of the land use impacts associated with the MXP would be temporary because most of the impacted areas would be allowed to revert to prior uses following construction. An exception would be the conversion of forested land to herbaceous cover or developed land uses within the new permanent easements for the pipelines or at the new aboveground facility sites. Overall, the MXP would convert about 800 acres of forest to maintained pipeline easement or developed land for the life of the project. The MXP would likely contribute to minor cumulative impact on some land use types when combined with the following 14 other projects:

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Utica Access Project (in the vicinity of the MXP Elk River Compressor Station);
- SM80 MAOP Restoration Project (in the vicinity of the MXP Ceredo Compressor Station);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- WBX (Elk River Compressor Station);
- MarkWest Pipeline;
- MXP-100 tie-in with LEX Power Line;

- MXP-200 tie-in with Line 1983;
- Ripley Regulatory Station Power Line;
- White Oak Electric Power Line;
- Putnam Business Park (near MXP MP 146.7 – 147.9); and
- Existing active and newly permitted oil and gas wells.

The linear transmission projects listed above would be expected to have similar impacts on land use as the MXP, especially on forested lands where tree clearing would result in long-term or permanent effects (see section 4.13.2.4.1). The other projects would still impact land uses in the vicinity (within 0.5 mile) of the MXP including short-term impacts during construction.

Aboveground project components, such as buildings and aboveground facilities, would generally have greater long-term impacts on land uses than would the buried pipeline, where most land use activities would be allowed to resume following construction. Therefore, pipeline facilities typically have only temporary impacts on land use. The majority of long-term or permanent impacts on land use are associated with the prohibition of construction of new structures within the pipeline rights-of-way and the permanent change in land use at aboveground features (compressor and meter stations, MLVs). Additionally, the oil and gas wells within 0.5 mile of the MXP have and will continue to affect the landscape of the MXP area. The clearing of trees for well pads and access roads have altered the landuse both by function and viewshed. The MXP's contribution towards cumulative impact on land use, when combined with oil and gas wells, would be noticeable, but not significant.

Areas where the MXP, combined with one or more of the other projects listed above, would most noticeably contribute to a cumulative impact on land use type (other than forested), specifically to landowners and residences within proximity to the MXP, include the Appalachian Gateway and LXP projects. At the MXP MP 5.0, Columbia Gas' pipeline would intersect the Appalachian Gateway Project's pipeline right-of-way, which construction was completed on in 2016. The land use in this immediate area includes approximately 15 acres of agricultural or hayfield. Although landowners were able to maintain this area in its pre-construction use after construction and restoration was achieved on the Appalachian Gateway Project, the land would again be disturbed (less than 2 years after previous disturbances) by the MXP, which could result in a temporary reduction in crop yield or hay production during construction and possibly within the following growing season. At MP 0.0, where MXP will tie in to the LXP near Nixon Ridge, a residential area exists where there are numerous residents who will experience extended construction traffic (discussed further in section 4.13.2.8.1) and an impact on existing land use due to the conversion of agricultural or hayfield to a small fenced-in tie-in facility, which would result in restrictions on the land use inside the fenceline.

There would also be cumulative impacts on existing residential areas due almost entirely to the presence of MXP's construction vehicles making multiple daily trips for extended periods of time within areas that had recently undergone the same disturbance from other projects. These areas include;

- the intersection of the Ohio Valley Connector pipeline with MP 19.05 of the MXP;

- the neighborhood around the Elk River Compressor Station, due to the recent completion of the Utica Access Project less than 0.1 mile away;
- neighborhoods directly east and southeast of the Ceredo Compressor Station, which will also be exposed to heavy duty vehicles during construction of the SM80 MAOP Restoration Project;
- the residents along Englands Run near MXP MP 48.0, who were also exposed to construction vehicles during construction of the Rover Pipeline Project, would again have large trucks and equipment traversing along an access road that comes within about 115 feet of their house for an extended period; and
- areas along the MXP corridor where new and future oil and gas wells would be constructed.

Columbia Gas would compensate landowners for any temporary loss or reduction in crop yield or hay production as a result of the MXP; and, because the other projects affecting agricultural/hayfields on these same projects were FERC-regulated activities, the other companies were or would be held to the same requirement. Additionally, Columbia Gas (as well as the other FERC-regulated projects) would implement its Environmental Complaint Resolution (discussed in 4.8.1.3.1), which provides landowners with simple directions to follow to notify the appropriate company representatives when an issue has been identified. Under these circumstanced, the MXP, when combined with these other projects, would result in a minor contribution to cumulative impacts on land use.

The Putnam Business Park is the one project in this list that has/will result in a more noticeable and permanent change in land use (from open land/agricultural to light industrial business park). However, where the two projects overlap, the MXP would be a maintained pipeline right-of-way and would not result in a new change in land use because no further tree clearing would be necessary within the area. Therefore, in the area of the Putnam Business Park, the MXP's contribution to cumulative impact of land use would be negligible.

Although the MXP would cross within 0.25 mile of several state and local special interest areas, none of the eight projects within the MXP's geographic scope share the same special interest areas; therefore, the MXP would not contribute to a cumulative impact on these areas.

4.13.2.6.2 Gulf XPress Project

The GXP would permanently impact existing land uses by converting about 82 acres of primarily agricultural land to developed land. These impacts on land use from the GXP, when added to the impacts of the RXP (Grayson Compressor Station) and the three non-jurisdictional power lines that would serve Goodluck, Cane Ridge, and Clifton Junction Compressor Stations, which are within the 0.5-mile geographic scope of the GXP, would also affect agricultural land. However, this would not result in significant cumulative impact due to the abundance of agricultural and open land in the surrounding areas, and that farmers are generally compensated for loss of crop production, which is typically limited in scope and duration.

4.13.2.7 Visual Resources

The geographic scope for assessing cumulative impact on visual resources includes the surrounding area (i.e., viewshed) where a new MXP or GXP aboveground facility would be constructed or the immediate area surrounding the pipeline where mature tree clearing would be performed. We considered a distance of approximately 500 feet for this reason; however, that distance could be greater depending on surrounding topography and the scope or extent of the actual viewshed.

4.13.2.7.1 Mountaineer XPress Project

The terrain in the general MXP area is highly mountainous with narrow valleys and extensive tree cover. A visual impact would occur from the pipeline mostly where new tree clearing is required for construction and operation along the right-of-way. The maintained right-of-way would be most noticeable to motorists where the pipeline crosses public roadways and from residences where a natural visual barrier is removed. Depending on the visibility of the surrounding area, the new MXP compressor stations would result in the most noticeable visual impact. When combined with the 12 other projects listed below, the MXP would likely result in a minor contribution towards cumulative visual impacts.

- Appalachian Gateway Project (where it intersects the MXP at MP 5.0);
- Ohio Valley Connector Project (where it intersects the MXP at MP 19.2);
- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- LXP (where it intersects the MXP at MP 0.0);
- WBX (Elk River Compressor Station);
- MarkWest Pipeline;
- MXP-100 tie-in with LEX Power Line;
- MXP-200 tie-in with Line 1983;
- Ripley Regulatory Station Power Line;
- White Oak Electric Power Line;
- Putnam Business Park (near MXP MP 146.7 – 147.9); and
- Existing active and newly permitted oil and gas wells.

The degree of contribution by the MXP to cumulative visual impacts, in conjunction with these other projects, would be highly variable and dependent on the line-of-sight of the observer; the proximity of the projects to one another; the timing of their observation (i.e., winter time when deciduous trees/plants have shed their leaves); and the types of facilities, project sites, or permanent easements being observed. In the area where the Appalachian Gateway Project, Ohio Valley Connector Project, Rover Pipeline Project, LXP, and MarkWest Pipeline abuts the MXP, cumulative visual impacts would be limited to the observer's view of two pipeline easements intersecting. The non-jurisdictional power line that would serve the White Oak Compressor Station would likely result in additional tree clearing up until the point where it reaches the White

Oak fenceline. The additional compression added to the pending Elk River Compressor Station would not result in a noticeable visual change when combined with the aboveground facilities previously installed under the WBX Project. The addition of a buried pipeline easement within the same viewshed as the Putnam Business Park would also be negligible. Finally, the addition of oil and gas wells in the landscape immediately adjacent to the MXP have affected and will continue to affect the visual landscape, particularly through tree clearing and/or through the introduction of new features in the visual landscape. Consequently, we conclude that the MXP, in combination with these 12 other projects as well as oil and gas development, would have only a very minor cumulative impact on visual resources.

4.13.2.7.2 Gulf XPress Project

The terrain in the general area of the proposed GXP compressor stations consists of rural and agricultural areas. There are two other projects and three non-jurisdictional facilities within the viewshed of GXP's proposed facilities that could result in cumulative impacts on existing viewsheds surrounding the Grayson, Goodluck, Clifton Junction, and Cane Ridge Compressor Station sites:

- RXP (Grayson Compressor Station);
- Goodluck Electric Power Line;
- Clifton Junction Electric Power Line;
- Cane Ridge Electric Power Line; and
- Delvin Downs Phase 2 Expansion (adjacent to Cane Ridge Compressor Station).

The additional compression proposed at the approved Grayson Compressor Station would not result in a noticeable visual change when combined with the aboveground facilities previously installed under the RXP. Therefore, the GXP's contribution to cumulative impact on the viewshed surrounding the Grayson Compressor Station would be negligible.

The Phase 2 expansion of the existing Delvin Downs subdivision and the extension of the power line in to the Cane Ridge Compressor Station would result in a change in the viewshed for residents living nearby. However, any addition of residential housing is consistent with the surrounding residential neighborhood. The change in the viewshed for observers near the Cane Ridge Compressor Station site could be significant if Columbia Gulf did not implement visual screening methods such as planting quick-growing vegetation around the facility boundaries and/or designing the structures to fit the existing agricultural setting. With the implementation of visual screening at the Cane Ridge station, combined with the expansion of an existing residential subdivision, the GXP's contribution to cumulative impact on the viewshed would be noticeable, but not significant.

4.13.2.8 Socioeconomics

Past, present, and reasonably foreseeable future projects and activities could cumulatively impact socioeconomic conditions in the geographic scope for both the MXP and the GXP. The socioeconomic issues considered in the area of the proposed projects were employment and

workforce, housing, economy and tax revenues, public services, and transportation. For evaluating cumulative impact on socioeconomics for the MXP and GXP, the geographic scope was the county because the metrics for assessing the resources that may be affected (population, housing, taxes, etc.) are generally collected at the regional level, and services such as healthcare, education, and public safety are usually provided on a regional basis. The exception is impacts on transportation (or traffic), which has a smaller geographic scope and is essentially confined to the project areas and surrounding roads, due to the localized and temporary nature of pipeline construction. Any given location generally experiences active construction for only a matter of a few weeks (although restoration activities would take longer, but with comparatively less construction equipment). Construction of the compressor stations would be longer at those specific locations, but the extent of construction-related traffic would be even more localized to the site. Operational traffic would not be an issue, due to the projects only requiring a few new permanent employees. Thus, on a temporal basis, the scope for employment and workforce, housing, public services, and transportation would be limited to the relatively brief construction phase of the projects because operational effects would be *de minimis*. The potential cumulative impact on economy and tax revenues extends further into the future due to the tax revenues that would be generated every year the MXP and GXP are operating.

4.13.2.8.1 Mountaineer XPress Project

The past, present, or reasonably foreseeable future actions/projects listed below are located within the same geographic (county) and temporal scopes (construction phases) as portions of the MXP. When socioeconomic impacts from the MXP are combined with socioeconomic impacts from these other projects, collectively they would likely result in cumulative impacts on employment/workforce, housing, economy and tax revenues, public services, and/or transportation.

- Rover Pipeline Project (in Doddridge, Marshall, Tyler, and Wetzel Counties);
- Broad Run Expansion Project (in Kanawha County);
- LXP (in Marshall County);
- WBX (in Kanawha County);
- Supply Header Project (in Doddridge and Wetzel Counties);
- Mountain Valley Pipeline Project (in Doddridge and Wetzel Counties);
- MarkWest Pipeline (in Doddridge County);
- White Oak Electric Power Line (in Calhoun County)
- MarkWest Sherwood Gas Processing Facility Expansion (in Doddridge County);
- Majorsville, WV and Clarington, OH POR Facilities (in Marshall County);
- Moundsville Power Plant (in Marshall County);
- Putnam Business Park (in Putnam County);
- Tanyard Station Plaza (in Cabell County);
- Meighen Bridge Replacement (in Marshall County);
- MXP-100 tie-in with LEX Power Line (in Marshall County);
- MXP-200 tie-in with Line 1983 (in Doddridge County);

- Ripley Regulatory Station Power Line (in Jackson County);
- Antero Sandstrom Facility (in Doddridge County);
- Alexander's Place (in Putnam County); and
- Existing active and newly permitted oil and gas wells (all counties).

As shown in the list above, seven of the other projects, and potentially almost 600 newly permitted oil and gas wells (see table 4.13-2), also occur in Doddridge County and share the same temporal scope as the MXP. Six of the other projects, and potentially more than 200 newly permitted oil and gas wells, also occur in Marshall County while sharing the same temporal scope as the MXP. Three other projects in Wetzel County, two in Kanawha County, and two in Putnam County also share the same temporal scope as the MXP. Additionally, some portion of the permitted oil or gas wells in these three counties (271 in Wetzel County, 14 in Kanawha County, and 1 in Putnam County) could share the same temporal scope as the MXP. Therefore, the MXP would most greatly contribute towards cumulative impacts on socioeconomics when combined with the other projects occurring within Doddridge, Marshall, and Wetzel Counties.

Employment/Workforce

Columbia Gas anticipates that up to half of the overall construction workforce (estimated to average about 3,600 for the pipeline and aboveground facilities; see table 4.9-2) would be local hires. This would result in a temporary decrease in the local and regional unemployment rate and a temporary increase in income and sales taxes generated in the same geographic scope. Cumulative impacts on employment and workforce would largely depend on how much of the temporary construction workforce is sourced locally and the number of permanent positions that would be needed to operate the other facilities listed above. The largest impact on employment and workforce would likely be the number of natural gas projects proposed in the same geographic area. These projects range in size and scope; some include site-specific modifications to existing facilities, and others propose the construction of new facilities (sometimes at discrete locations, sometimes including many miles of continuous pipeline).

Short-term construction laborers would be in high demand during the construction cycles of these projects, some of which may overlap. The impact on the local workforce would depend on the percentage of workers hired locally. When combined with the demand for temporary workers with the same general skill sets for the other projects in the same geographic scope, the short-term cumulative impacts would be substantially beneficial to the counties directly affected and abutting the MXP work areas. These effects would only occur during the construction cycle of these projects; once construction winds down, the small demand for workers needed to operate these facilities would be easily met by local labor resources. The number of permanent employees that would be hired to operate the MXP, estimated at 29, would have a negligible contribution to a cumulative impact on employment in the geographic scope.

Housing

The largest impacts on housing from the MXP would be from non-local workers relocating to the area during construction, requiring a large amount of temporary housing. The affected West Virginia counties and nearby cities along the MXP pipeline route contain a substantial inventory

of temporary housing. However, depending on the timing of construction and temporary labor forces of the pipeline and infrastructure projects listed above, the temporary housing demand could reach or exceed capacity.

The amount of impact the temporary construction workforce would have on the counties crossed by the MXP would depend on the number of projects that go into construction, the amount of labor sourced locally, and the amount of overlap in construction schedules. The demand for construction worker housing may restrict the supply available to other users, such as vacationers and other visitors, and may increase the prices of short-term housing during the MXP construction period, especially when it overlaps with other projects in the area. These impacts could be substantial, but would be restricted to the period when the MXP would be under construction.

Economy and Tax Revenues

Columbia Gas would spend approximately $2 billion on construction and facility expenses, which include the costs of right-of-way, project development, installation and maintenance, and facility commissioning. Columbia Gas would contribute approximately $26 million in annual property taxes during operation of the MXP.

Property taxes generated from MXP components would provide local governments with revenue to fund public facilities and services. In addition to property tax revenue, the temporary and permanent workforce associated with the project would spend money locally on consumer items and living expenses, which would generate sales tax revenue to the state and municipalities. The MXP would contribute a positive tax revenue impact within its geographic scope. The workforce associated with the other projects listed above also would contribute sales and income taxes to the local economy, thereby leading to a compounding positive cumulative impact on the regional economy.

There would also be long-term cumulative impact on the economy from property, sales, and income tax collections associated with the MXP and the other projects listed above. The MXP contribution toward cumulative economic impact is anticipated to be positive through increased tax revenues generated within the project's geographic scope.

Public Services

The cumulative impact on public services from the MXP and the 20 other projects listed above would depend on the number of projects under construction at one time. The small incremental demands of several projects occurring at the same time could become difficult for police, fire, and emergency service personnel to address. With proper planning, emergency and other public services generally can handle additional service needs. The problem would be temporary, occurring only for the approximate 1-year duration of construction, and could be mitigated by the various project sponsors consulting with local emergency responders in the development of project-specific emergency response plans, providing their own personnel to augment the local capacity, or providing additional funds or training for local personnel. As explained in section 4.9.3.1, prior to construction Columbia Gas would require all construction contractors to develop and submit for review an individual emergency services coordination plan specific to the project area and to the local areas surrounding it. Other FERC-regulated projects,

and we assume non-FERC-regulated projects, would require similar plans to be implemented by its contractors.

Further, Columbia Gas has developed a liaison program between company personnel and public safety and emergency response organizations throughout West Virginia for advising emergency response, government, and public safety officials on how to prevent damage to company facilities and how to recognize and report emergencies.

Short-term construction workers would likely not bring their families with them for the duration of the construction cycle. Thus, short-term impacts on the educational resources in the Project's geographic scope would be insignificant. The number of permanent employees planned for the MXP is also minor when compared to the total population and size of the project's geographic scope. The small increase in population resulting from new permanent employees, if they were to transfer from outside the MXP area, would not contribute to a cumulative impact on educational resources.

For these reasons, we anticipate that when combined with the other projects listed above, the MXP's contribution toward cumulative impact on public services resulting from construction and operation would not be significant.

Transportation

Construction of the MXP would result in temporary impacts on road traffic at locations where the work area is accessed and could contribute to cumulative traffic impacts if other projects take place at the same time and in the same areas. Short-term construction impacts would be mitigated by the fact that the construction workforce would access the work sites during non-peak traffic hours, as site construction activities typically extend from 7 a.m. to 7 p.m.; therefore, workers would arrive before 7 a.m. and likely leave after 7 p.m.

The geographic scope for cumulative impact on transportation is more refined than other socioeconomic factors. In our evaluation of potential cumulative impact on transportation, we looked at the areas abutting and adjacent to the construction areas for the MXP. Short-term impacts in rural areas may result in increased congestion from construction traffic during the movement of heavy equipment. Rural roads are generally not designed to handle large traffic volumes. Short-term compounding cumulative impacts may occur on the rural road networks, especially where other projects in Doddridge, Marshall, and Wetzel Counties are under construction near and at the same time as the MXP. To mitigate impacts on the transportation network, the MXP would work with state and local transportation authorities to address worker and materials/equipment transportation. It is expected that other projects in the area would be required to manage their construction traffic in a similar manner to mitigate short-term cumulative impacts on the region's transportation corridors. For these reasons, we anticipate that the contribution to cumulative transportation impacts from the MXP would be minor and temporary.

4.13.2.8.2 Gulf XPress Project

The following past, present, or reasonably foreseeable future actions/projects are located within the same geographic and temporal scopes as portions of the GXP; and, when combined with the socioeconomic impacts from the GXP, could contribute towards cumulative impacts on

employment/workforce, housing, economy and tax revenues, public services, and/or transportation:

- Broad Run Expansion Project (in Davidson County, TN);
- RXP (in Carter County, KY);
- Cane Ridge Electric Power Line (Davidson County, TN);
- Clifton Junction Electric Power Line (Wayne County, TN);
- Goodluck Electric Power Line (Metcalfe County, KY);
- Delvin Downs Phase 2 Expansion (Davidson County, TN);
- New County Jail (Rowan County, KY);
- Nashville International Airport Improvements (Davidson County, TN);
- Morehead State University Improvements (Rowan County, KY);
- Kentucky State Route 32 Reconstruction (Rowan County, KY); and
- Antioch Mixed Use Development (Davidson County, TN).

As shown in the list above, five of the other projects also occur in Davidson County, Tennessee and share the same temporal scope as the GXP. Three of the other projects also occur in Rowan County, Kentucky while sharing the same temporal scope as the GXP. Therefore, the GXP would most greatly contribute towards cumulative impacts on socioeconomics when combined with the other projects occurring in Davidson and Rowan Counties.

Employment/Workforce

Columbia Gulf anticipates that, due to the specific experience needed for aboveground natural gas facility construction, few local workers would be qualified to construct the new GXP compressor stations or make modifications at the two existing facilities. At the new stations, local construction jobs would average fewer than 10 and range from 3 to 14 over the 10-month construction period. We do not expect that drawing 14 local workers from the affected counties, when combined with the other projects listed above, would contribute significantly to a cumulative impact on the area workforce. Furthermore, the impact would be temporary, limited to the 10-month station construction period. Only 14 permanent employees (total) would be hired full-time to operate the seven new compressor stations, and this would also have negligible cumulative impacts on employment within the geographic scope of the GXP.

Housing

The largest impact on housing from the GXP would be from non-local workforces during construction. Columbia Gulf estimates its non-local workforce would peak at 126 workers for a 4-month period. Most of these workers would need to locate temporary housing or other accommodations in the vicinity of the new compressor station sites. Our review concluded that this temporary influx of workers from the GXP, when combined with those needed on the other projects, would not contribute significantly to cumulative impacts on housing resources in the

affected counties. The project's permanent workforce of 14 employees would result in a minor cumulative impact on employment in conjunction with the other projects that may occur in the area affected the GXP.

Economy and Tax Revenues

The GXP would generate about $19 million in property taxes from 2016 to 2019 (table 4.9-14). In addition to property tax revenue, the temporary and permanent workforce associated with the project would spend money locally on consumer items and living expenses, which would generate sales tax revenue. Workers who are permanent residents of Kentucky, Tennessee, or Mississippi also would pay income taxes on income derived from construction of the GXP. The GXP's contribution towards the cumulative tax revenues for the state and affected counties during construction would be minor, but positive.

During project operation, permanent employees would pay sales and income taxes in addition to the facility property taxes identified above. We assume the eight other projects listed above also would generate property, sales, and income tax receipts to the local economy, thereby leading to a compounding cumulative positive impact on the regional economy. For these reasons, the contribution to cumulative impact from the GXP is anticipated to be positive through increased tax revenue generated in the project's geographic scope.

Public Services

The scope of the GXP is such that demands on public and educational services in the affected counties would be extremely limited. The GXP, in conjunction with the eight projects listed above, would not have a significant contribution to a cumulative impact on public or educational services in the affected counties due to the short duration of construction and the very small number of permanent employees that would be hired for operation of the facilities. Nevertheless, Columbia Gulf, like Columbia Gas, has committed to maintaining a liaison program between company personnel and local emergency response, government, and public safety officials within the areas where Columbia Gas' facilities are located.

Transportation

In our evaluation of potential cumulative impact on transportation, we looked at the areas abutting and adjacent to the construction areas for the GXP. Construction would result in temporary impacts on road traffic in areas in proximity to the compressor station sites and could contribute to cumulative traffic impacts. This may be particularly evident where new station construction would occur near residential development (i.e., the Cane Ridge site). However, impacts would be temporary and limited to the 10-month station construction period. Our review of the projects listed above found that none of the other projects would be likely to add cumulatively to potential traffic impacts resulting from construction of the GXP due to timing of construction and location. No significant operational impacts on transportation would be expected.

4.13.2.9 Air Quality

Construction of both the MXP and GXP (as well as most of the projects and activities listed in tables 4.13-3 and 4.13-4) would involve the use of heavy equipment that would generate

temporary emissions of air contaminants and fugitive dust. The majority of criteria emissions generated during construction would be PM_{10} and $PM_{2.5}$ in the form of fugitive dust that would result from clearing, grading, excavation, and vehicle traffic on unpaved roadways. Typically, PM_{10} settles quickly near the construction sites. The cumulative air impacts would be additive emissions of pollutants due to the use of equipment powered by diesel or gasoline engines and further generation of fugitive dust from land clearing, ground excavation, and cut and fill operations. Emissions would be reduced by measures such as using properly maintained vehicles. The impacts would be localized to the vicinity of the construction areas during active construction. For the MXP or GXP to contribute to a cumulative impact from construction air emissions, other projects/actions listed in table 4.13-3 and 4.13-4 would need to also involve concurrent construction (temporal scope) in an area within 0.25 mile of the active construction footprint of the MXP or GXP (geographic scope).

Operation of the MXP and GXP would result in permanent air quality impacts associated with the new and modified compressor stations over the lifetime of the projects. Both the MXP and GXP would contribute cumulatively to air quality impacts when considering other stationary past, present, and reasonably foreseeable sources of air emissions within 31 miles (geographic scope). *Past and present sources are already accounted for by modeling existing sources and including background values in the analysis presented in section 4.11.1.* Reasonably foreseeable (i.e., future or pending) sources are discussed further below. For our analysis, operational emissions were taken from state permit applications or FERC filing documents.

4.13.2.9.1 Mountaineer XPress Project

For analyzing the potential for construction-related cumulative air impacts, the Putnam Business Park and the Rover Pipeline are expected to cross or be constructed within 0.25 mile of the MXP within the same general timeframe, and could therefore contribute to cumulative impacts should the construction schedules align. Additionally, the MXP non-jurisdictional facilities, MarkWest Pipeline and White Oak Electric Power Line, would likely go to construction within the same timeframe as the MXP. As conventional pipeline construction proceeds quickly, any cumulative air impacts from the use of conventional construction equipment would be temporally limited to days or weeks and therefore not considered significant; however, residents near these areas may experience temporarily elevated levels of fugitive dust and construction vehicle exhaust.

As listed in table 4.13-3 and summarized in table 4.13-6, seven pending or reasonably foreseeable projects with operational air emissions were identified within 30 miles of an MXP compressor station site. The other nearby sources would be required to comply with state and federal air quality regulations for the protection of air quality listed in section 4.11.1, and the specific operational air permit required is listed in table 4.13-6. This permitting process is designed to protect ambient air quality and prevent significant cumulative impacts. Prior to issuance of air quality permits, the authorities must make a determination that the cumulative effect of both projects would not cause or contribute to an exceedance of the NAAQS, that the appropriate level of control of new air emissions would be installed, and that the facilities would be in compliance with all applicable federal and state air quality regulations and permit conditions.

Table 4.13-6 Summary of Projects for Analyzing Cumulative Operational Air Impacts			
Proposed New or Modified MXP Compressor Station (County)	**Reasonably Foreseeable Projects a/**	**Distance from MXP Compressor Station site (miles)**	**Operational Air Permit Required**
Mountaineer XPress Project			
Sherwood (Doddridge)	Sherwood Gas Processing Facility Expansion	2.5	Yes, update to Title V permit required
	Antero Sandstrom Wastewater Treatment Plant	8.8	Facility under Title V permitting thresholds – not currently required
	LL Tonkin Compressor Station (Monroe to Cornwell Project)	3.7	Yes, update to Title V permit required
	Mockingbird Hill Compressor Station (Monroe to Cromwell Project and Supply Header Project)	22.3	No increase in operational air emissions – no permitting required.
Lone Oak (Marshall)	Majorsville Compressor Station; (Rover Pipeline)	12.5	Facility under Title V permitting thresholds – not currently required.
	Moundsville Power Plant	12.4	Yes, new Title V permit required.
	Colerain Compressor Station; (OPEN Project)	22.0	Yes, new Title V permit required.
	Burch Ridge Compressor Station (Supply Header Project)	15.0	No increase in operational air emissions – no permitting required.
White Oak (Calhoun)	Antero Sandstrom Wastewater Treatment Plant	22.5	Facility under Title V permitting thresholds – not currently required.
	LL Tonkin Compressor Station (Monroe to Cornwell Project)	28.8	Yes, update to Title V permit required.
Mount Olive (Jackson)	Rocky Fork Compressor Station (Broad Run Expansion Project)	17.5	Facility under Title V permitting thresholds – not currently required.
	Tyler Mountain Compressor Station (Broad Run Expansion Project)	20.0	Facility under Title V permitting thresholds – not currently required.
Elk River (Kanawha)	Rocky Fork Compressor Station (Broad Run Expansion Project)	20.0	Facility under Title V permitting thresholds – not currently required.
Ceredo (Wayne)	Grayson Compressor Station (RXP and GXP)	22.5	Yes, new Title V permit required.
a. Oil and gas wells identified in table 4.13-2 are not included in this table, but those within 0.25 mile of the MXP are considered in our text analysis.			

Operation of natural-gas-fired compressor stations would generate emissions of criteria pollutants, VOCs, HAPs, and GHGs. The air modeling presented in section 4.11.1.2.3 for each of the MXP compressor stations demonstrates that impacts of the stations along with the existing, approved, or pending sources at the same stations would not be significant.

The combined effect of multiple actions occurring within 31 miles of the operation of emission-generating aboveground facilities associated with the project could have a long-term impact on air quality in the project area. Existing or proposed facilities within 31 miles of the emission-generating MXP aboveground facilities are listed in table 4.13-3 and include natural gas processing facilities, natural gas compressor stations, and a wastewater treatment plant. Potentially affected air resources include long-term air pollutant concentrations in ambient air.

Potential cumulative impacts on air quality from the operation of the MXP compressor stations in conjunction with gas wells in the region has been repeatedly mentioned in comments submitted on the draft EIS. Gas production emits VOCs (including HAPs) and GHGs, largely from well completions and fugitive emissions. Existing permits for oil and gas are summarized in Table 4.13-2, showing the highest density of development in Doddridge, Ritchie, and Calhoun Counties. Any regional impacts from existing oil and gas activity would be reflected in the ambient air quality measurements presented alongside the air quality dispersion modeling in section 4.11.1.2.4. Continued gas development could have a cumulative operational air impacts with proposed new compressor stations, in particular with the proposed new Sherwood and White Oak Compressor Stations in Doddridge and Calhoun Counties. While FERC does not regulate gas production, nor do we issue the air permits for compressor stations or oil and gas well operations, new gas development would need to comply with federal, state, and local air regulations. Recent NSPS regulations promulgated by the EPA under 40 CFR 60 Subpart OOOOa require controls to limit the emission of methane as well as VOCs and HAPs for all oil and gas facilities newly built or modified since September 2015. At the time of this document publication, those rules have been stayed for reconsideration by the EPA; if implemented, the original regulations would reduce any potential cumulative impacts from continued development (EPA, 2017a).

In addition to existing gas production, the existing MarkWest Sherwood Gas Processing Facility is 2.5 miles from the proposed MXP Sherwood Compressor Station and presently under construction for expansion. Gas processing facilities, as well as oil and gas drilling wells, are known emitters of VOCs and HAPs (Moore et al., 2014). However, the stationary facilities at this station would be located within the ozone transport region and are subject to stricter NO_x and VOC emission controls by the WVDEP during its Title V permitting process. While residents between the expanded processing facility and proposed compressor station may experience air quality impacts from both, the WVDEP checks any new minor or major new source permits and is responsible for minimizing emissions to the extent practicable. The emissions of both the gas processing facility and gas production would also be incorporated into the inventory for the region's state implementation plan to confirm that the areas would retain attainment status.

New permanent stationary sources of air emissions would be located at the reasonably-foreseeable LL Tonkin Compressor Station, Mockingbird Hill Compressor Station, Majorsville Compressor Station, Burch Ridge Compressor Station, Rocky Fort Compressor Station, Tyler Mountain Compressor Station, Moundsville Power Plant, and the approved Grayson Compressor Station. These facilities will be operated by combusting natural gas and are not expected to significantly contribute to air quality impacts in the MXP areas. All projects that trigger permitting due to the potential emissions would be required to both obtain a construction permit and operate under any required operating permits. We conclude that these proposed projects are unlikely to result in significant emission impacts on local air quality and unlikely to add cumulatively with other sources due to either the amount of emissions or distance from the other emission sources.

Antero Resources Corporation submitted an application to construct the Sandstrom Wastewater Treatment Facility in July of 2015. The facility will treat wastewater associated with shale development to an effluent water purity suitable for surface discharge or reuse with future oil and gas operations. A construction permit was issued by the WVDEP on December 7, 2015. This facility will be 8.8 miles from the Sherwood Compressor Station and 22.5 miles from the White Oak Compressor Station. The facility received a permit under West Virginia regulation 45 CSR 13 – Permits for Construction. It is not subject to any PSD regulations. The major sources of emissions from the facility are boilers and a thermal oxidizer. Due to the relatively low emissions from the facility and the distances to the Sherwood and White Oak Compressor Stations, cumulative impacts are not expected.

As noted previously, the air quality impacts from the MXP compressor stations would not exceed NAAQS. Considering the distance to the sources in table 4.13-3, as well as the magnitude of the potential emissions from those projects, we conclude that the cumulative impact of the projects in table 4.13-3 in combination with the MXP would not significantly affect local or regional air quality.

In conclusion, construction and operation of the MXP facilities are not expected to have a significant impact on air quality in the project areas or in the region itself. The potential emissions associated with the operation of the majority of other projects described above are located over a large area and have varying construction schedules. They must also adhere to federal, state, and local regulations for the protection of ambient air quality. Therefore, significant cumulative impacts on air quality are not anticipated.

4.13.2.9.2 Gulf XPress Project

In analyzing the potential for construction-related cumulative air impacts, only the Delvin Downs residential subdivision project and the three non-jurisdictional powerlines serving Goodluck, Cane Ridge, and Clifton Junction Compressor Stations were identified for potential concurrent construction. The Delvin Downs subdivision, which is adjacent to the Cane Ridge Compressor Station site, recently underwent an expansion to accommodate 27 new single-family housing lots. Tree clearing, grading, and road paving was completed in 2016. Many of the lots already have new homes on them. If there are still some homes being constructed within this expanded area at the same time the Cane Ridge station is being constructed, the two projects together may result a localized increase in emissions and dust associated with construction equipment in a residential area.

Only one pending or reasonably foreseeable project with operational air emissions was identified within 31 miles of a GXP compressor station: the Compressor Station 563, which is proposed as part of the Broad Run Expansion Project, approximately 24 miles from the Cane Ridge Compressor Station site. Commenters expressed concern about potential cumulative impacts from the operation of the two stations. The air impacts from the construction and operation of Compressor Station 563 are described in FERC's environmental assessment under docket CP15-77, published in March 2016. The station requires a Title V Major Source Operating Permit and performed air modeling based on its potential to emit – all concentrations at the station boundary were modeled to be well below the NAAQS. Given the modeling results showing concentrations below the NAAQS for both the Compressor Station 563 and the Cane Ridge Compressor Station

as well as the distance between the two stations, we conclude that these proposed projects are unlikely to result in significant emission impacts on local air quality.

The construction and operation of the GXP facilities are not expected to have a significant impact on air quality in the project areas themselves. Only around the Cane Ridge station site were any pending or reasonably foreseeable projects identified for cumulative impact analysis. As described above, some additive impacts may be expected from any concurrent construction with the Delvin Downs subdivision but these impacts would be limited and temporary. Therefore, significant cumulative impacts on air quality from the GXP are not anticipated.

4.13.2.10 Noise

Construction of the MXP and GXP would involve construction equipment and generally result in highly localized and temporary noise impacts. For the MXP or GXP to have a cumulative impact from construction noise, other projects/actions listed in tables 4.13-3 and 4.13-4 would need to also involve concurrent construction (temporal scope) in an area that overlaps or directly abuts the active construction footprint of the MXP or GXP (geographic scope).

As analyzed in section 4.11.2.1, operation of the MXP and GXP would result in an increase of perceptible noise at NSAs such as residences and places of worship near new and modified compressor and meter stations. Cumulative noise impacts could occur at an NSA where noise may be experienced from both the operation of a reasonably foreseeable project and a compressor station to be modified under the MXP or GXP.

Operational noise impacts attributable to the MXP and GXP are limited by FERC regulations to a maximum allowable contribution of 55 L_{dn} dBA at existing NSAs. To maintain compliance, we have recommended a condition requiring the Companies to file a noise survey within 60 days of placing its stations in service. The condition further requires that if the noise attributable to the operation of all the equipment at any station under interim or full horsepower load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gas should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. Columbia Gas would then be required to file a second noise survey within 60 days after it installs the additional noise controls.

4.13.2.10.1 Mountaineer XPress Project

The following projects are expected to cross or be constructed within 0.25 mile of the MXP and within the same general timeframe, and could therefore contribute to cumulative noise impacts should the construction schedules align:

- Rover Pipeline Project (where it intersects the MXP at MP 48.0);
- MarkWest Pipeline;
- White Oak Electric Power Line;
- Sherwood Processing Facility Expansion;
- Putnam Business Park (between MXP MPs 146.7 – 147.9); and
- Newly permitted oil and gas wells.

Because conventional pipeline construction proceeds quickly, any cumulative noise impacts would be limited to the immediate area of construction where the MXP and one of the other project activities are occurring simultaneously. Noise from construction of these projects would occur during daylight hours over the course of days or weeks and therefore would not be considered significant.

There is only one proposed facility identified in table 4.13-3 that could contribute to a cumulative impact on noise during operation. The MXP Sherwood Compressor Station would operate within 2.5 miles of the Sherwood Gas Processing Facility to the east. Approximately 15 NSAs appear to be between the two facilities (east of the compressor station). While we have no independent estimates of noise expected to be generated from the processing facility, we can assume the noise would be within an order of magnitude that is within the same level of noise as the compressor station. Given this assumption, it is possible that NSAs between the two facilities may be impacted by perceptible noise from the concurrent operation of both; however, the cumulative impact is not expected to be significant given the distance between the facilities and the attenuation of noise with that distance.

The MXP expansion of the approved LXP Lone Oak Compressor Station and the pending WBX Elk River Compressor Station are expected to result in a cumulative impact from noise, but are analyzed in sections 4.11.2.1 as part of the project's expected noise impacts and compared to the noise threshold of 55 dBA L_{dn} at any nearby NSAs. Therefore, no cumulative noise impacts from operation are expected from the expansion of these expanded stations.

4.13.2.10.2 Gulf XPress Project

The GXP could contribute to a cumulative impact (temporarily) on noise from construction activities in the areas surrounding the Goodluck, Clifton Junction, and Cane Ridge Compressor Station sites when combined with the following other projects:

- Cane Ridge Electric Power Line;
- Clifton Junction Electric Power Line;
- Goodluck Electric Power Line; and
- Delvin Downs Phase 2 Expansion (adjacent to the Cane Ridge Compressor Station).

As described in the air section above, there is a possibility that the construction schedules could overlap. At the Cane Ridge Compressor Station, the construction of multiple projects together would result in a cumulative impact on noise to residents living within and directly abutting the Delvin Downs subdivision. Construction noise from the Delvin Downs expansion could include intermittent home building noise, like hammering and power tools, which would likely be limited to daytime hours. The Cane Ridge Compressor Station is expected to be constructed over a period of 10 months with construction noise impacts at nearby NSAs (mostly residences) of 54 dBA L_{dn} or less. We recognize commentors concern that this may be a burdensome nuisance; however, since activities at both project sites would be expected to occur only during the daytime, any cumulative noise impact would not affect nighttime noise levels and not be considered significant. Additionally, there would be minor and temporary cumulative

impact from noise at the Goodluck and Clifton Junction Compressor Station sites while the non-jurisdictional power lines are constructed.

No new permanent noise sources are proposed within 0.5 mile of any of the other GXP facilities; therefore, the GXP would not contribute toward a permanent cumulative impact on the existing noise environment.

4.13.2.11 Climate Change

Climate change is the change in climate over time, whether due to natural variability or as a result of human activity, and cannot be represented by single annual events or individual anomalies. For example, a single large flood event or particularly hot summer are not indications of climate change, while a series of floods or warm years that statistically change the average precipitation or temperature over years or decades may indicate climate change. Although climate change is a global concern, for this analysis, we will focus on the potential cumulative impacts in the proposed MXP and GXP project regions.

The following observations of environmental impacts with a high or very high level of confidence are attributed to climate change in the proposed MXP and GXP project regions:

- Heat waves, and river flooding will pose a growing challenge to the region's environmental, social, and economic systems. This will increase the vulnerability of the region's residents, especially its most disadvantaged populations;
- Increasing temperatures and the associated increase in frequency, intensity, and duration of extreme heat events will affect public health, natural and built environments, energy, agriculture, and forestry;
- Decreased water availability, exacerbated by population growth and land-use change, will continue to increase competition for water and affect the region's economy and unique ecosystems;
- Agriculture, fisheries, and ecosystems will be increasingly compromised over the next century by climate change impacts. Farmers can explore new crop options, but these adaptations are not cost- or risk-free. Moreover, adaptive capacity, which varies throughout the region, could be overwhelmed by a changing climate; and
- While a majority of states and a rapidly growing number of municipalities have begun to incorporate the risk of climate change into their planning activities, implementation of adaptation measures is still at early stages.

The rate and magnitude of expected changes will exceed those experienced in the last century. Existing adaptation and planning efforts are inadequate to respond to these projected impacts.

In addition to the GHG emissions associated with construction and operation of the MXP and GXP, the downstream end-use would result in additional GHG emissions. Columbia Gas and Columbia Gulf state that their respective projects would facilitate 1,800,000 Dth/d capacity to serve multiple Midwest, Northeast, and Mid-Atlantic markets and 900,000 Dth/d capacity to serve

markets in the South and the Gulf Coast. Assuming that the projects transport the maximum 2,700,000 dekatherms per day of natural gas and that all the gas being transported is used for additional combustion, the downstream end-use could result in about 52.3 million metric tons of carbon dioxide per year. However, given the possibility of fuel-switching from coal or other fossil fuel combustion as a result of additional gas supply and the likelihood that pipelines and compressor stations would not operate continuously at maximum capacity, this represents an upper bound of actual downstream carbon dioxide emissions.

The emissions would increase the atmospheric concentration of GHGs, in combination with past and future emissions from all other sources, and contribute incrementally to climate change that produces the impacts previously described. Because we cannot determine the projects' incremental physical impacts on the environment caused by climate change, we cannot determine whether the projects' contribution to cumulative impacts on climate change would be significant.

The Ohio Valley Environmental Coalition (OVEC) and other commentors objected to this indeterminate conclusion. However, no standard methodology exists to determine how a specific project's contribution to greenhouse gas emissions would translate into physical effects on the environment. Without an accepted methodology, the Commission cannot make a finding whether a particular quantity of greenhouse gas emissions poses a significant impact to the environment, whether directly or cumulatively with other sources. Further, although the OVEC may disagree, we do not believe that the potential increase in greenhouse gas emissions associated with production, non-project transport, and non-project combustion are causally related to this project, nor are the potential environmental effects reasonably foreseeable as contemplated by CEQ's regulations. Production and end-use consumption of natural gas will likely occur regardless of whether the Commission approves these two projects. With respect to climate change impacts of upstream production and downstream use, we are unable to predict the nature and extent of impacts associated with those upstream production and downstream use activities and thus such impacts are not reasonably foreseeable for purposes of this NEPA analysis. The specific sources of natural gas and the point of consumption of natural gas moving through the projects is currently unknown and will likely change throughout the projects' operations. Contrary to OVEC's contentions, these and other facts are indeed necessary for the Commission to conduct a more meaningful analysis of the related effects.

4.13.3 Conclusion

Recently completed, ongoing, and planned projects in the MXP and GXP areas were identified for inclusion in this cumulative impact analysis (refer to tables 4.13-3 and 4.13-4). The majority of cumulative impacts would be temporary and minor when considered in combination with past, present, and reasonably foreseeable activities. However, some long-term and potentially significant cumulative impacts would occur on forested habitat, particularly interior forest and CFA areas, and the associated habitat for the cerulean warbler. Some long-term cumulative benefits to the communities in and around the MXP and GXP areas would be realized from increased tax revenues. Short-term cumulative benefits would also be realized through jobs, wages, and purchases of goods and materials.

Due to the implementation of specialized construction techniques, the relatively short construction timeframe in any single location, and carefully developed resource protection and

mitigation plans designed to avoid or minimize environmental impacts from the MXP and GXP, minimal cumulative effects are anticipated when the effects of each project are added to the past, present, and reasonably foreseeable future projects within the MXP's and GXP's geographic scopes.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS OF THE ENVIRONMENTAL ANALYSIS

The conclusions and recommendations presented in this section are those of the FERC environmental staff. Our conclusions and recommendations were developed with input from the EPA, USACE, USFWS, WVDEP, and WVDNR as cooperating agencies. The federal cooperating agencies may adopt the EIS per 40 CFR 1506.3 if, after an independent review of the document, they conclude that their permitting requirements and/or regulatory responsibilities have been satisfied. However, these agencies would present their own conclusions and recommendations in their respective and applicable records of decision. Otherwise, they may elect to conduct their own supplemental environmental analysis, if they deem it necessary.

We determined that construction and operation of Columbia Gas' MXP would result in some adverse environmental impacts. These impacts would occur during both construction and operation of the MXP on soils, vegetation, aquatic resources, wetlands, wildlife, noise, and air quality as discussed in section 4, above. Short-term impacts would occur on soils, vegetation, aquatic resources, wetlands, wildlife, air, and noise. Long term impacts would occur on vegetation, air, and noise. Impacts on upland forested habitat; in particular, interior forest and CFAs, are considered to be significant due to the amount of new (i.e., not co-located) right-of-way to be constructed through forested areas. Likewise, impacts on forested habitat for the cerulean warbler (a migratory bird considered sensitive in the MXP area) are also deemed to be significant.

We determined that construction and operation of Columbia Gulf's GXP also would result in some adverse environmental impacts. These impacts would occur during both construction and operation of the GXP on soils, vegetation, aquatic resources, wetlands, wildlife, noise, and air quality. Short-term impacts would occur on soils, vegetation, aquatic resources, wetlands, wildlife, air, and noise. Long term impacts would occur on vegetation, air, and noise. However, if the projects are constructed and operated in accordance with applicable laws and regulations, the mitigation measures discussed in this EIS, and our recommendations, these impacts would be reduced to acceptable levels. This determination is based on a review of the information provided by Columbia Gas and Columbia Gulf and further developed from data requests; field investigations; scoping; literature research; alternatives analyses; and contacts with federal, state, and local agencies, as well as individual members of the public.

As part of our review, we developed a number of specific mitigation measures that we determined would appropriately and reasonably reduce the environmental impacts resulting from construction and operation of the MXP and GXP. We therefore recommend that our mitigation measures be attached as conditions to any authorization issued by the Commission. A summary of the anticipated impacts, our conclusions, and our recommended mitigation measures is provided below, by resource area.

5.1.1 Geology

The overall effects of MXP and GXP construction and operation on topography and existing geologic conditions would be minor. Primary impacts would be limited to construction activities and would include temporary disturbance of slopes at facilities or within pipeline

corridors resulting from grading and trenching operations. During construction activities, some slopes within the construction workspaces would be contoured to safely accommodate construction and equipment operation for the compressor station facilities. However, after completion of construction activities, topography and associated drainageways would be returned to pre-construction contours and elevations to the extent practicable.

The removal of bedrock, by blasting or other means, may be required if bedrock is encountered within the MXP pipeline trench or at MXP or GXP aboveground facility sites. Blasting events would be designed to break up only the amount of bedrock needed for construction, and impacts on bedrock would be minor and limited to the immediate area of construction. The Companies would comply with all federal, state, and local blasting regulations and have each developed a Blasting Plan that describes measures that would be implemented to minimize potential blasting-related impacts. We have reviewed the Companies' blasting plans and find them acceptable.

Conditions necessary for the development of landslides are not present in the GXP work areas; however, the MXP is in an area of elevated landslide risk due to steep slopes. MXP pipelines would cross about 58.2 miles of slopes over 30 percent, including 55.6 miles along MXP-100, 2.4 miles along MXP-200, less than 0.1 mile along the SM80 Line, and 0.1 mile along the SM80 Loop Line. Columbia Gas filed its Phase I Landslide Hazard Assessment; and, we have included a recommendation for submittal of a Phase II Landslide Hazard Assessment. If a significant landslide hazard is identified during MXP construction, Columbia Gas would implement mitigation measures and BMPs in its ECS to maintain slope stability. We have reviewed the ECS and found it generally consistent with FERC's Plan and Procedures. Where the ECS differed from FERC's Plan and Procedures, we found the modifications acceptable. We have also included a recommendation for Columbia Gas to submit its Landslide Mitigation Plan, which will further define any special measures to implement in areas that are susceptible to landslides or in response to a landslide that occurs during construction.

Based on a review of publicly available data from the WVDEP, four known coal mine sites are within 0.25 mile of MXP facilities. Columbia Gas would coordinate with the mining companies in advance of MXP construction so that appropriate planning for subsidence can occur. Columbia Gas would continue to coordinate with the mining companies for the duration of operation. None of the GXP work sites are within 0.25 mile of a mine or quarry.

Karst is not present in or in proximity to the MXP workspace and is not considered a risk to the MXP facilities. If Columbia Gas encounters a sinkhole, notification would be made to the WVDEP - Groundwater/Underground Injection Control Department, and Columbia Gas would follow the WVDEP's approved sinkhole mitigation document in addition to Columbia Gas' Karst Mitigation Plan. Columbia Gulf conducted geotechnical studies at each of the compressor station sites and found karst terrain at the Paint Lick, Goodluck, Cane Ridge, and Clifton Junction sites; the existing GXP facilities (Leach C Meter and Grayson Compressor Stations) are not within karst terrain. Where karst topography may be a potential hazard, Columbia Gulf would construct foundations that are supported by competent bedrock to mitigate the risk of foundation disturbance due to seismic activity or sinkhole development.

With the implementation of the Companies' respective ECSs, Blasting Plans, and procedures to be followed in the event of discovery of previously undocumented karst features or abandoned underground mines, we conclude that impacts on geological resources would be adequately minimized.

5.1.2 Soils

The MXP and GXP would traverse a variety of soil types and conditions. Construction activities could adversely affect soil resources by causing erosion, compaction, and introduction of excess rock or fill material to the surface, which could hinder restoration. However, the Companies would implement the mitigation measures contained in their respective ECSs to control erosion, segregate topsoil, enhance successful revegetation, and minimize any potential adverse impacts on soil resources, including any impacts on cropland associated with the MXP.

Permanent impacts on soils would mainly occur at the aboveground facilities where the sites would be graveled and converted to industrial use. Implementation of the Companies' ECSs would adequately avoid, minimize, or mitigate construction impacts on soil resources in those areas at the aboveground facility sites that would be stabilized with vegetative cover. Based on our analysis of the Companies' proposed measures, we conclude that potential impacts on soils would be avoided or effectively minimized or mitigated.

Columbia Gas identified three facilities (a hospital, a material fabricating business, and a technical school) within 0.25 mile the MXP workspaces that are permitted to generate, transport, treat, or dispose of hazardous waste. None of the facilities have reported an uncontrolled release to the environment. Two LUST sites are also within 0.25 mile of the proposed MXP facilities; cleanup activities for these sites were completed in 1998 and 2003. None of the GXP facilities would be within 0.25 mile of any hazardous waste sites. One hazardous waste generator site owned by Columbia Gulf is 0.3 mile southeast of the existing Leach C Meter Station. While a LUST site was identified approximately 0.8 mile northeast of the proposed New Albany Compressor Station, the distance separating the two areas and the limited extent of the excavation associated with the new facility make it unlikely that contaminated soil would be encountered at the station site.

If contaminated soils are encountered during construction, the Companies would each implement measures outlined in their respective Unexpected Contamination Discovery Plans that includes proper handling, agency notification, and disposal methods. If unexpected contaminated soil is encountered, the Companies would contact state and local agencies, as appropriate, to develop and implement mitigation measures and procedures to address the contamination. Further, spill prevention measures from the Companies' respective ECSs and SPCC Plans would reduce the potential impacts on soils from spills of fuels, lubricants, coolant, and hazardous materials used during construction.

5.1.3 Water Resources

5.1.3.1 Groundwater

None of the MXP and GXP facilities would be within SSAs or state-designated aquifers. Construction of the facilities could result in increased turbidity and alteration of flow in shallow aquifers if encountered within trench depth or during grading and excavation at aboveground

facilities. These impacts would be minimized by measures included in the Companies' respective ECSs and SPCC Plans, as well as our recommendations.

Four WHPAs were identified within the 3-mile-search radius of the MXP-100 pipeline, and an additional 30 WHPAs were identified within 3 miles of MXP pipe/contractor yards and access roads. Due to the proximity of the MXP construction work area to four drinking water wells, we have included a recommendation to establish pre- and post-construction notification protocols with Doddridge County Park and the Roane-Jackson Technical Center.

No WHPAs or Source Water Protection Areas are within 3 miles of the GXP compressor station sites in Kentucky, and no WHPAs were identified within 3 miles of the compressor station sites in Tennessee. Four PWS wells were identified within 3 miles of the New Albany station site in Mississippi; all of them are greater than 2 miles from the site. No springs crossed by the MXP have a flow of greater than or equal to 100 gpm.

Columbia Gas consulted with the WVDHHR to obtain location data for PWS wells within 150 feet of project workspaces. Additionally, Columbia Gas sought to identify private supply wells through landowner discussions, civil survey, and well records from the respective county health departments. To date, 42 private wells have been identified, 12 of which are abandoned. Columbia Gas would determine the status of water wells within the workspace and offer pre-construction testing of all water wells within 150 feet of the construction work areas.

Columbia Gulf consulted with the KDEP, TDEC, and MDEQ to obtain location data for PWS wells within 150 feet of GXP station workspaces. No public wells are within 150 feet of the project workspaces. Information about private wells and springs located near the station sites was obtained through discussions with landowners and field surveys. One private well was identified approximately 33 feet to the south-southwest of the existing Leach C Meter Station. No springs were identified within 150 feet of any GXP facilities.

Columbia Gas proposes use of HDD at one location – the Kanawha River. The HDD crossing of the Kanawha River would, at its deepest point, involve drilling to a depth of about 150 feet below the ground surface through the alluvial aquifer of this river valley. An inadvertent release of drilling mud could occur during drilling operations, affecting groundwater turbidity, which would diminish with time and distance from the point of release. Absent an inadvertent return event, no adverse impact on groundwater would occur as a result of HDD operations because the drilling fluid would be largely confined to the bore (cooling the drill bit and transporting cuttings to the surface) and the walls of the bore (where it creates a clay barrier to limit fluid migration away from the bore and external groundwater seeping into the bore).

We have determined that construction activities are not likely to significantly impact groundwater resources in the long-term because the majority of construction would involve shallow, temporary, and localized excavation. Trench depths are typically less than 10 feet, while the typical depth to groundwater ranges from 25 to 50 feet in the MXP area. Excavation associated with MXP and GXP aboveground facilities would be less than 6 feet deep in most instances. Columbia Gas would avoid or further minimize impacts by using construction BMPs such as temporary and permanent trench plugs and interceptor dikes.

The Companies' respective ECSs would be implemented during construction to manage any required dewatering. The greatest threat posed to groundwater resources would be a hazardous material spill or leak into groundwater supplies. We have reviewed the Companies' respective ECSs and SPCC Plans and conclude that they adequately address strategies and methods to prevent or limit such contamination should a spill occur. We do not anticipate any significant, long-term impacts on aquifers or groundwater supplies from construction or operation of the MXP and GXP given the relatively shallow depths required for construction.

Columbia Gas estimates that about 88 percent of the MXP-100 and MXP-200 pipeline routes crosses bedrock at depths of less than 60 inches where blasting may be required for pipeline installation. Additionally, Columbia Gulf anticipates encountering bedrock during construction at several compressor station sites. Blasting could affect groundwater quality by temporarily changing groundwater levels and increasing groundwater turbidity near the construction right-of-way. Impacts on nearby wells and springs from blasting would be temporary and would likely dissipate shortly after blasting or after a well has been flushed several times. The Companies have agreed to perform pre- and post-construction monitoring for well yield and water quality for private wells within 150 feet of construction workspaces (with landowner consent) for water quality and quantity parameters, including well yield, before and after construction, and provide an alternative water source or a mutually agreeable solution in the event of construction-related impacts. We conclude that with these measures along with our recommendations, and adherence to the Companies' respective blasting plans, impacts from blasting on groundwater resources would be reduced to less-than-significant levels.

5.1.3.2 Surface Water

The MXP pipeline centerlines would directly cross 381 minor waterbodies, 109 intermediate waterbodies, and 7 major waterbodies. The 381 minor waterbodies are mostly ephemeral drainages typical of the topography in the MXP area; and, most of these will be dry at the time of construction. Columbia Gas' ECS, which follows FERC's Procedures would be followed in the instances of wet or flowing water. The seven major crossings are of the Fish Creek, South Fork Hughes River (crossed twice), Little Kanawha River, Spring Creek, Kanawha River, and the Mud River. In addition to these 497 crossings, another 326 streams would be within the construction rights-of-way, but not crossed by the pipeline trench directly. Access roads associated with pipeline construction would require crossings of intermediate and minor waterbodies that are classified as ephemeral, intermittent, and perennial. Surveys of the pipe yards and staging areas identified one intermittent stream, seven ephemeral streams, and one pond. Columbia Gas would avoid these features where practicable. At locations where impacts are unavoidable (e.g., where bridges or culverts are required to access the site), Columbia Gas would implement procedures from its ECS and conditions from applicable permits. Following construction, all pipeyards and staging areas would be restored in accordance with the ECS, agency requirements, and landowner stipulations.

The majority of MXP stream crossings are proposed as dry-ditch crossings when water is flowing in the channel. Because dry-ditch crossing construction methods such as a flume or dam-and-pump allow for trenching and backfill activities to occur under relatively dry conditions, they would minimize the potential for sedimentation of the waterbody and avoid disruption to water flow. If trench dewatering is necessary, it would be conducted in a manner that would not cause

erosion or result in silt-laden water entering the waterbody, as outlined in Columbia Gas' ECS. Following construction, waterbody beds and banks would be restored to pre-construction contours and revegetated.

The HDD crossing method would be used to cross the Kanawha River, while Columbia proposes to use the dam-and-pump or flume method to cross the other major waterbodies. To minimize the potential for an inadvertent release of drilling fluid, Columbia Gas would implement measures identified in its Horizontal Directional Drilling Contingency Plan, which describes site-specific procedures to monitor, avoid, contain, and clean up any inadvertent drilling fluid releases.

The MXP centerline would traverse 50 streams that are listed as impaired on the West Virginia 303(d) list. Only one 303(d) impaired waterbody is adjacent to a proposed pipe yard. Twenty-seven access roads would cross 303(d) impaired waterbodies.

West Virginia identifies some streams as HQW based on their ability to support certain fisheries. Construction of the MXP-100 and MXP-200 pipelines and access roads would result in crossing of multiple waterbodies classified as HQW. The pipe yards and staging areas would not cross any HQWs. Columbia Gas would observe instream work timing windows for fisheries based on requirements or approved permit conditions from the WVDNR. The WVDHHR did not identify any potable water intakes within 3 miles downstream of any MXP crossings. However, the data provided by the WVDHHR identified ZCC and ZPC that are considered surface water protection areas in corridors along waterbodies within Source Water Protection Watersheds; therefore, we have recommended further communication by Columbia Gas with the appropriate government entity or water utility authority prior to construction.

A total of 17 waterbodies could potentially be affected by the GXP, including 13 ephemeral streams and 4 impoundments/stock ponds. Columbia Gulf would implement the measures included in its ECS, which incorporates FERC's Procedures, to avoid or minimize impacts on the ephemeral waterbodies and ponds present on several of the compressor station sites.

We received a comment during public scoping regarding concerns with the potential for upstream impacts due to construction within proximity of the ephemeral drainage that crosses the Holcomb Compressor Station site. The Holcomb Compressor Station site is bisected by an ephemeral drainage that would be crossed to provide access to TWS north of the feature. Columbia Gulf would mitigate impact on this drainage by installing erosion controls and a temporary bridge or culvert during construction. The temporary crossing would be removed during site restoration. One commenter expressed concern that construction activities might impede flow in this ephemeral drainage, causing it to back-up onto the commenter's property. Columbia Gas would install a bridge (or culvert) across the feature and implement its ECS, therefore, we conclude that impact on the flow capacity of this drainage would be avoided.

We received a number of comments about potential impacts from the new Cane Ridge Compressor Station on the nearby Mill Creek, which lies to the southeast of the site and is separated from the site by Barnes Road and either undeveloped forest or a residential subdivision and Columbia Gulf's existing right-of-way. Due to the distance of the compressor station to Mill Creek (about 450 feet at the nearest point), the likelihood of a spill or leak at the new compressor

station having an impact on Mill Creek is remote. Once site restoration is complete, site runoff would be directed to an on-site pond for infiltration into the ground.

Accidental spills and leaks of hazardous materials associated with vehicle refueling or maintenance, and the storage of fuel, oil, and other fluids can have immediate effects to aquatic resources and could contaminate a waterbody downstream of the release point. The Companies would implement procedures from their respective ECSs and SPCC Plans to avoid or minimize impacts associated with spills or leaks by restricting the location of refueling to at least 100 feet from a wetland or waterbody. During construction, fuel storage would be surrounded by a dike with an impervious lining in accordance with the Companies' respective SPCC Plans. Machinery would be routinely inspected for leaks, and any spills would be contained, cleaned up, disposed of, and reported as per the SPCC Plan.

We have determined that no significant impacts on surface waters would result from construction and operation of MXP and GXP. Columbia Gas would bury the pipeline beneath the bed of all waterbodies, implement erosion controls, and restore the streambanks and streambed contours as close as practicable to pre-construction conditions. Columbia Gas would also implement the measures contained in its ECS during construction to minimize instream impacts. Through consultation with the USACE, Columbia Gulf would determine the jurisdictional status of water features at its compressor station sites and would avoid or mitigate impacts as required by permit conditions. Columbia Gulf would implement BMPs, as specified in its ECS, and would restore temporary work areas not encumbered by permanent facilities after construction.

5.1.3.2.1 Surface Water Uses during Construction

Columbia Gas would use about 50 million gallons of water from surface water sources for hydrostatic testing its pipeline segments and new aboveground facilities, which could temporarily affect the recreational and biological uses of the waterbody if the diversions constitute a substantial percentage of the source's total flow or volume. For this reason, we have recommended further consultations with the WVDNR prior to withdrawing water from certain streams in West Virginia. As practicable, hydrostatic test water would be transferred between test segments to minimize the total volume of test water needed. Following testing, the test water would be discharged into well-vegetated upland locations adjacent to the construction work area, in accordance with permit conditions and Columbia Gas' ECS.

Hydrostatic testing would also be required to confirm the integrity of facilities and associated suction and discharge pipelines connecting the new compressor stations with Columbia Gulf's system. Municipal water would be trucked to each facility site from a commercial source or pumped from an on-site well. The amount of water used for hydrostatic testing at each facility varies, but would total about 1.4 million gallons. Columbia Gulf would attempt to re-use hydrostatic test water at multiple facilities to minimize the volume of water used and may re-use the water for fugitive dust mitigation, as needed. Test water would be discharged on site in accordance with Columbia Gulf's ECS and applicable permits. Columbia Gulf may use methanol following hydrostatic testing to scavenge any residual water from the pipe.

Both Companies would use municipal, on site (new wells), and surface water sources for dust control; although the amount would be highly variable based on the conditions at the time of

construction. During extremely dry conditions, the construction work area would be sprayed with water to reduce fugitive dust in residential areas. All appropriate permits and authorization required would be obtained prior to conducting any dust control activities.

Columbia Gas would minimize the potential effects of water withdrawals from surface water and groundwater sources by adhering to the measures in its ECS, and to any additional state and federal conditions. Both Companies would also implement the measures in their respective ECSs to protect surface waters during the discharge and disposal of hydrostatic test waters. Therefore, we conclude that impacts on surface waters from withdrawal of test and dust control water would be minimized and not significant.

5.1.4 Wetlands

Based on the results of a wetland field survey, approximately 7.6 acres of wetlands are within the MXP construction footprint. Construction of the pipeline facilities would temporarily impact 5.1 acres of PEM and 0.5 acre of PSS wetlands within the construction right-of-way. In addition, less than 0.5 acre of PFO wetlands would be temporarily impacted by construction activities, of which less than 0.2 acre would be converted to a PEM or PSS wetland type due to pipeline operational and maintenance activities within the permanent pipeline easement. Less than 0.1 acre of PEM wetlands would be permanently altered at the White Oak Compressor Station site. Temporary impacts on wetlands within the footprint of contractor yards and access roads would be restored to pre-construction contours following construction. Operational and maintenance activities associated with access roads would not impact any wetlands.

In wetlands, the construction right-of-way would be generally limited to a width of 75 feet, except in areas where Columbia Gas has requested ATWS within a wetland. Columbia Gas has filed site-specific justifications for ATWS within 50 feet of a wetland or within the boundaries of a wetland for approval from FERC. Wetlands located in the vicinity of MXP construction activities would be avoided where possible, and Columbia Gas would implement appropriate BMPs in accordance with its ECS to protect each wetland.

The majority of MXP construction impacts are to PEM wetlands, which would recover quickly following right-of-way restoration (typically within 1 to 3 years). Long-term temporary and permanent impacts would occur within PFO wetlands, as trees would be removed from the permanent right-of-way, which would be mowed or otherwise cleared periodically to maintain it in an herbaceous state. These impacts on PFO wetlands would be minimized, as those portions of the right-of-way used for construction and not maintained within the permanent pipeline corridor would be allowed to revegetate; however, revegetation of PFO wetlands could take several years. Columbia Gas would maintain a 30-foot-wide corridor in PFO wetlands, with selective removal of trees within 15 feet of the pipeline, resulting in less than 0.2 acre of impacts on PFO wetlands for the MXP. Additionally, Columbia Gas would maintain a 10-foot-wide herbaceous strip centered over the pipeline through wetlands, which would allow for growth of PSS wetland habitats. Columbia Gas would mitigate for unavoidable wetland impacts by implementing the procedures specified in its ECS, and by complying with the conditions of its pending section 404 and 401 permits.

In accordance with a MXP-specific wetland restoration plan and its ECS, Columbia Gas would conduct routine wetland monitoring for a minimum of 3 years (or until revegetation is successful) and submit annual reports to the Commission on the status of wetland restoration and vegetation growth. Where revegetation is not successful at the end of 3 years, Columbia Gas would develop and implement remedial revegetation plans, in consultation with a professional wetland ecologist, to actively revegetate any wetland, continue revegetation efforts, and file annual reports until wetland revegetation is successful.

Wetland impacts from the construction and operation of the GXP would include one PEM wetland at the Morehead Compressor Station, one PEM wetland at the Leach C Meter Station, one PEM wetland at the Holcomb Compressor Station, and three PEM wetlands at the New Albany Compressor Station. The wetland at the Morehead station would be culverted during construction and operation, resulting in less than 0.01 acre of permanent impact. The wetland at Leach C Meter Station would be matted during construction and would be returned to preconstruction conditions following construction. The wetland at the Holcomb Compressor Station would be avoided and no impacts are expected. The New Albany wetlands would be disturbed by TWS during construction; however, permanent impacts would be less than 0.01 acre. Columbia Gulf anticipates that wetland impacts would be approved under the USACE Nationwide Permit Program and would not require compensatory mitigation. We conclude that impacts on wetlands associated with the GXP would be unavoidable, but with implementation of BMPs in Columbia Gulf's ECS, impacts would not be significant.

Based on the types and amounts of wetlands that would be impacted and the Companies' measures to avoid, minimize, and mitigate wetland impacts (as described in their construction and restoration plans) as well as compliance with USACE section 404 and state permit requirements, we conclude that impacts on wetlands would be effectively minimized or mitigated.

5.1.5 Vegetation

The main vegetation type the MXP would impact during construction is forested (about 2,400 acres). Additional vegetation impact types impacted by construction include agricultural lands (about 674 acres), and open lands (about 314 acres). Permanent vegetation impacts associated with operation of the MXP would include conversion of about 814 acres of upland forest, about 163 acres of agricultural land, and about 66 acres of open land. Following construction, all staging areas and pipe yards would be restored to pre-construction conditions in accordance with Columbia Gas' ECS or per landowner agreements.

The main vegetation type that would be disturbed by construction of the GXP is agricultural (about 149 acres). Additional vegetation impact types include upland forested lands (about 22 acres) and open lands (about 13 acres).

Impacts on upland open land, emergent wetlands, and agricultural lands would be short-term as these vegetation cover types would likely return to their pre-construction states within one to three growing seasons after restoration is complete and typically do not require maintenance mowing. The exception would be at aboveground facilities where construction would permanently convert existing vegetation cover into an industrial site.

We received comments during public scoping expressing concern regarding the potential impacts of the MXP on interior forest. Thus, interior forests were assessed by identifying CFAs based upon the acreage of contiguous habitat. During MXP construction, about 1,311 acres of impact would occur to CFAs. Permanent impacts on CFAs, for operation of the facilities, would total about 490 acres; the majority of impacts on CFAs would result from pipeline construction. Interior forest tracks would not be affected by GXP construction. In our draft EIS, we overestimated the MXP's impacts on core forest areas due to the number of existing access roads that were inadvertently evaluated as newly constructed access roads. The corrected numbers have been incorporated into this EIS; however, our conclusions remain the same.

Impacts on forested uplands, forested wetlands, and scrub-shrub wetlands would be long-term or permanent and would constitute the most pronounced change in vegetation strata, appearance, and habitat. Trees would be cleared within the construction area and replaced by herbaceous plants, shrubs, saplings, and other successional species until trees can again flourish, which can take several decades or longer to occur. Regeneration of scrub-shrub wetlands would likely require 3 to 5 years to regain their woody composition. Forested uplands and wetlands would take several more years and up to decades in some instances to grow back. Moreover, the forest land on the permanent MXP pipeline right-of-way would be permanently impacted by ongoing vegetation maintenance during operations, which would preclude the re-establishment of trees in the right-of-way. Based on the acreage of mature upland forest and the fragmentation of interior forest blocks and CFAs by construction and operation of the MXP, the permanent conversion of some forested habitat to a new right-of-way corridor, and the length of time required to recover forested vegetation in the temporary workspace, these impacts would be considered significant. Columbia Gas would attempt to minimize these impacts through the implementation of its ECS, in addition to the recommendations made below in section 5.2. Due to the minimal impact on forested areas from construction and operation of the GXP, we conclude the small amount of permanent conversion of forested lands associated with the new GXP facilities would not result in a significant impact.

No WVDNR NHP rare, significant, or unique ecological communities were identified within the MXP area. However, four state-owned WMAs are crossed by the MXP pipeline centerline. These WMAs are managed for habitat and are not considered unique, rare, or significant except for the Lewis Wetzel WMA, which has been recognized as an IBA for the management of cerulean warblers. No federal or state-owned or managed lands are present within the proposed GXP compressor station sites. Additionally, no unique, sensitive, or protected vegetation communities were identified at the GXP sites.

The removal of existing vegetation and disturbance of soils within MXP work areas during construction would create conditions conducive to the spread and establishment of noxious and invasive weeds, particularly where new corridors are established in previously vegetated areas. Invasive species could also spread during MXP operation due to the transmission of seeds or viable plant fragments from infested areas via mowing equipment. To limit the potential spread of invasive species, Columbia Gas states that it is continuing consultations with the WVDNR, WVDEP, and West Virginia Office of the NRCS to develop BMPs to control the spread of invasive and noxious species. Columbia Gas has committed to monitoring for invasive species for 3 years following construction; however, we believe that additional post-construction invasive species

monitoring may be needed, and we are recommending that Columbia Gas prepare a project-specific noxious and invasive weed management plan.

To limit the potential spread of invasive species, Columbia Gulf would limit vegetation removal to the extent necessary to construct the project and either burn, chip, or haul cleared vegetation to a commercial disposal facility. Additionally, Columbia Gulf would implement the measures in its ECS, which would promote the establishment of desirable plant species and deter the spread of unwanted plant species. Columbia Gulf would also conduct post-construction monitoring for noxious weed growth in revegetated areas. We conclude that the potential spread of noxious or invasive weeds would be avoided or effectively mitigated for both the MXP and GXP.

Further, based on comments received during the public review period on the draft EIS, we have added a recommendation for the GXP regarding the emerald ash borer beetle, which would apply to both compressor station sites in Tennessee where tree removal would occur.

5.1.6 Wildlife and Aquatic Resources

The MXP and GXP could have both direct and indirect impacts on wildlife species and their habitats, including the displacement of wildlife, potential individual mortality, and reduction in habitat. Forest fragmentation would increase in certain locations due to clearing, thus reducing the amount of habitat available for interior forest species. With habitat conversion and forest fragmentation, there is also a risk of intrusion by invasive or noxious species. To minimize impacts, the Companies have sited facilities to avoid sensitive areas, co-locate with existing rights-of-way where practicable, and reduce workspace in wetlands and interior forest areas. The Companies' would each adhere to their ECSs, and Columbia Gas would adhere to its Invasive Species Management Plan, as recommended below in section 5.2.

The effect to species that rely on open land habitats would be short-term, and vegetation in these areas would likely recover within 1 to 3 years after construction. Cleared scrub-shrub vegetation would likely require several years to regain its woody composition. Forested lands could take decades to return to pre-construction condition, and Columbia Gas would prevent trees from reestablishing on the permanent right-of-way. Most forest-dwelling wildlife species would not be significantly impacted by the presence of the right-of-way, due to the amount of forested habitat available in the overall project area. Columbia Gas would further minimize impacts by co-locating workspaces with other existing rights-of-way in certain areas (approximately 22 percent of the proposed alignment) to reduce the amount of additional clearing required, and by reducing the pipeline construction right-of-way to 100 feet in interior forest areas, where possible.

A variety of migratory bird species are associated with habitats that would be affected by the MXP. Columbia Gas has consulted with the USFWS and WVDNR to implement appropriate steps to avoid and minimize the potential for the unintentional take of migratory birds during project construction and operation. Implementation of Columbia Gas' ECS during construction and operational practices would reduce the potential for impacts on migratory birds. Columbia Gas would attempt to complete vegetation clearing in forested areas before the nesting season begins in April; however, limited vegetation clearing activities may continue into May, with some risk of affecting active nests of migratory birds. Mitigation required for wetland impacts under

section 404 of the CWA, particularly mitigation for the conversion of forested wetlands to other cover types, would help in providing habitat mitigation for birds that utilize wetland habitats. We agree that the measures proposed by Columbia Gas could help reduce impacts on migratory birds and are consistent with the goals of the MBTA MOU. However, we have recommended further consultations with USFWS and WVDNR to address impacts on suitable habitat for the cerulean warbler, which was identified in the MXP area. Because the cerulean warbler is considered by the WVDNR as especially sensitive in the MXP area, we have concluded that the significant impact on interior forest habitat and CFAs would extend to this species, although we do not expect direct mortality on the birds themselves.

No bald eagle nests or eagles were identified during site surveys in the vicinity of the MXP or of the GXP compressor station sites in Kentucky. Additionally, the KDFWR did not identify golden eagle nests or documented occurrences in the area during review of the GXP. IPaC data indicate that bald eagles may occur in or near the GXP sites in Tennessee and Mississippi; however, no bald eagle nests or eagles were identified at the project sites or along nearby public roads during field surveys. Additionally, both the TDEC and the MDWFP maintain records of known bald eagle nest locations in Tennessee and Mississippi, respectively, and confirmed that no bald eagle nests are documented within the GXP counties. Based on the results of biological field surveys conducted by Columbia Gulf and agency consultations, we believe that construction and operation of the GXP would be in compliance with National Bald Eagle Management Guidelines and would not affect the bald eagle.

The MXP pipelines would result in 123 crossings of B1 fisheries and 37 crossings of HQWs. Based on a review of Columbia Gas' MSHCP database, USFWS's IPaC, and consultation with the WVDNR, one protected fish species, the federally endangered diamond darter, and no commercial fish species or coldwater fisheries, are known or believed to occur within waterbodies crossed by or located near the MXP.

No waterbodies classified as a fishery resource would be affected by any of the GXP compressor station sites. Columbia Gulf would implement the measures included in its ECS, which adopts the measures of FERC's Plan and Procedures, to minimize impacts on waterbodies and associated fisheries, such as the installation and maintenance of sediment and erosion controls to manage the quality of storm water runoff during construction. We conclude that the construction and operation of the MXP and GXP would not have a significant impact on fisheries or other aquatic resources.

5.1.7 Special Status Species

To comply with section 7 of the ESA, we consulted either directly or indirectly (through the Companies' informal consultation as our federal representative) with the USFWS and state resource agencies regarding the presence of federally listed, proposed for listing, or state-listed species in the MXP and GXP areas. Within MSHCP-covered lands, Columbia Gas and Columbia Gulf would implement AMMs for species identified in the MSHCP. Where we determine that the proposed activities are consistent with the MSHCP, the subsequent programmatic BO and/or resource agency concurrence letters, no further consultation is required. For non-MSHCP species (i.e., listed species occurring within covered lands but not authorized for incidental take under the MSHCP), Columbia Gas and Columbia Gulf would implement BMPs similar to the AMMs, and

additional section 7 consultation may or may not be required. In addition, consultation with the USFWS in compliance with section 7 of the ESA is required for project areas and species that are not covered under the MSHCP (i.e., non-covered lands, non-covered species) if the proposed activity deviates from the MSHCP in scope or location; the activity may affect a non-MSHCP species or designated critical habitat; or the activity otherwise deviates from the MSHCP, programmatic BO, and/or concurrence letters.

Mountaineer XPress Project

According to the USFWS, there are four bat species, one fish species, and eight mussel species protected under the ESA in the MXP project vicinity. Three species (gray bat, Virginia big-eared bat, and northern riffleshell) are MSHCP species associated entirely with MSHCP covered lands; five species (Indiana bat, NLEB, and the clubshell, fanshell, and sheepnose mussels) are MSHCP species associated with both covered and non-covered MSHCP lands; five species (diamond darter and pink mucket, rayed bean, snuffbox, and spectaclecase mussels) are non-MSHCP species. Columbia Gas initiated specialized surveys for federally protected species in areas not covered under the MSHCP.

We determined that suitable habitat for the Indiana bat and NLEB is present within all counties affected by the MXP. In those areas covered by the MSHCP, Columbia Gas would implement the applicable AMM for these species, including prohibiting clearing activities during certain times of year to protect maternity colonies. In non-covered MSHCP lands, Columbia Gas would submit survey results to the USFWS, which would work with Columbia Gas to address any species-specific issues and develop AMMs for federally protected species affected by the MXP. No known roosting habitat for the Virginia big-eared bat is within 6 miles of the project area, and no AMMs would be required. No further section 7 consultation is required for this species.

To avoid disturbance of the diamond darter population known to exist in the Elk River, there would be no instream work at the Elk River Compressor Station site. We do not anticipate direct impacts on this species, and applicable AMMs for this species (as identified in the MSHCP) would be implemented by Columbia Gas. For any activity within 100 feet of the Elk River with potential effects, Columbia Gas would include special procedures within its EM&CP. Based on these measures and the fact that the project would not directly impact the Elk River, we have concluded that the MXP is *not likely to adversely affect* the diamond darter. The USFWS has concurred with our determination.

With USFWS and WVDNR approval, Columbia Gas also conducted initial surveys for protected mussel species in 2015 and 2016. In consultation with the USFWS and WVDNR, Columbia Gas will perform additional stream surveys for mussel species in 2017. If presence is identified during surveys, Columbia Gas and the USFWS will determine the appropriate AMMs to be implemented outside of MSHCP-covered lands. It is anticipated that the AMMs for mussels located outside of MSHCP lands would be consistent with the requirements of the MSHCP. Columbia Gas anticipates completing the remaining mussel surveys in late spring 2017.

West Virginia has no state endangered species legislation; therefore, the only species listed as threatened or endangered in the state are those listed as such by the federal government. The WVDNR NHP does assign state rankings to species considered rare based on the species' documented occurrences and distributions as well as other factors, such as habitat and threats to

existing populations. To date, Columbia Gas has not identified any S1 ("Critically Impaired") or S2 ("Imperiled") state-ranked terrestrial species during biological surveys; however, as noted above, surveys are being undertaken for mussels in suitable streams crossed by the MXP. Based on our recommendations in section 5.2, Columbia Gas would not begin construction until all section 7 consultations are complete, as well as consultations with WVDNR regarding state-protected mussels.

Gulf XPress Project

All GXP facilities are in areas covered by the MSHCP. Therefore, AMMs would be implemented by Columbia Gulf as required for all MSHCP-covered species where it is determined that the project *may affect* these species. For non-MSHCP species, the USFWS would address potential take programmatically through tiered Section 7 consultations. Acting as our non-federal representative, Columbia Gulf has completed informal consultations with USFWS for non-MSHCP species potentially occurring at the GXP locations. Columbia Gulf conducted field surveys of all GXP preferred site locations and suitable alternatives in June 2015 for federal and state-listed species.

According to the USFWS IPaC Trust Resource Reports generated for the project locations, 4 bat species, 1 fish, 18 species of mussels, 1 insect, 1 crustacean, and 6 plant species that are protected under the ESA (or candidate species) may occur in the GXP area.

Suitable gray bat habitat (i.e., cave habitat) was not identified at GXP sites during field surveys. Through MSHCP review and consultation with USFWS, we determined the GXP is *not likely to adversely affect* this species. Potential Indiana bat and NLEB summer habitat was identified in the vicinity of all GXP sites. The Indiana bat and NLEB are covered species in the MSHCP, the GXP is *likely to adversely affect* these species without avoidance and mitigation. Therefore, Columbia Gulf would implement the appropriate AMMs for these species, including clearing only during those periods described in the MSHCP, when Indiana bats and NLEBs would be less likely to be affected by construction activities. The Virginia big-eared bat is a covered species in the MSHCP and is considered *not likely to adversely affect*. Because no habitat exists for this species at GXP sites within its range, no AMMs would be implemented, and no further section 7 consultation is required.

We received comments from the public regarding the potential for the Nashville crayfish to occur in the vicinity of the Cane Ridge Compressor Station. With regard to this species, the USFWS stated that although it does not anticipate the Nashville crayfish to occur at the station site, due to the location of the site relative to Mill Creek where there are known occurrences, the USFWS recommends that strict sediment and contaminant runoff prevention measures be in place during construction and operation of the facility. Based on the information provided, the USFWS concluded that the requirements of section 7 of the ESA have been fulfilled. We agree with these findings.

We identified 110 state-listed threatened and endangered species in Kentucky, 36 state-listed species in Tennessee, and 2 state-listed species in Mississippi where GXP activities would occur. Based on review of the site locations, habitat requirements of the species, and general

biological surveys, there is no suitable habitat for any state-listed-only species located at the GXP sites; thus, no impacts on these species are expected.

Although a number of other candidate, state-listed, or special concern species were identified as potentially present in the MXP and GXP areas, none were detected during surveys, and we do not expect any adverse effects given the Companies' proposed measures and our recommendations. Based on implementation of these measures and our recommendations, we conclude that impacts on special-status species would be adequately avoided or minimized.

5.1.8 Land Use, Recreation, Special Interest Areas, and Visual Resources

Mountaineer XPress Project

Construction of the MXP would impact a total of about 3,647 acres. About 76 percent of this acreage would be utilized for the pipeline facilities. The remaining acreage impacted during construction would be associated with aboveground facilities (4 percent), pipe yards and staging areas (13 percent), and access roads (8 percent). Following construction, about 1,076 acres of land would be permanently encumbered by operation of the MXP.

The MXP pipeline right-of-way would generally be allowed to revert to its former use, except for forest/woodland and tree crops. Approximately 131 miles of the 170.9 miles of the proposed MXP pipeline routes pass through forested areas. There would be a permanent change in the visual appearance to forested lands within the permanent easement (50 feet wide for the pipelines) because they would be maintained in an herbaceous state for pipeline surveillance and operations purposes. This maintained right-of-way would be mowed no more than once every 3 years, but a 10-foot-wide strip centered over the pipeline might be mowed more frequently to facilitate maintenance and operational surveys. Trees and shrubs in the TWS and ATWS areas would be allowed to regenerate to pre-construction conditions.

Agricultural lands affected by construction would include cultivated croplands and uncultivated lands, such as hayfields. The primary impacts in these areas would be short-term and limited to the growing season concurrent with construction. Farmers would experience some loss of crop production in areas directly disturbed by construction-related activities. Following construction, agricultural practices within the pipeline rights-of-way would be allowed to resume.

Columbia Gas is currently not aware of any existing drain tile systems within the construction work area; however, Columbia Gas is consulting with landowners in an attempt to locate and flag existing drainage tiles. If drainage tiles are exposed or damaged during construction activities, appropriate measures to repair/replace them would be implemented after communication with the landowner and in accordance with applicable regulatory guidelines.

Impacts on visual resources would be greatest where the MXP pipeline parallels or crosses roads and the pipeline right-of-way may be seen by passing motorists; from residences where vegetation used for visual screening or for ornamental value is removed; and where the pipelines are routed through forested areas. A portion of the MXP pipeline (about 22 percent) would be installed within or parallel to existing utility rights-of-way. As a result, the visual resources along this portion of the MXP pipeline have been previously affected by other similar activities. In other areas, the visual effects of construction in forests would be permanent on the maintained pipeline

right-of-way where the regrowth of trees would not be allowed, and would be long-term in the TWS. After construction, all disturbed areas within the pipeline right-of-way, including forested areas, would be restored in compliance with the Columbia Gas' ECS; federal, state, and local permits; landowner agreements; and easement requirements. The new aboveground facilities would result in a permanent visual impact throughout the operational life of the MXP.

Columbia Gas' proposed construction work areas would be within 50 feet of 49 houses. To address impacts on residences, Columbia Gas developed site-specific construction plans for each of the residences. If any damages to residential property result from construction, Columbia Gas would repair the damaged property or provide appropriate compensation to the landowner. All TWS and ATWS on residential land would be restored to its pre-construction condition, or as negotiated with the landowner during right-of-way easement discussions. Landowners would receive a 2-week notification prior to construction on their respective properties. Columbia Gas would implement an environmental complaint resolution procedure for construction and for a period of at least 2 years following the completion of construction. Prior to construction, Columbia Gas would mail a letter describing the procedures to landowners whose properties would be affected by the MXP.

We have reviewed the site-specific plans, mitigation, and associated workspace justifications and noted that the distance between a residence and the construction work area is less than 25 feet for 33 residences (11 of which are associated with the pipeline construction corridor). In these locations, the pipeline trench would not remain open overnight. Residential driveways are crossed by the construction work area on eight tracts. Columbia Gas' plans indicate that vehicle access to residences would be maintained at all times, or other accommodations would be made with the landowner. We noted a fenced corral and a shed within the construction work area for two tracts. The plans generally indicate that these and other physical features that need to be protected would be enclosed in safety fence to avoid disturbance during construction. However, it appears that these structures may need to be removed or relocated to accommodate construction. Therefore, we are recommending that Columbia Gas provide additional information regarding these tracts.

We received scoping comments regarding the potential loss of privacy from clearing mature trees in residential areas. We believe that the general and site-specific mitigation measures proposed by Columbia Gas would address these concerns, including preservation of mature trees and landscaping at the edge of the construction right-of-way, unless removal is necessary.

The MXP would cross or pass within 0.25 mile of five WMAs managed by the WVDNR and one West Virginia Scenic Byway. During the public scoping process, we received comments regarding concerns with impacts on recreational areas used for hunting. Columbia Gas would work with WVDNR officials to maintain the continued public recreational use of affected WMAs during construction of the MXP. Columbia Gas would adhere to its ECS and WVDNR requirements when constructing facilities within the WMA. Once construction is complete, the MXP is not expected to have permanent impacts on the WMAs ability to continue to serve as a public recreational resource and to protect biodiversity. Following construction, most open land uses, such as hunting, would be able to continue. Columbia Gas would enter into an agreement with the WVDNR to obtain easement rights through the WMAs for a term of 15 years, which

would be renewable. Columbia Gas is continuing discussions about the MXP with the WVDNR for each of the WMAs.

About 0.2 mile of a well-developed, existing access road associated with the MXP crosses one conservation easement, the Lantz Farm and Nature Preserve, in the vicinity of MP 29.0 in Wetzel County. The property is owned by the Wheeling Jesuit University and cooperatively managed by the WVDNR. Columbia Gas met with the WVDNR on September 7, 2016, to discuss the project and the current proposed route. Based on the meeting, it appears that Columbia Gas and the WVDNR can successfully execute a license agreement for the current proposed route or the route with slight modifications. Columbia Gas will continue to work with the WVDNR to finalize the route. Once finalized, Columbia Gas will provide us with an update and summarize the associated impacts.

The MXP would cross several recreational trails managed by state, local, and private entities. Within the Lewis Wetzel WMA, the MXP would cross four designated trails and is within 0.25 mile of two additional trails. The MXP would also cross the North Bend Trail, which is a 72-mile-long rail-trail managed by the WVDNR. In addition to the state-maintained trails, the MXP-100 would cross a 2-mile-long nature trail owned by the Roane-Jackson Technical Center and the 67-mile-long Warrior Trail in Marshall County. Columbia Gas would work with each trail management agency to establish safety protocols at each crossing and would make efforts to alert recreational users of trails and other recreation areas of the anticipated time and duration of disruptions associated with construction. Construction of the MXP could temporarily impact the quality of trail user's recreational experience, as well as affect visual impacts on trail-users hiking in areas near MXP construction activities. Columbia Gas would also work with the respective trail management agencies to develop site-specific crossing methods and restoration plans for each trail crossing, which may include the installation of visual screening, such as special plantings. In general, MXP pipeline impacts on recreational and special interest areas would be temporary and limited to the period of active construction. These impacts would be minimized by implementation of Columbia Gas' ECS.

The MXP would not cross any current or proposed wild and scenic rivers or be located within the Coastal Zone as established in the CZMA. No federally managed lands would be crossed by or are within 0.25 mile of the MXP.

Gulf XPress Project

All the GXP facilities would be sited on land owned by Columbia Gulf. Project construction would temporarily disturb a total of about 198 acres. Following construction, about 82 acres of land would be permanently converted to developed land for operation of the GXP. The primary land use types that would be permanently encumbered would be agricultural (77 percent), forested (15 percent), and open land (7 percent). Developed land, open water, and wetlands would make up the remaining 1 percent of permanent impacts. No houses are within 50 feet of either the temporary or permanent workspace of any of the facilities.

The GXP facilities would be within 0.25 mile of two publicly owned lands, the DBNF and the Malmaison WMA. The DBNF comprises 708,000 acres, of which a portion is about 600 feet east of the Morehead Compressor Station in Kentucky. Public recreational uses of the DBNF

include camping, horseback riding, swimming, hiking, target shooting, caving, geocaching, wildlife viewing, boating, and fishing. I-64 is located between the compressor station site and the DBNF; therefore, construction and operation of the station would likely not be noticeable from the DBNF. Columbia Gulf contacted representatives from the DBNF, who indicated that they had no concerns regarding the GXP because the compressor station site is on private lands.

A portion of the Malmaison WMA is about 1,000 feet west of the Holcomb Compressor Station in Mississippi. The 9,483-acre Malmaison WMA is utilized for hunting, fishing, wildlife viewing, and hiking. The GXP could result in temporary and permanent visual impacts on the WMA. However, the presence of forested areas between the compressor station site and the WMA would provide visual screening. Columbia Gulf attempted to contact representatives of the WMA; however, no responses were received.

We received multiple scoping comments regarding a zoning ordinance amendment (Ordinance No. BL2015-1210) enacted in August 2015 by the Metropolitan Government of Nashville and Davidson County requiring that natural gas compressor stations be located within an industrial zoning district. The Cane Ridge site is currently zoned agricultural. Although local ordinances have no bearing on a Commission Certificate, Columbia Gas has agreed to work with the Metropolitan Government to identify recommended site development measures for this property.

We received numerous comments regarding concerns centered around impacts on the Mill Creek Greenway from the proposed Cane Ridge Compressor Station. The Mill Creek Park and Mill Creek Greenway are approximately 0.4 mile south of the proposed compressor station site. Due to the distance, existing tree cover, and existing residential developments that abut the park, any visual and/or noise impacts on trail- and park-users of Mill Creek Park and Greenway would be negligible.

We also received a comment from a landowner adjacent to the existing Leach C Meter Station regarding nighttime lighting; and, we have recommended Columbia Gulf consider adjusting the direction of its existing lights to minimize impacts on its neighbors.

The new aboveground facilities would result in a permanent visual impact throughout the operational life of the MXP and GXP. The Companies have designed aboveground facilities to preserve existing tree buffers within purchased parcels to the extent practicable. To further mitigate visual impacts, the Companies would install perimeter fences and directionally controlled lighting.

5.1.9 Socioeconomics

Construction of the MXP and GXP would not have significant adverse impacts on local populations, housing, employment, or the provision of community services. There would be temporary increases in demand for housing, such as hotels, motels, and other rental units, due to the influx of construction workers. Also, there would be temporary increases in traffic levels due to the commuting of the construction workforce to the MXP and GXP areas, as well as the movement of construction vehicles and delivery of equipment and materials to the construction sites. To address and mitigate traffic impacts related to MXP and GXP construction, the

Companies would coordinate with local officials to avoid traffic interruptions and protect the safety of pedestrians, motorists, and emergency vehicles. Further, we are recommending that Columbia Gas prepare a final traffic management plan to address measures for implementing detours on public roadways, timing shifts and worker commutes to avoid heavy traffic periods, and measure to restore roadways damaged during project-related activities.

During MXP scoping, we received multiple comments regarding concerns with reductions in property values that could result from the construction and operation of natural gas facilities near homes, residential areas, or areas identified for future residential or commercial developments. The effect that a pipeline easement may have on property value is a damage-related issue that would be negotiated between the parties during the easement acquisition process, which is designed to provide fair compensation to the landowner for the right to use the property for pipeline construction and operation, including compensation for construction-related damages and for damages associated with residential properties, crops, pasture, and timber. Based on the research we have reviewed, we find no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values in general; however, there is always the possibility that any given property may experience some value-related impacts.

We also received comments regarding concerns with local tax losses due to diminished property values, but found no conclusive evidence indicating that natural gas pipeline easements would have a negative impact on property values. The long-term positive economic impacts from the MXP include an increase in annual tax revenue, paid by Columbia Gas, ranging from $50,000 per year in Mason County to $5.6 million in Doddridge County. Increases in annual tax revenues, paid by Columbia Gulf, in the counties affected by the GXP facilities, would also be received. This increase in taxes paid would benefit the local governments and their budgets annually for the life of the MXP and GXP.

Construction of the MXP and GXP would result in minor beneficial socioeconomic impacts due to increases in construction jobs, payroll taxes, purchases made by the workforce, and expenses associated with the acquisition of material goods and equipment. Operation of the MXP would have a minor to moderate positive effect to the local governments' tax revenues due to the increase in property taxes that would be collected from Columbia Gas.

Overall, we conclude that the MXP and GXP would not have a significant adverse effect to the socioeconomic conditions of the respective project areas.

5.1.10 Cultural Resources

West Virginia Cultural Resources Surveys

As of March 2017, Columbia Gas has documented and assessed 56 archaeological resources within the MXP surveyed area and only one has been determined to be eligible for the NRHP. This one site was previously recorded, determined eligible for the NRHP, and would be avoided by HDD. There were two previously recorded pre-contact mound remnant sites which are no longer NRHP eligible. The newly recorded resources include 11 historic-era cemeteries, 18 pre-contact sites, 4 isolated finds of pre-contact artifacts, 10 historic-period sites, and 1 multicomponent site. MXP construction would avoid all 11 historic-era cemeteries recorded

during the survey. For the cemetery that is less than 20 meters from the MXP centerline, Columbia Gas would install construction fencing and/or flagging or signage at the edge of the construction workspace to protect the cemetery from construction impacts.

The MXP-100 Pipeline survey corridor passes through the eastern portion of the Burning Springs Civil War battlefield, approximately 1.2 miles east of the Burning Springs Complex NRHP boundary. The portion of the pipeline that crosses the Little Kanawha River is listed on the NRI due in part to its association with the Burning Springs Complex Site. No further cultural investigations are recommended for this area.

Columbia Gas documented and assessed 188 historic-age architectural resources within the surveyed area, including 169 residential properties, 5 farm complexes with residences, 8 churches, 2 commercial buildings, a bridge (Mud River Covered Bridge), a school, a hospital complex, and a rail line that has been converted to a recreational trail. One of these resources, the 1930s-era Morris Memorial Children's Hospital complex, is NRHP-listed. The hospital complex occupies a hilltop approximately 0.3 mile to the west of the MXP. MXP construction is not expected to have a significant negative impact on the viewshed due to the modern infrastructure already present, and that the visual effects would not be adverse. In addition, the MXP crossing point at Mud River in Cabell County at MP 161.4 is within a segment listed on the NRI as having historic value based in part on the Mud River Covered Bridge. The original location of the bridge is about 1.7 miles north-northwest of the proposed MXP-100 pipeline crossing of the Mud River. This bridge, listed as a National Historic Landmark, was subsequently moved off the river to an isolated pond within the Cabell County Fairgrounds, approximately 1.5 miles north of the proposed crossing of the Mud River. Columbia Gas recommended six resources as eligible for the NRHP and two as "contributing." The remaining are recommended as not eligible for the NRHP. No further cultural investigations are recommended for this area. Columbia Gas recommended that the remaining 166 resources were not eligible for the NRHP. The SHPO has not yet concurred with Columbia Gas' recommendations; therefore, compliance with section 106 of the National Historic Preservation Act is not complete. Columbia Gas would not be authorized to begin implementation of any treatment plans or construction in any areas where SHPO's concurrence is outstanding; and we have made recommendations in section 5.2 regarding outstanding consultations.

Kentucky Cultural Resources Surveys

Columbia Gulf's Phase I archaeological survey resulted in the identification of two new pre-contact archaeological sites and an isolated find. Columbia Gulf recommended that one of the sites and the isolated find were not eligible for the NRHP. Following Phase II evaluation testing, the portion of the other site was recommended as not eligible for the NRHP, and Columbia Gulf recommended no further work for the site. In a letter dated June 9, 2016, the Kentucky SHPO concurred with these recommendations. We concur also.

Columbia Gulf's Phase I architectural survey resulted in the identification of seven previously recorded resources (a cemetery, two residences, two barns, and two farms) and eight newly recorded resources (a bridge, a farmstead, three residences, and three barns). Four of the previously recorded resources had been previously determined not eligible for the NRHP and were not revisited. The remaining 11 resources were recommended as not eligible for the NRHP. In a letter dated September 22, 2016, the Kentucky SHPO concurred with Columbia Gulf's revised

report and indicated no historic properties would be affected by the project. We agree with the Kentucky SHPO.

Tennessee Cultural Resources Surveys

Columbia Gulf's Phase I survey for archaeological and historic architectural resources resulted in the identification of one newly recorded pre-contact archaeological site, one previously recorded pre-contact archaeological site, eight newly recorded historic architectural properties (all residences), and four previously recorded historic architectural properties (three residences and a church/cemetery). Columbia Gulf recommended that none of these resources were eligible for the NRHP, and no further work would be required. In a May 16, 2016 letter, the Tennessee SHPO found that "the project area contains no historic properties eligible for listing in the National Register of Historic Places." We agree with the Tennessee SHPO.

The NPS communicated concerns over the potential for impacts on the Trail of Tears at the proposed Clifton Junction Compressor Station site. We have determined that no direct impacts on the Trail of Tears would result from the construction and operation of this compressor station. The station exhaust stack would potentially be visible to motorists from points along U.S. Highway 64; however, as the highway is used for vehicle traffic, the stack would be seen only briefly, and distinct features would be difficult to distinguish given the prevalence of surrounding forested lands and rolling topography.

Mississippi Cultural Resources Surveys

Columbia Gulf's Phase I survey for archaeological and historic architectural resources resulted in the identification of no archaeological sites and nine newly recorded historic architectural properties (seven residences, a radio tower, and a church/cemetery). Columbia Gulf recommended that none of the historic architectural properties were eligible for the NRHP, and no further work would be required. In a May 23, 2016 letter, the Mississippi SHPO concurred with the findings and recommendations of Columbia Gulf. We concur also.

Native American Consultation

Columbia Gulf and Columbia Gas requested information from federally recognized Native American tribes regarding the locations of archaeological sites, burials, or traditional cultural properties within or near the MXP and GXP areas. Columbia Gas sent introductory project letters to 11 tribes on July 14, 2015. The Seneca Nation of Indians and Delaware Nation replied requesting a copy of the survey findings upon completion. The Delaware Tribe of Indians replied with a letter detailing its fee structure for responding to consultation requests. Columbia Gas indicated it would provide the Seneca Nation and Delaware Nation with the survey report. We sent our Notice of Intent and follow-up letters to these same tribes. The United Keetoowah Band of Cherokee Indians of Oklahoma responded on April 8, 2016, and recommended a survey be completed. Columbia will provide the tribe with the survey report.

Columbia Gulf requested information from federally recognized Native American tribes and sent introductory project letters to 21 tribes on July 17, 2015, and two additional tribes on June 1, 2016. Columbia Gulf also conducted follow-up phone calls with the tribes. Columbia Gulf received nine responses to the introductory letter, including requests to be notified of inadvertent

discoveries and for copies of survey reports. Columbia Gulf provided survey reports to those tribes that requested them. We sent our Notice of Intent and follow-up letters to these same tribes. The United Keetoowah Band of Cherokee Indians responded on June 22, 2016, and recommended a survey be completed. In a June 23, 2016 letter, the Quapaw Tribe of Oklahoma expressed interest in the GXP and requested copies of all SHPO correspondence. Columbia Gulf provided both tribes with the requested information and the survey reports.

Compliance with the NHPA

The Companies' have planned the MXP and GXP to avoid impacting NRHP-eligible resources. If NRHP-eligible resources are identified that cannot be avoided, the Companies would prepare treatment plans. Implementation of a treatment plan would only occur after certification of the MXP and GXP and after the FERC provides written notification to proceed. Portions of the MXP still require survey and Section 106 consultation with the SHPO is not complete. Compliance with section 106 of the NHPA is complete for all the GXP components in Tennessee, Mississippi, and Kentucky.

5.1.11 Air Quality and Noise

5.1.11.1 Air Quality

The air quality impacts associated with construction of the MXP and GXP would include temporary, localized increases in tailpipe emissions from fossil-fueled construction equipment and temporary increases in fugitive dust due to surface disturbances caused by construction activities and vehicle travel on unpaved roads. Local emissions may be elevated, and nearby residents may notice elevated levels of fugitive dust, but these would not be significant, and air quality impacts would be temporary and localized. The Companies would each implement their respective Fugitive Dust Control Plan that describes mitigation measures to control fugitive dust during construction activities. We have reviewed these plans and find them acceptable. In nonattainment and maintenance areas, estimated construction emissions would not exceed the General Conformity thresholds. Therefore, we conclude that the MXP and GXP construction would not result in a significant impact on local or regional air quality.

Operation of the MXP and GXP aboveground facilities would result in long-term air emissions from stationary equipment (e.g., turbines, emergency generators, and heaters at compressor stations and M&R stations), including emissions of NO_x, CO, particulate matter, SO_2, VOCs, GHGs (including fugitive CH_4), and HAPs. Modeling results demonstrate that the MXP and GXP compressor stations would not exceed NAAQS, and the project areas would continue to remain protective of human health and public welfare for all listed pollutants. The proposed and modified compressor stations and M&R stations would be a minor source of air emissions under federal air quality programs and would not have a significant impact on local or regional air quality.

Commenters expressed concern about exposure to chemicals from the construction and operation of gas compressor stations and the impacts on human health. Fugitive gas emissions can occur because of leaks from gas pipeline equipment and can be emitted from blowdowns at compressor stations. Fugitive emissions from equipment leaks are estimated to be less than 1 tpy

for each GXP compressor station, and blowdown emissions are estimated to be in the range of 5 to 7 tpy. These fugitive gas emissions would be pipeline quality gas that primarily comprises CH4, ethane, and propane (hydrocarbons) and not highly toxic compounds. The principle source of pollutants from the compressor stations, both HAPs and criteria pollutants, would occur as a result of natural gas combustion. Combustion emissions were estimated for each GXP compressor station, and all GXP compressor station emissions are below the major source HAP thresholds (10 tpy for each individual HAP and 25 tpy for combined HAPs). The remaining criteria pollutants were modeled and estimated ambient concentrations were found to be below NAAQS which are set by the EPA to be protective of the public health.

Based on our analysis and compliance with federal and state air quality regulations, we conclude that operational emissions would not have a significant impact on local and regional air quality.

5.1.11.2 Noise

Noise would be generated during construction of the MXP pipelines and MXP and GXP aboveground facilities. Construction noise associated with the MXP pipelines would be spread over the length of the pipeline corridors and would not be concentrated at any one location for an extended period, except at the proposed HDD sites. Construction noise associated with the MXP and GXP aboveground facilities would be more concentrated in the vicinity of compressor stations and would extend for several months, but would vary depending on the specific activities taking place at any given time.

NSAs near the MXP and GXP construction areas may experience an increase in perceptible noise, but the effect would be temporary and local. Noise mitigation measures that would be employed during construction include the use of sound-muffling devices on engines and the installation of barriers between construction activity and NSAs. Generally, nighttime noise would not increase during construction, except for HDD activity for the MXP.

At the HDD and Direct Pipe sites, construction activity and drilling noise may be prolonged (several weeks to months depending on the length of the drill and the hardness of the substrate being drilled) and extend overnight. Columbia Gas proposes to use these techniques at two locations along the MXP pipeline route (HDD at the Kanawha River and Direct Pipe at Highway 50), and performed ambient noise surveys and acoustical assessments of NSAs within 0.5 mile of the sites to determine background noise levels and the predicted noise levels at NSAs. For entry and exit points at which the predicted noise levels at a NSA are greater than 55 dBA L_{dn}, Columbia Gas would install residential grade exhaust mufflers on engines and install acoustic barriers between the drilling site and the impacted NSA to mitigate noise impacts. Even with mitigation measures at the Kanawha River, the expected impacts at NSA #1 would still exceed 55 dBA L_{dn} and would represent more than a doubling of perceived ambient noise levels. We are recommending that Columbia Gas provide mitigation measures and make all reasonable efforts to ensure residents do not experience noise impacts above 55 dBA L_{dn}.

Based on the analyses conducted and mitigation measures proposed, as well as our recommendation, we conclude that construction of the MXP pipelines (including HDD activities),

compressor stations, and regulator stations would not result in significant noise impacts on NSAs. There are no proposed HDD drilling operations for the GXP.

Noise levels associated with the operation of each MXP compressor and regulator station, except for the existing Ceredo Station, are projected to be below an L_{dn} of 55 dBA. The modifications associated with the Ceredo Station would result in a decrease in noise levels at NSAs. Operation of the Sherwood, White Oak, Mount Olive, and Saunders Creek stations would result in a noticeable increase in noise levels, but total noise levels would remain below an L_{dn} of 55 dBA. Noise levels from each GXP compressor and meter station are projected to be below an L_{dn} of 55 dBA. Operation of the Paint Lick, Goodluck, Leach C, and Cane Ridge stations would result in a noticeable increase in noise levels; however, total noise levels would remain below our 55 dBA L_{dn} criterion. Noise from planned or unplanned blowdown events could exceed the noise criteria, but would be infrequent and of relative short duration. To ensure that the noise levels during operation of the compressor stations and meter stations do not exceed the FERC 55 dBA L_{dn} sound criterion, we are recommending that the Companies file noise surveys at full load conditions and install additional noise controls if the levels are exceeded.

We performed CadnaA noise modeling to take into account the surrounding terrain at the proposed site of the Cane Ridge Compressor Station. Our modeling results indicated that noise levels would be lower than levels predicted by Columbia Gulf.

Based on modeled noise levels, mitigation measures proposed, our recommendations, and the temporary nature of construction, we conclude that construction and operation of the MXP and GXP would not result in significant noise impacts on residents or the surrounding communities.

5.1.12 Reliability and Safety

The MXP pipelines and MXP and GXP aboveground facilities would be designed, constructed, operated, and maintained to meet the DOT Minimum Federal Safety Standards in 49 CFR 192 and other applicable federal and state regulations. These regulations include specifications for material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. Each compressor station would be enclosed within a chain-linked fence and equipped with security cameras, an alarm system, ventilating equipment, automatic shutdown systems, and relief valves.

Safety standards specified in 49 CFR 192 also require that each operator establish and maintain liaison with appropriate fire, law enforcement, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Columbia Gas would utilize the emergency procedures contained in its Emergency Operating Procedures Manual, which requires communication with emergency responders on an annual basis. Local contact phone numbers, external contact information, equipment or resources available for mobilization, and any specific procedures to be followed for the MXP would be incorporated into the Emergency Operating Procedures Manual prior to commencement of pipeline operations.

Based on the Companies' compliance with federal design and safety standards and their implementation of safety measures, we conclude that constructing and operating the MXP and GXP facilities would not significantly impact public safety.

5.1.13 Cumulative Impacts

The MXP and GXP have potential to contribute towards cumulative impacts on the environment and economy when other past, present, and reasonably foreseeable projects or actions occur within the same geographic and temporal scopes as the MXP or GXP. These projects include FERC-jurisdictional natural gas pipelines and aboveground facilities; non-jurisdictional facilities associated with the MXP and GXP; other natural gas facilities that are not under the Commission's jurisdiction; oil and gas wells, and other actions including electric transmission projects, transportation projects, and residential and commercial developments.

A majority of the impacts associated with the MXP and GXP, when combined with impacts from other projects, would be temporary and relatively minor overall, and we included recommendations in the EIS to further reduce the environmental impacts associated with the two projects. However, when combined with other past, present, and reasonably foreseeable future oil and gas wells and appurtenant facilities, the MXP would likely contribute to some long-term significant cumulative impacts on upland forested vegetation and associated wildlife habitats. The MXP could contribute substantially to short-term impacts on the availability of local housing along the MXP-100 pipeline route. However, short- and long-term cumulative benefits, from a combination of multiple projects within a region, on the communities would be realized through jobs, wages, purchases of goods and materials, and annual property taxes paid by the Companies and the other project's advocates.

5.1.14 Alternatives

We evaluated the no-action alternative, system alternatives, MXP pipeline major route alternatives, minor pipeline route variations, and alternative locations for the proposed GXP Cane Ridge Compressor Station. While the no-action alternative would eliminate the short- and long-term environmental impacts identified in the EIS, the state objectives of the Companies' proposals would not be met.

We compared each alternative to the proposed action using three key criteria:

1. Does the alternative meet the objectives of the proposed action?
2. Is the alternative technically and economically feasible, reasonable, and practical?
3. Does the alternative offer a significant environment advantage over the proposed action?

For the purpose of analyzing system alternatives, we evaluated potential impacts associated with using other gas suppliers to transport an equivalent volume of gas to meet the MXP purpose and need and to provide firm transportation service to Columbia Gas' TCO Pool, as well as more southerly markets accessible from Columbia Gulf's pipeline. None of the other pipeline systems in the vicinity of the MXP have the capacity to transport the large volumes of gas that would be carried by the MXP, and none of the existing systems would be able to expand their facilities within the schedule required by the MXP's shippers. Because other pipeline carriers in the MXP

area would be required to construct new pipeline segments and other appurtenances to reach the receipt and delivery points required by MXP, we do not consider the use of other existing pipeline systems to be a viable alternative to the MXP. Therefore, these alternatives were eliminated from further analysis.

We analyzed two major pipeline route alternatives to the MXP, one that involved looping/upgrades to existing Columbia Gas pipeline systems and one that included modifications to an approved Columbia Gas project currently under construction (the LEX; Docket No. CP15-514). The alternatives reviewed were determined to be not environmentally preferable to the proposed action. Additionally, the constructability issues associated with all the major pipeline route alternatives and the potential impacts on an increased number of landowners make the alternatives less preferable than the MXP. We received comment letters from four affected landowners requesting alternative routes across their properties and have recommended Columbia Gas evaluate these routes, as discussed in section 3.4 and listed below in section 5.2. We revised our recommendation to account for landowner-approved final route adjustments on these properties.

We considered two alternatives involving Columbia Gulf using its existing system to meet the purpose and need of the GXP: a loop-intensive alternative that would include modifications to an existing facility and seven new pipeline looping sections; and a separate alternative that involved a combination of looping and horsepower increases at five existing compressor stations. We do not consider the looping and addition of compression at Columbia Gulf's existing compressor stations to be preferable to or provide a significant environmental advantage over the GXP. Therefore, they were eliminated from further analysis.

We received additional letters, comments, and mapping from residents living around the proposed location of the Cane Ridge Compressor Station. Based on comments received during the draft EIS comment period regarding alternative sites for the GXP Cane Ridge Compressor Station, we evaluated an additional 13 alternative sites. However, we did not find that any of the alternative sites conferred an environmental advantage over the proposed site, and we are not recommending them. In summary, we have determined that Columbia Gas and Columbia Gulf's proposed projects, as modified by our recommended environmental conditions below, are the preferred alternative than can meet the project objectives.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission authorizes the MXP and GXP, we recommend that the following measures be included as specific conditions in the Commission's Order. We conclude that these measures would further mitigate the environmental impacts associated with the construction and operation of the MXP and GXP.

1. Columbia Gas and Columbia Gulf shall each follow the construction procedures and mitigation measures described in their respective applications and supplements (including responses to staff data requests) and as identified in the EIS, unless modified by the Order. Columbia Gas and Columbia Gulf must:

    a. request any modification to these procedures, measures, or conditions in a filing with the Secretary of the Commission (Secretary);

b. justify each modification relative to site-specific conditions;

c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

d. receive approval in writing from the Director of the OEP **before using that modification**.

2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the MXP and GXP. This authority shall allow:

   a. the modification of conditions of the Order; and

   b. the design and implementation of any additional measures deemed necessary (including stop-work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from MXP and GXP construction and operation.

3. **Prior to any construction**, Columbia Gas and Columbia Gulf shall file an affirmative statement with the Secretary, certified by their senior company officials, that all Columbia Gas and Columbia Gulf personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.

4. The authorized facility locations shall be shown in the EIS, as supplemented by filed alignment sheets, and shall include the staff's recommended route variations identified in section 3.4 of the EIS. **As soon as they are available, and before the start of construction,** Columbia Gas and Columbia Gulf shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   Columbia Gas and Columbia Gulf exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Columbia Gas and Columbia Gulf right of eminent domain granted under NGA section 7(h) does not authorize them to increase the size of their natural gas facilities to accommodate future needs or to acquire a right-of-way for a pipeline to transport a commodity other than natural gas.

5. Columbia Gas and Columbia Gulf shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, staging areas, pipe storage yards, new access roads, and other areas that would not be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other

environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

This requirement does not apply to extra workspace allowed by FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and/or minor field alignments per landowner needs and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

a. implementation of cultural resources mitigation measures;

b. implementation of endangered, threatened, or special concern species mitigation measures;

c. recommendations by state regulatory authorities; and

d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of the authorization and before construction begins**, Columbia Gas and Columbia Gulf shall file their respective Implementation Plans with the Secretary for review and written approval by the Director of OEP. Columbia Gas and Columbia Gulf must file revisions to their plans as schedules change. The plans shall identify:

a. how the Companies will implement the construction procedures and mitigation measures described in its application and supplements (including responses to staff data requests), identified in the EIS, and required by the Order;

b. how the Companies will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;

c. the number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;

d. company personnel, including EIs and contractors, who will receive copies of the appropriate material;

e. the location and dates of the environmental compliance training and instructions the Companies will give to all personnel involved with construction and restoration (initial and refresher training as the MXP and GXP progress and personnel change), with the opportunity for OEP staff to participate in the training session(s);

f. the company personnel (if known) and specific portion of the Companies' organization having responsibility for compliance;

g. the procedures (including use of contract penalties) the Companies will follow if noncompliance occurs; and

h. for each discrete facility, a Gantt or Program Evaluation Review Technique (PERT) chart (or similar project scheduling diagram), and dates for:

(1) the completion of all required surveys and reports;

(2) the environmental compliance training of onsite personnel;

(3) the start of construction; and

(4) the start and completion of restoration.

7. Columbia Gas shall employ a team of EIs (i.e., two or more or as may be established by the Director of OEP) per construction spread for the MXP. Columbia Gulf shall employ at least two EIs for the GXP. The EIs shall be:

a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;

b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 6 above) and any other authorizing document;

c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;

d. a full-time position, separate from all other activity inspectors;

e. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and

f. responsible for maintaining status reports.

8. Beginning with the filing of its Implementation Plan, Columbia Gas shall file updated status reports with the Secretary on a **weekly basis** until all construction and restoration activities are complete. Beginning with the filing of its Implementation Plan, Columbia Gulf shall file updated status reports with the Secretary on a **monthly basis** until all construction and restoration activities are complete. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

a. an update on the Companies' efforts to obtain the necessary federal authorizations;

b. the construction status of each spread, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;

c. a listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);

d. a description of the corrective actions implemented in response to all instances of noncompliance, and their cost;

e. the effectiveness of all corrective actions implemented;

f. a description of any landowner/resident complaints that may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and

g. copies of any correspondence received by the Companies from other federal, state, or local permitting agencies concerning instances of noncompliance, and the Companies' response.

9. Columbia Gas shall develop and implement an environmental complaint resolution procedure during construction and for a period of at least 2 years following the completion of construction. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the MXP and restoration of the right-of-way. **Prior to construction**, Columbia Gas shall mail the complaint procedures to each landowner whose property would be crossed by the project.

a. In its letter to affected landowners, Columbia Gas shall:

(1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;

(2) instruct the landowner that if they are not satisfied with the response, they should call Columbia Gas' Hotline; the letter should indicate how soon to expect a response; and

(3) instruct the landowners that if they are still not satisfied with the response from Columbia Gas' Hotline, they should contact the Commission's Landowner Helpline at 877-337-2237 or at LandownerHelp@ferc.gov.

b. In addition, Columbia Gas shall include in its weekly status report a copy of a table that contains the following information for each problem/concern:

(1) the identity of the caller and date of the call;

(2) the location by milepost and identification number from the authorized alignment sheet(s) of the affected property;

(3) a description of the problem/concern; and

(4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

10. **Prior to receiving written authorization from the Director of OEP to commence construction of any facilities**, Columbia Gas and Columbia Gulf shall each file with the Secretary documentation that it has received all applicable authorizations required under federal law (or evidence of waiver thereof).

11. Columbia Gas and Columbia Gulf must receive written authorization from the Director of OEP **before placing their respective facilities into service**. Such authorization will only be granted following a determination that rehabilitation and restoration of the right-of-way and other areas affected by the project are proceeding satisfactorily.

12. **Within 30 days of placing the authorized facilities in service**, the Companies shall each file an affirmative statement with the Secretary, certified by a senior company official:

    a. that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or

    b. identifying which of the conditions in the Order the Company has complied with or will comply with. This statement shall also identify any areas affected by the project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Prior to construction**, Columbia Gas shall finalize the design for and adopt the route variations on the Umstead (MP 68.0), Hall (MP 97.1), and Elliot (MP 145.8) properties into its final proposed route for MXP-100. Columbia Gas shall file with the Secretary, for review and written approval by the Director of OEP:

    a. aerial and/or topographic maps identifying the proposed route variation that addresses the identified landowner issue(s);

    b. documentation of landowner consultation; and

    c. documentation of any required surveys and agency consultations for each route variation. (*section 3.4*)

14. **Prior to construction**, Columbia Gas shall file with the Secretary for review and written approval by the Director of OEP, the results of a Phase II Landslide Hazard Assessment, which includes the results of all field activities to investigate and document the status of all potential landslide areas, and provide a Landslide Mitigation Plan that includes site-specific mitigation measures Columbia Gas will implement during construction and operation of the project on steep slopes and slip-prone soils. The Landslide Mitigation Plan shall include:

    a. a description of how construction activities will be conducted on steep slopes and in areas prone to instability;

    b. safety protocols for personnel working on steep slopes or areas prone to instability;

    c. measures Columbia Gas will implement if project-related activities result in instability/landslides during, and after, MXP construction; and

d. steps to be taken to stabilize and restore such areas affected by project-related activities.

Columbia Gas shall develop the Phase II Landslide Hazard Assessments and the Landslide Mitigation Plan shall be developed in consultation with the WVDEP and WVDNR. (*section 4.1.4.4.1*)

15. **Prior to commencing construction activities between MP 50 – 51 and MP 113.3-114.3, Columbia Gas shall consult with the Doddridge County Park and Roane-Jackson Technical Center** to establish pre- and post-construction notification protocols and identify any special measures that may be needed to further reduce the potential for impacts on water quality and/or yield of Doddridge County Park Well #1 and Roane-Jackson Technical Center Wells #1, #2, and #3. Columbia Gas shall file with the Secretary documentation of its consultations, and proposed notification and mitigation measures, for review and approval by the Director of OEP. (*section 4.3.1.2.1*)

16. **Prior to construction,** Columbia Gas shall:

    a. file with the Secretary the location of all water wells and potable springs within 150 feet of all areas of disturbance associated with the MXP pipelines and related aboveground facilities;

    b. provide the status (active, abandoned, capped, etc.) of the two water wells located at MP 164.3 and, if active, identify measures to protect these water wells during construction, for review and written approval by the Director of OEP. (*section 4.3.1.3.1*)

17. **Prior to construction,** Columbia Gas shall consult with the appropriate government entities and/or water utilities to identify any specific protective measures for SWPAs that will be crossed by the MXP. The results of these consultations shall be filed with the Secretary. (*section 4.3.2.1.1*)

18. **Prior to withdrawing water for hydrostatic testing from Fish Creek, Piney Fork, Meathouse Fork, McElroy Creek, Slab Creek, or Frozencamp Creek**, Columbia Gas shall consult with WVDNR to assess whether stream flow is sufficient to protect aquatic life, and to assess whether any specific measures to protect in-stream habitat and downstream uses are warranted at these waterbodies. The results of these consultations shall be filed with the Secretary. (*section 4.3.2.4.1*)

19. **Prior to construction,** Columbia Gas shall file with the Secretary any specific construction, restoration, replacement, and/or operation mitigation measures identified through its discussions with the WVDNR that Columbia Gas will implement to promote compatibility with the restoration and management of upland forested areas. (*section 4.5.4.1*)

20. **Prior to construction,** Columbia Gas shall develop, in consultation with the appropriate West Virginia state agencies and local NRCS, a noxious and invasive weed management plan. This plan shall include:

    a. identification of the locations by milepost where noxious or invasive weeds are currently present either within or immediately adjacent to all areas of project-related disturbance; and

b. BMPs that include integrated vegetation management and a site-specific plan for each location where weeds are present which:

(1) describes options for pretreatment (including the month(s) of the year when pretreatment would be effective), treatment during construction (to avoid introducing or spreading invasive species), and post-construction treatment and monitoring;

(2) identifies who was consulted regarding possible treatment options; and

(3) includes whether the landowner/administrator has approved of the treatment options proposed.

Columbia Gas shall file this plan with the Secretary, for review and written approval from the Director of OEP, before implementation and include the comments of the various agencies consulted during its development. (*section 4.5.5.1*)

21. **Following construction,** Columbia Gas shall conduct noxious and invasive species monitoring within the maintained rights-of-way **for 3 years** following successful completion of revegetation, and file with the Secretary the results of these surveys. Columbia Gas shall not move mowing and maintenance equipment from an area where invasive species have been encountered during operation of the project unless the equipment is cleaned to remove invasive species and seeds prior to moving. (*section 4.5.5.1*)

22. **Prior to removal of any ash tree from the GXP areas in Tennessee,** Columbia Gulf shall inspect all ash trees that will be removed for indications of emerald ash borer infestations, before transporting ash trees away from the area. If signs of an infestation exist, Columbia Gulf shall immediately contact the USDA Emerald Ash Borer Hotline at 866-322-4512 to determine the appropriate method for disposing of the tree(s). **Prior to operation of the GXP,** Columbia Gulf shall file with the Secretary the results of these inspections. (*section 4.5.5.2*)

23. **Prior to construction**, Columbia Gas shall file with the Secretary an update of its MBTA consultations with the USFWS and WVDNR regarding the development of its MBTA Tree Clearing Strategy (and provide a copy of the final plan, if available); and identify special measures, if any, that Columbia Gas will implement to reduce impacts on cerulean warbler habitat. (*section 4.6.3.1*)

24. **Prior to construction,** Columbia Gas shall:

a. complete required mussel surveys **as soon as conditions allow** and file the results of the surveys with the Secretary and concurrently provide the survey results to the USFWS and WVDNR; and

b. file an update with the Secretary of any further discussions or progress made with the USFWS regarding recommendations on stream crossing locations and construction methodologies where federally protected mussel species may be present.

Columbia Gas **shall not begin construction** of the MXP until FERC staff has completed all necessary section 7 consultations with the USFWS for federally listed mussel species, and the Director of OEP authorizes construction or implementation of mitigation measures to begin. (*section 4.7.5.1*)

25. **Prior to construction,** Columbia Gas shall:

    a. complete required bat surveys **as soon as conditions allow** and file the survey results with the Secretary and concurrently provide the results to the USFWS and WVDNR; and

    b. file an update with the Secretary of any further discussions or progress made with the USFWS regarding the Indiana bat and the NLEB.

    Columbia Gas **shall not begin construction** of the MXP until FERC staff has completed all necessary section 7 consultations with the USFWS for federally listed bat species, and the Director of OEP authorizes construction or implementation of mitigation measures to begin. (*section 4.7.6.1*)

26. **Prior to construction,** Columbia Gas shall file documentation with the Secretary regarding Columbia Gas' consultation with the WVDNR for state-listed mussel species, including any updated stream crossing plans and/or additional mitigation measures for all locations where state-listed mussels may occur. (*section 4.7.10.1*)

27. **Prior to construction**, Columbia Gas shall file with the Secretary, for review and written approval by the Director of OEP, an updated site-specific plan for Tract WV-DO-0278.007 near MP 51.0 and Tract WV-JA-0368.000 near MP 124.6 that includes specific impact avoidance or minimization measures for the fenced corral and shed. (*section 4.8.1.3.1*)

28. **Prior to construction,** Columbia Gulf shall perform a nighttime site visit to the Leach C Meter Station to evaluate stray lighting that may be disruptive to its neighbors. If existing lighting can be angled in a direction that it is no longer a nuisance to the adjacent residence, Columbia Gulf shall consider making an adjustment, provided it does not jeopardize the safety and/or security of the facility operations, and file a report with the Secretary identifying proposed modifications. (*section 4.8.3.2*)

29. **Prior to construction,** Columbia Gas shall file with the Secretary, for review and written approval by the Director of OEP, a traffic management plan for the MXP, which includes:

    a. proposed measures for implementing any detours on public roadways;

    b. timing shifts and worker commutes as to avoid heavy traffic periods; and

    c. proposed measures for restoration of roadways damaged by project-related activities upon completion of construction. (*section 4.9.6.1*)

30. Columbia Gas **shall not begin implementation** of any treatment plans/measures (including archaeological data recovery)**, construction** of facilities, and/or **use** of staging, storage, or temporary work areas and new or to-be-improved access roads **until**:

a. Columbia Gas files a response to the West Virginia SHPO's April 6, 2017, comments, and the SHPO's comments on the response;

b. Columbia Gas files all remaining archaeological resources survey report(s) and any required evaluation reports and treatment plans, and the SHPO's comments on the reports and plans;

c. the ACHP is provided an opportunity to comment on the undertaking if historic properties would be adversely affected; and

d. the Commission staff reviews and the Director of OEP approves all cultural resources survey reports and plans and notifies Columbia Gas in writing that treatment plans/mitigation measures may be implemented or construction may proceed.

All material filed with the Secretary that contains **location, character, and ownership information** about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: **"CUI/PRIV – DO NOT RELEASE."** (*section 4.10.4.1*)

31. **Prior to the construction of the U.S. Highway 50 and Kanawha River crossings**, Columbia Gas shall file with the Secretary, for the review and written approval by the Director of OEP, a drilling noise mitigation plan to reduce the projected noise level attributable to the proposed drilling operations at nearby NSAs. During drilling operations, Columbia Gas shall implement the approved plan, monitor noise levels, and make all reasonable efforts to restrict the noise attributable to the drilling operations to no more than a L_{dn} of 55 dBA at the NSAs. (*section 4.11.2.2.1*)

32. Columbia Gas shall make all reasonable efforts to maintain its predicted noise levels from the Sherwood and White Oak Compressor Stations are not exceeded at nearby NSAs, and file noise surveys showing this with the Secretary **no later than 60 days** after placing these stations in service. However, if the noise attributable to the operation of the Sherwood and White Oak Compressor Stations at full load exceeds an L_{dn} of 55 dBA, at any nearby NSAs, Columbia Gas shall file a report on what changes are needed and shall install additional noise controls to meet the level **within 1 year** of the in-service date. Columbia Gas shall demonstrate compliance with this requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*section 4.11.2.2.2*)

33. Columbia Gas shall file a noise survey with the Secretary **no later than 60 days** after placing the Mount Olive Compressor Station, and the Ripley and Saunders Creek Regulator Stations in service. If a full-load-condition noise survey of the entire station is not possible, Columbia Gas shall instead file an interim survey at the maximum possible horsepower load and file the full-load survey **within 6 months**. If the noise attributable to the operation of all the equipment at any of these facilities under interim or full-horsepower-load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gas shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Columbia Gas shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*section 4.11.2.2.2*)

34. Columbia Gulf shall file a noise survey with the Secretary **no later than 60 days** after placing each of the GXP compressor stations in service. If a full-load-condition noise survey of the entire station is not possible, Columbia Gulf shall instead file an interim survey at the maximum possible horsepower load and file the full-load survey **within 6 months**. If the noise attributable to operation of all the equipment at any compressor station under interim or full-horsepower-load conditions exceeds 55 dBA L_{dn} at any nearby NSAs, Columbia Gulf shall file a report on what changes are needed and shall install the additional noise controls to meet the level **within 1 year** of the in-service date. Columbia Gulf shall confirm compliance with the 55 dBA L_{dn} requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*section 4.11.2.3.2*)

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July 2017

FERC/FEIS-0275F

FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR
Columbia Gas Transmission, LLC – Mountaineer XPress Project
Columbia Gulf Transmission, LLC – Gulf XPress Project

Docket Nos. CP16-357-000 and CP16-361-000

Volume II

Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, NE, Washington, DC 20426

Final Environmental Impact Statement

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Final EIS Distribution List

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Rena Purdy, TCEcD, Chamber of Commerce
Joe Hanback, Commissioner
John McDonald, Commissioner
O.C. Berry Jr., Commissioner
Steve Anderson, Commissioner

Cabell County, WV

Karen Cole, County Clerk
Anne Yon, Commissioner
Bob Bailey, Commissioner
Nancy Cartmill, Commissioner
Gordon Merry, EMS Director

Calhoun County, WV

Jean Simers, County Clerk
Kevin Helmick, Commissioner
Robert Weaver, Commissioner
Scottie Westfall II, Commissioner

Doddridge County, WV

Beth Rogers, County Clerk
Greg Robinson, Commissioner
Ralph Sandora, Commissioner
Ronnie Travis, Commissioner
Greg Cottrill, Doddridge County Parks
Pat Heaster, Emergency Services Director

Jackson County, WV

Jeff Waybright, County Clerk
Dick Waybright, Commissioner
Mike Randolph, Commissioner
Tommy Nutter, Commissioner
Walter Smittle, Emergency Services Director
Jackson County Board of Education, LeRoy, WV
Jackson County Commission, Ripley, WV

Kanawha County, WV

Vera McCormick, County Clerk
Dave Hardy, Commissioner
Henry Shores, Commissioner
Dale Petry, Emergency Management Director

Mason County, WV

Diana Cromley, County Clerk
Miles Epling, Commissioner
Rick Handly, Commissioner
Tracy Doolittle, Commissioner
Chuck Blake, Emergency Services Director

Marshall County, WV

Betsy Wilson-Frohnapfel, County Administrator
Jan Pest, County Clerk
Robert Miller Jr., Commissioner
Scott Varner, Commissioner
Stanley Stewart, Commissioner
Thomas Hart, Emergency Management Director

Putnam County, WV

Brian Wood, County Clerk
Andy Skidmore, Commissioner
R. Joseph Haynes, Commissioner
Stephen Andes, Commissioner
Frank Chapman, Emergency Management Director
Putnam County Chamber of Commerce
Putnam County Development Authority Inc.

Ritchie County, WV

Tracy McDonald, County Clerk
Ritchie County Commission
Floyd Hodge, Commissioner
Samuel Rogers, Commissioner
Stephen Worden, Commissioner
James White, Emergency Services Director

Roane County, WV

Jennifer Randolph, County Administrator
Charles White Jr., County Clerk
Gary Mace, Commissioner
Melissa O'Brien, Commissioner
Merlin Shamblin, Commissioner
Melissa Gilbert, Emergency Services Director

Tyler County, WV

Charles Smith, Commissioner
Eric Vincent, Commissioner
John Stender, Commissioner
Teresa Hamilton, Commissioner
Thomas Cooper, Emergency Management Director

Wayne County, WV

David Pennington, Commissioner
Kenneth Adkins, Commissioner

Wetzel County, WV

Carol Haught, County Clerk
Bob Gorby, Commissioner
Don Mason, Commissioner
Larry Lemon, Commissioner
Ed Sapp, Emergency Services Director

Wirt County, WV

Suellen Calebaugh, County Clerk
Charles Murray, Commissioner
Robert Gunnoe Jr., Commissioner
Robert Lowe, Commissioner

Town Agencies

Milton, WV

Town of Milton

Wheeling, WV

Regional Economic Development Authority
Josh Jefferson, Project Coordinator

Winfield, WV

Brian Donat, City Manager

Grayson, KY

City of Grayson

Libraries

Kentucky

Boyd County Public Library - Ashland Main, Ashland, KY
Carter County Public Library - Grayson Branch, Grayson, KY
Garrard County Library, Lancaster, KY
Metcalfe County Library, Edmonton, KY
Rowan County Library, Morehead, KY

Mississippi

Elizabeth Jones Library, Grenada, MS
Union County Library, New Albany, MS

Tennessee

Nashville Public Library Southeast Branch, Antioch, TN
Wayne County Public Library, Waynesboro, TN

West Virginia

Barboursville Public Library, Barboursville, WV
Benwood-McMechen Public Library, McMechen, WV
Cabell County Public Library, Huntington, WV
Calhoun County Library, Grantsville, WV
Cameron Public Library, Cameron, WV
Center Point Outpost Library, Salem, WV
Cox Landing Public Library, Lesage, WV
Doddridge County Library, West Union, WV
Dora B. Woodyard Memorial Library, Elizabeth, WV
Gallaher Village Library, Huntington, WV
Guyandotte Library, Huntington, WV
Hannan Public Library, Ashton, WV
Hundred Public Library, Hundred, WV
Jackson County Public Library - Ravenswood, Ravenswood, WV
Jackson County Public Library - Ripley, Ripley, WV
Mason City Public Library, Mason, WV
Mason County Public Library, Point Pleasant, WV
Milton Public Library, Milton, WV
Moundsville-Marshall County Library, Moundsville, WV
New Haven Public Library, New Haven, WV
New Martinsville Library, New Martinsville, WV
Paden City Public Library, Paden City, WV

Pennsboro Branch Library, Pennsboro, WV
Pine Grove Library, Pine Grove, WV
Putnam County Library - Buffalo Branch, Buffalo, WV
Putnam County Library - Eleanor Branch, Eleanor, WV
Putnam County Library - Hurricane Branch, Hurricane, WV
Putnam County Library - Main Branch, Hurricane, WV
Putnam County Library - Poca Branch, Poca, WV
Ritchie County Public Library, Harrisville, WV
Roane County Library, Spencer, WV
Salt Rock Library, Salt Rock, WV
Sistersville Public Library, Sistersville, WV
Tyler County Public Library, Middlebourne, WV
Walton Public Library, Walton, WV
West Huntington Library, Huntington, WV

Newspapers

Kentucky

Daily Independent, Ashland, KY
Grayson Journal, Grayson, KY
Morehead News, Morehead, KY
The Edmonton Herald News, Edmonton, KY
The Richmond Registrar, Richmond, KY

Mississippi

New Albany Gazette, New Albany, MS
The Grenada Star, Grenada, MS

Tennessee

Tennessean, Franklin, TN
Wayne County News, Waynesboro, TN

West Virginia

Green Tab, Moundsville, WV
Jackson Herald/Jackson Star News, Ripley, WV
The Calhoun Chronicle, Grantsville, WV
The Charleston Gazette, Charleston, WV
The Doddridge Independent (weekly), West Union, WV
The Intelligencer, Wheeling, WV
The Pennsboro News (weekly), Harrisville, WV

Miscellaneous Individuals, Organizations, and Landowners

A. Julian, Antioch, TN
Aaron J. & Shelly B. Ramey, Hana, HI
Abdullah & Zehra Berwary, Antioch, TN
Abdulsalam H. Gundky, Antioch, TN
Abe Yazdian, Nashville, TN
Abiodun Adefurin & Abimbola Oginni, Antioch, TN
Adam Kniseley, Raleigh, NC
Adena & Nicholas Petsch, Antioch, TN
Adrenna M. Epling, Ripley, WV
AH4R-TN 3, LLC, Malibu, CA
Ahmad M. Mohammad & Dawlat Adbi, Antioch, TN
Ahmad R. Afzal, Antioch, TN
Ahmed & Aziza A. Duski, Antioch, TN
Alaina Mullins, Antioch, TN
Alan A. & Zuleyha O. Ahmed, Antioch, TN
Albert & Janice Peterson, Ripley, WV
Albert B. Hankins, Jr., Grenada, MS
Albert Moore, New Martinsville, WV
Albin Gesek & Carol Myers, West Union, WV
Alex Cole, Pliny, WV
Alex P. O'Neill, Coal, Murray Energy Corporation, St. Clairsville, OH
Alexandria D. Jones, Antioch, TN
Alfred & Francis Rose, Brohard, WV
Alfred & Lois Kent, Antioch, TN
Alfred Marcos, Antioch, TN
Alice Ruth Strange, Antioch, TN
Alicia Douglas, Antioch, TN
Alicial Maddox, Antioch, TN
Alisa D. & Rodney W. Barlow, Antioch, TN
Alissa Walker, Grayson, KY
Allan B. & Pamela D. Schmidt, Antioch, TN
Allan Leroy Wilson & Ricky Joe Dockery, Oldtown, MD
Allegheny Defense Project, Kane, PA
Allen Doneff, Sr., Milton, WV
Allen Leadmon, Hurricane, WV
Allen Neal & Nina Wallace Gross, Antioch, TN
Allen Nelson, Sandyville, WV
Allen, Glenn Jr., Margaret & Michael Mann, Post Falls, ID
Allissa Nicole & Robert S Caudill, Grayson, KY
Alton Gene and Randa Joyce Watson, Harrisville, WV

Alvin L. Engelke, Creston, WV
Alvin Polin, Reedy, WV
Amanda Achry-Hill, Antioch, TN
Amanda L. Suttles, Grayson, KY
American Homes 4 Rent Properties Seven, LLC, Agoura Hills, CA
American Residential Leasing Company, LLC, Agoura Hills, CA
AMH 2014-2 Borrower, LLC, Agoura Hills, CA
AMH 2014-3 Borrower, LLC, Agoura Hills, CA
AMH 2015-1 Borrower LLC, Agoura Hills, CA
Amir Yacoub & Wafaa Henain, Antioch, TN
Amon and Tonda Yates, Grayson, KY
Amy Dawson, Munday, WV
Amy R. & Antwon D. Butler, Antioch, TN
Anas M. Muhsin, Antioch, TN
Anda K. Hileman, West Union, WV
Andrea Lynee Tyler, Antioch, TN
Andrew & Andrea Shuluga, Saint Petersburg, FL
Andrew & Beth Williamson, Harts, WV
Andrew L. Bailey, Antioch, TN
Andrew MacBride, National Grid, Waltham, MA
Andrew Paul, Jeriann, & Barbara Roberta Berry, Antioch, TN
Andrew & Jamie Peterson, Antioch, TN
Andrew Rowlett, Yorktown, VA
Andrew W. & Mallory L. Dood, Antioch, TN
Andrew Wells & Tania Bartos-Wells, Antioch, TN
Andrius Malinauskas & E. O. Malinauskein, Antioch, TN
Andy & Melissa Platt, Antioch, TN
Anealia Sasser, Cane Ridge, TN
Angela Burr Adderly, Antioch, TN
Angela Ellis, Cane Ridge, TN
Angela M. & Andrew P. Wilson, Antioch, TN
Angela Mclean, Antioch, TN
Angela Radford, Antioch, TN
Angie & Patrick Johnston, Nashville, TN
Angie Rosser, Executive Director, West Virginia Rivers Coalition, Charleston, WV
Ann Cook, Roswell, GA
Ann Czerner, Alexandria, VA
Ann Hisle Cook Trustee, Roswell, GA
Ann Woods, Holcomb, MS
Anna Chamleunsouk & Praphatsone Boupharath, Antioch, TN
Anna E. Strickland, Antioch, TN

Anna M. Ortiz, Antioch, TN
Anna Virbick, Dallas, TX
Anne Lawrence, Summer Shade, KY
Annette G. Ericksen, Milton, WV
Antero Resources Corporation, Denver, CO
Anthere Nzabatsinda & Madlyn Bonimy, Antioch, TN
Anthony & Lois Gray, Antioch, TN
Anthony Eruolin, West Union, WV
Anthony H & Marla L Hicks, Edmonton, KY
Anthony R. Lawrence, Antioch, TN
Anthony W. Little, Grayson, KY
Antonio D. & Kara Zapata, Antioch, TN
Antonio R. Johnson, Antioch, TN
Appalachian Power Company, Canton, OH
Aren Sulfridge, Antioch, TN
Ariel M. Elam, Antioch, TN
Arley & Winona Holbrook, Barboursville, WV
Arnie Goodnight, Moundsville, WV
Arnold & Pamela Conant, Leroy, WV
Arnold Lee Bonnell, Tridelphia, WV
ARP 2014-1 Borrower LLC, Agoura Hills, CA
Arthur Cain, Given, WV
Arthur D., Jr & Catherine Henderson, Antioch, TN
Arthur J. Yevchak, Antioch, TN
Arthur L. Waryck, Glen Dale, WV
Ascent Resources, Oklahoma City, OK
Ashley Giles Etal, Antioch, TN
Ashley Lafalce, West Union, WV
Asya Meho & Bewar Dosky, Antioch, TN
Audie L. & Kimberly B. Sheridan, Antioch, TN
Augustina Durunna, Antioch, TN
Augustine Tina Tuggle, Antioch, TN
Austin & Regina Bryant, Grayson, KY
Author Baptist & Brilontine Peete, Antioch, TN
Aysha H. & Mahir Tovi, Antioch, TN
Barbara Cunningham, New Martinsville, WV
Barbara F. Gray, Nashville, TN
Barbara Hudson, Red House, WV
Barbara Jividen, Red House, WV
Barbara Roe, Grayson, KY
Barbara and Ronald Yerkey, West Union, WV

Barbara Young, Milton, WV
Barnes Bend Estates Homeowner's Assn Inc., Nashville, TN
Barry A. Burgess, Antioch, TN
Barry Duane Brown & Cathy Hibbs, Antioch, TN
Barry Hamilton, Morehead, KY
Barry Vincent, Nashville, TN
Bashar Halwani & Alhabbal Rula & Mala Al. Idany, Brentwood, TN
Bassell Maxwell & Mary Holland Irrevockable Trust, c/o Jane Hafer, Westfield, NJ
BCG Land LLC, Stanford, KY
Beatrice Jacobs, Trustee, Antioch, TN
Beckwith Realty Inc., Huntington, WV
Belinda J. Boggess, Ripley, WV
Belma Withrow, Hurricane, WV
Ben J. Schoene, Sr. Regulatory Analyst, Houston, TX
Ben Thompson, U.S. Oil and Gas Association, Jackson, MS
Benjamin Bateman, Nashville, TN
Benjamin D. Logan, Scobey, MS
Benjamin Shanower, Louisville, OH
Benton and Nancy Kilgallin, Catlettsburg, KY
Berevan A. Barwari, Antioch, TN
Bernard & Patricia Stanley, Proctor, WV
Bernard E. Johnson, III, Antioch, TN
Bernice & James Barr, New Milton, WV
Bertha A. Scott, Elizabeth, WV
Beth A. Holley, Ripley, WV
Beth Gilliam, Antioch, TN
Betty Casto, Leon, WV
Betty D. Reed, Culloden, WV
Betty E. Gibson, Hurricane, WV
Betty Guffey, Smyrna, TN
Betty K. & David L. Allison, Antioch, TN
Bevery Dillon, Ripley, WV
Big Tygart Farms LLC, Mineral Wells, WV
Bill & Betty Swartz, Melbourne, FL
Bill Crum, Lancaster, OH
Bill Knoblock, Madison, IN
Billy & Sue Hurt C/O Larry and Nancy Hurt, Summer Shade, KY
Billy Fouty, Reedy, WV
Billy Greer Jr. & Clara Greer, Grayson, KY
Billy J Menix, Grayson, KY
Billy J. Gregg & Lynn P. Gregg, Hurricane, WV

Billy Lowell Kouns, Grayson, KY
Bishnu & Thakur Magar, Antioch, TN
Blackstone Development Inc., Brentwood, TN
Blake G. Bohanan & Kayla E. Smith, Antioch, TN
Bobby L. Eads, Buffalo, WV
Bonnie Johnson, Hurricane, WV
Boyd H. & Loretta M. Neiswenter, Given, WV
Brad E. Hammond & Kimberly N. Marsh, Antioch, TN
Brad Maggard, Catlettsburg, KY
Bradley Crow, Morgantown, WV
Bradley Zeigler, Elkview, WV
Brandon & Kayla Jordan, Grayson, KY
Brandon Six, Oakdale, PA
Brandon Wayne Rigsby, Antioch, TN
Brant Miller, Friends of Mill Creek Greenway, Cane Ridge, TN
Braxton Collins, Assistant General Counsel, SCANA Corporation, Public Service Company of North Carolina, Inc., Cayce, SC
Brenda Joyce Gambill & Derek Michael Whittaker, Lavergne, TN
Brenda Mcmillan, Antioch, TN
Brenda Roberts, Creston, WV
Brent & Satona Cunningham, Moundsville, WV
Brent H. Clayton, Antioch, TN
Bretford W. & Jacqulyn C. Bell, Antioch, TN
Brian & Sarah Board, Ripley, WV
Brian & Stacey M. Cox, Antioch, TN
Brian Anderson & Kari Reed, Ripley, WV
Brian Arrington, Winfield, WV
Brian Cox, Antioch, TN
Brian Douglas & Shanna Marie Bauman, Antioch, TN
Brian E Flannery, Oldtown, KY
Brian Harvey, Leon, WV
Brian J. Knight, etal, Ripley, WV
Brian Keith & Anna Marie Bayes, Grayson, KY
Brian L Fields, Gas, Regulatory, Calpine Corporation, Houston, TX
Brian L. & Allicia Bellew, Hampstead, NC
Brian L. & Hollye K. Salazar-Cross, Antioch, TN
Brian M. Pulley, Antioch, TN
Briar Fork Trust, Roanoke, VA
Brice A. Mcmaster & Samantha Cunningham, Antioch, TN
Brient J. & Katelyn G. Barnett, Antioch, TN
Brittany Carns, Charleston, WV

Brotherton Heirs in care of J. Kay, LeRoy, WV
Bruce & Sharon Shamblin, Big Springs, WV
Bruce P. Bannerman, Culloden, WV
Brunette T. Jeanniton-Daly, Antioch, TN
Bryan & Heather Ireland, Pullman, WV
Bryan S. & Liesl C. Dunlap, Antioch, TN
BT Wayne LLC, Luka, MS
Buck Murray, Ripley, WV
Burns & McDonnell, Attn: Carrie Barton, Kansas City, MO
Burns & McDonnell, Attn: Jennifer Bell, Centennial, CO
Burns & McDonnell, Attn: Robyn Susemihl, Alpharetta, GA
Byron & Gloria McDavid, Grayson, KY
C. Eric & Candace H. Seagraves, Antioch, TN
CAD Energy Corporation, Creston, WV
Caldwell Mildred S. & Caldwell Investment Group, Charleston, WV
Calvin Burchett, Leon, WV
Campbell Lane Estates LLC, Grayson, KY
Capitol Homes Inc., Brentwood, TN
Carl & Debra Greer, Grayson, KY
Carl E. Walters, Providence, NC
Carl H. & Carolyn S. Clay, Antioch, TN
Carl Harris, Antioch, TN
Carl L. Bell, Moundsville, WV
Carl M. Thach, Jr., Greenwood, MS
Carl Reynolds, Mineral Wells, WV
Carlos Torres Lazo & Monica Delgado Gonazales, Antioch, TN
Carol A. Clark, Moundsville, WV
Carol Haught & John Haught, Mt. Sterling, KY
Carol L. Irwin & Jacqueline J. Hetzer, West Union, WV
Carol Lynn & David Liston, Wadsworth, OH
Carole Downes, Ashburn, VA
Carole M. Welling, Given, WV
Caroline C. Mgbemere, Antioch, TN
Caroline Copenhaver, Hurricane, WV
Carolyn D. Mcintyre, Ripley, WV
Carolyn Kennedy, Antioch, TN
Carolyn S. Jenkins, Munday, WV
Carrie D. Mills, Antioch, TN
Carroll & Patricia Winters, Ripley, WV
Carry & Terri Ranson, Ripley, WV
Cassandra Thompson, Cain Ridge, TN

Castle Tower Corporation, McMurray, PA
Casto Cemetery, Ripley, WV
Catherine Byrd, Antioch, TN
Catherine Donahue & Diane Melton, Delaware, OH
Catherine Goddard & James Ledergerber, Reynoldsburg, OH
Cecil Radcliff, West Union, WV
Cedar Creek Farms Homeowners Association, Eleanor, WV
Cemetery Philadelphia, Waynesboro, TN
Chad Reed, Leon, WV
Chadrick G. Lowther & Jamie Bero, Winfield, WV
Charles & Barbara Welling, West Union, WV
Charles & Patsy Heaster, West Union, WV
Charles & Patsy Monk, Ripley, WV
Charles A. & Brenda K. Pierson, Ripley, WV
Charles B & Deidre Jill Yates, Grayson, KY
Charles Bedwell, Buffalo, WV
Charles Brett & Natalie Kay Valdez, Antioch, TN
Charles E & Selena R Terry, Grayson, KY
Charles E. Nesler, II, Longs, SC
Charles E., Jr & James Hetal Brownlee, Nashville, TN
Charles F. Guthrie, Hurricane, WV
Charles H. Whiting, Antioch, TN
Charles Hall, Nashville, TN
Charles Harrison & Alice M Clark, Grayson, KY
Charles L. Jr & Dorothy H. Cooper, Antioch, TN
Charles L. Morrison, Normantown, WV
Charles L. & Vickie D. Perine, Pullman, VA
Charles Matthew & Brianna Howard Griffin, Antioch, TN
Charles McCray Trust & Mark L. McCray, Mineral Wells, WV
Charles R. & Jimmy L. Carpenter, Harrisville, WV
Charles R. & Patricia Smith, Grayson, KY
Charles R. Cook, Chevron USA Inc., Houston, TX
Charles T. Box Revocable Trust, Marion, IL
Charles W. & Glenna Hennen, Elizabeth, WV
Charles W. Yeager, III, Perry Hall, MD
Charles William Hall, III & Amanda Grace Hall, Antioch, TN
Charles & Joanne Hunt, Charleston, WV
Cheryl Lynn & Carl E. Booker, Antioch, TN
Cheryl M. Ward, Milton, WV
Cheryl Meredith, Clarksburg, WV
Cheryl Miller, Grayson, KY

Chester & Imogene Caudill, Morehead, KY
Chester G. & Alesha M. Williams, Grayson, KY
Chester Skeen, Charleston, WV
Childers Farms, Inc., Hurricane, WV
Chris Campbell, Grayson, KY
Chris Capitani, Nashville, TN
Chris E. & Laura D. Harshbarger, Milton, WV
Chris M & Rebecca D Horton, Grayson, KY
Chris Strong, Cane Ridge, TN
Chrisanthi Zotos, Antioch, TN
Christian Smith, Winfield, WV
Christopher & Dennis Doyle, Wheeling, WV
Christopher & Katrina M. Lee, Antioch, TN
Christopher & Melissa Mosier, Grayson, KY
Christopher D. Mattingly, Antioch, TN
Christopher D. Young, Senior Counsel, Constellation Energy Commodities Group, Inc., Baltimore, MD
Christopher Hill, New Albany, MS
Christopher J. & Kimberly Ann Phillips, Las Vegas, NV
Christopher L. & Monica S. Mercado, Antioch, TN
Christopher L. & Rhonda N. Taylor, Antioch, TN
Christopher L. & Shelley D. Crooks, Grayson, KY
Christopher L. Coffman, West Union, WV
Christopher M. Gooch, III & Dianne Jl. Gooch, Antioch, TN
Christopher M. Heywood, Legal Counsel, Statoil Natural Gas LLC, Stamford, CT
Christopher Mealey, Reedy, WV
Christopher P. & Jennifer L. Kucia, Palestine, WV
Christopher R. Capitani, Nashville, TN
Christopher Sarver, Antioch, TN
Christopher Tuley, Keep Southeast Nashville Healthy, Cane Ridge, TN
Christopher Wiseman, Buffalo, WV
Christy C. & Jason A. Smith, Antioch, TN
Church Philadelphia, Waynesboro, TN
Cindi Croomes, Cane Ridge, TN
Clara I. Crow, Moundsville, WV
Clarence Randall & Bualate G. Hudgens, Antioch, TN
Claudia Black, Antioch, TN
Clinton & Karen Harris, Reader, WV
Clyde Bradley Bennett, Antioch, TN
Clyde Frashure, Jr., Monckscorner, SC
CNX Land Resources, Inc., Canonsburg, PA

Coastal Forest Resource Company, Buckhannon, WV
Cody Wright & Sarah Merritt, Antioch, TN
Colby B. & Tara M. Shea, Antioch, TN
Columbia Gas Transmission, LLC, Charleston, WV
Comstock Irrevocable Trust & Silvestre Trust, Issaquah, WA
Cone Gathering, LLC, Canonsburg, PA
Connie F. S. Henry, Southport, NC
Connie Humes, Summer Shade, KY
Connie J. & Gary A. Tolley, Given, WV
Connie L. Knipp, Grayson, KY
Connie M. Hansom, Antioch, TN
Connie Rogucki, Grafton, WV
Connie Staggs, Nashville, TN
Consolidation Coal Company, St. Clairsville, OH
Constance Taylor, New Martinsville, WV
Corinne Unger, Antioch, TN
Cory A. & Mie Na West, Antioch, TN
Craig Harvey, Charleston, WV
Craigo Real Estate Corporation, Nitro, WV
Creed & Opal Hardman, Smithville, WV
CSX Transportation Inc., Jacksonville, FL
Curtis W. Ault & Brittany N. Fraser, Antioch, TN
Cynthia Brewer, Cane Ridge, TN
Cynthia & Fred Jackson, Antioch, TN
Cynthia D. Ellis, President, West Virginia Highlands Conservancy, Charleston, WV
D & M Powell, LLC, West Union, WV
D&D Dismantling, Inc., Spencer, WV
Dale & Barbara Stone, Leon, WV
Dale & Melissa Keplinger, Gassaway, WV
Dallas Smith, etal, Harrisville, WV
Dallison Lumber Company Inc., Jacksonburg, WV
Dalton & Teddy Parsons, Brohard, WV
Dan & Glenda Kirby, Brentwood, TN
Dan Lekich, Nashville, TN
Dan Thomas, Brentwood, TN
Danelle J. Hughes, Antioch, TN
Daniel & Amber Rush, New Martinsville, WV
Daniel & Cindy Ellis, Piney Point, MD
Daniel & Jeanette Corey, Charleston, WV
Daniel & Jennifer A. Harris, Grayson, KY
Daniel & Kendall Call, Culloden, WV

Daniel E. II & Megan Freeman, Culloden, WV
Daniel H. Weed, Charleston, WV
Daniel Hughes, Leon, WV
Daniel J. Beyer, Antioch, TN
Daniel Jividen, Knoxville, TN
Daniel K. & Lisa A. Jozwick, Salem, WV
Daniel Mcguire & Erica Kay Hause, Antioch, TN
Daniel R. & Mary Lou Clevenger, Smithville, WV
Dannett M & Christopher R Stone, Grayson, KY
Dannie Huffman and Dervin Clay Huffman, Lewisburg, WV
Danny & Dianne Dolin, Ripley, WV
Danny & Joyce Groover, Avon, IN
Danny & Patty Sue Sergent, Grayson, KY
Danny Belcher, Ripley, WV
Danny Briggs, etal, Wileyville, WV
Danny J. & Penny E. Conner, Culloden, WV
Danny Mallett, Buffalo, WV
Danny McCormick, Liberty, WV
Danny R. & Annie F. Knight, Culloden, WV
Dara & Matthew Zarth, Antioch, TN
Darlene F. Smith, Ripley, WV
Darrell & Allene Miller, Summer Shade, KY
Darrell Brumfield, Kissimmee, FL
Darrell C. Bowers Etal, Alburquerque, NM
Darrell Taylor, Hurricane, WV
Darwin Brown, Friendly, WV
Dave Goodwin, Saint Albans, WV
David & Candy Mullan, West Union, WV
David & Christine Blythe, Summer Shade, KY
David & Jocelyn Gutekunst, Antioch, TN
David & Linda Cooper, Ripley, WV
David & Nancy Knight, Smithville, WV
David & Susanna Blumig, Palestine, WV
David & Terri Owens, Barboursville, WV
David & Victoria Bland, West Union, WV
David Beasten, Manager - Supply Planning and, Reading, PA
David Bowyer & Deborah Lynn Wyckoff, Alma, WV
David Burtrand, etal, Reader, WV
David C. Jean & Samantha Smith, Antioch, TN
David C. Jr & Deborah L. Hardy, Antioch, TN
David Chapman, Washington, PA

David E. & Beverly Miller, Grayson, KY
David E. & Robin D. Simms, Milton, WV
David E. & Shelly M Moore, Summer Shade, KY
David E. Bowyer, Alma, WV
David E. Ellis, Red House, WV
David F. Caffery, Dir. Ptflo Mgmt & Reg, PSEG Energy Resources & Trade LLC, Newark, NJ
David Goode, Summer Shade, KY
David Hastings, St. Albans, WV
David Hodge, Berea, WV
David Johnson, Red House, WV
David K. & Marilyn D. Ramey, Culloden, WV
David K. Goebel, Ashland, KY
David L. Card & Christopher M. Yount Et Al, Antioch, TN
David L. Daughtry, Fuels Procurement Administration, City of Richmond, Virginia, Richmond, VA
David L. Hensley, Barboursville, WV
David L. & Roberta L. Morton, Culloden, WV
David Meadows, Red House, WV
David P. Warsinsky, New Hope, AL
David Potter, ERM, Minneapolis, MN
David R & Tiffany B Matthews, Summer Shade, KY
David R. Ferrebee, West Union, WV
David Roland Bayer, Antioch, TN
David Sayre, Buffalo, WV
David W. Mullins, Ripley, WV
David W. Sayre, Buffalo, WV
David Waybright, Ripley, WV
David Weekley, St. Marys, WV
David Whited & Jill Easter, Ripley, WV
David Wymond, Houston, TX
David Yoders, Moundsville, WV
Dayton Lovejoy, Red House, WV
Deanna Allen, Milton, WV
Dearld Mason, Paden City, WV
Debbie Hoffman, Mt. Alto, WV
Deborah & Gregory Suttles, Grayson, KY
Deborah S. Wilson, Antioch, TN
Deborah T. Sweeneny, Culloden, WV
Debra & Timothy Holley, Ripley, WV
Debra & Timothy Shamblen & Patricia Brown, Lockbourne, OH
Debra Cart, Red House, WV

Deepak A Raval, Federal Energy Specialist, NiSource Distribution Companies, Columbus, OH
Deer Valley Homeowners Association Inc., Cane Ridge, TN
Delmar E. & Virginia L. Eagle, LeRoy, WV
Delmer Rhodes, Ripley, WV
Delvin Downs Homeowners Association, Inc., Brentwood, TN
Dempsey & Kathy Casto, Liberty, WV
Dennis & Carolyn Stover, Ripley, WV
Dennis & Dianne Cochran, Ripley, WV
Dennis Caveny, Antioch, TN
Dennis Cooper, Parkersburg, WV
Dennis Phengsavanh & Vanny Chhay, Antioch, TN
Dennis Weed, Charleston, WV
Denver & Mary Beth Cox, Smithburg, WV
Derek & Elaine King, Antioch, TN
Derek & Emily Lane, Ripley, WV
Derry G. & Beatrice Baltimore, Antioch, TN
Dervin Clay and Dannie L. Huffman, Lewisburg, WV
Devin L. & Cara Y. Maddox, Antioch, TN
Devon C. Horsley, Mineral Wells, WV
Diane Bedwell, Buffalo, WV
Diane Ludwig, Elizabeth, WV
Dianne McIntyre, Ripley, WV
Dimetra Mccutcheon, Antioch, TN
Dino and Rebecca Corsetti, Grayson, KY
Dominion Hope, Clarksburg, WV
Dominion Transmission, Inc., Pittsburgh, PA
Don & Carol Tangren, Cane Ridge, TN
Don Jr & Valerie Everman, Grayson, KY
Don Shipman and Divetta Shipman, Saint Marys, WV
Don Springer, Eaton Park, FL
Don Wimpelberg. Antioch, TN
Donald & Bonnie Elliott, Grayson, KY
Donald & Cora Jones, Ripley, WV
Donald & Helen Casto, Given, WV
Donald & Ilena Thomas, West Union, WV
Donald & Myrna Mason, Reader, WV
Donald A. Dunn, III & Jacqueline Ree Dunn, Antioch, TN
Donald and Opal Withrow, Grayson, KY
Donald E. & Claudia Y. Black, Antioch, TN
Donald G. & Norma Ruth Spurgeon, Antioch, TN
Donald L. Barnes, Harrisburg, PA

Donald M. Thompson, Charleston, WV
Donald McCoy, Jacksonburg, WV
Donald P. & Einleen J. Mayo, Antioch, TN
Donald P. & Dayna L. Gunn, Mt. Zion, WV
Donald Pickens, Ripley, WV
Donald R Sandidge, Edmonton, KY
Donald Radcliffe, Raleigh, NC
Donald Shull Jr. and Melissa Shull, Waynesboro, TN
Donna G. & Orman C. Johnston, Milton, WV
Donnie & Mary Kay Kimball, West Union, WV
Donnie Fisher, Eleanor, WV
Donnita Englad, Edmonton, KY
Donzel & Patona Whiting, Ripley, WV
Dora Parsons, LeRoy, WV
Doris Davis, Harrisville, WV
Doris M. Boone, Harrisville, WV
Doris Miller, Dunbar, WV
Dorothy Carney, Diven, WV
Dorothy Gola, Reynoldsville, WV
Dorothy K. Wise, Milton, WV
Dorothy Mae Davis, Nanjemoy, MD
Dorsel H. Cobb, Red House, WV
Doug Rudd, Gas Analyst, New Jersey Natural Gas Company, Wall, NJ
Douglas & Jeanette Bendle, Antioch, TN
Douglas & Susan Miller, West Union, WV
Douglas L. & Valree A. Peralta, Antioch, TN
Douglas M. Hartwell, Liberty, WV
Dremia K. Miller, Salem, WV
Dulcie F. Carroll, West Union, WV
Dunfa Peng, Antioch, TN
Dupree M. & Erika N. Pinson, Antioch, TN
Dustin & Savannah Hardbarger, Brohard, WV
Dustin A. & Sarah N. Everman, Grayson, KY
Dustin Beaver, Fraziers Bottom, WV
Dustin Eli Whiteside, New Albany, MS
Dustin L. & Kaci Whitney, Antioch, TN
Dwain Stanley, Parkersburg, WV
Dwight & Tina Moore, West Union, WV
E. Mae Rhodes, LeRoy, WV
E. Sharon Sanford, Antioch, TN
E.P. Haught Heirs, Grantsville, WV

E.S. Childers Heirs c/o John Taylor, Huntingtown, MD
Earl Sommerville, Reedy, WV
Early M. & Chander D. Cash, Antioch, TN
East West Properties, Inc., Olive Hill, KY
Ebonnie M. Figgins, Antioch, TN
Ed Jividen, Red House, WV
Edd Tate Parker Living Trust, Oxford, MS
Eddie Vinay & Anousone Thespurinton, Antioch, TN
Edgar & Audrey Duelley, Coxs Mills, WV
Edgar & Shannon Atkins, etal, Ripley, WV
Edgar McCutcheon, Reedy, WV
Edith Groves, Ripley, WV
Edith Littleton, Morehead, KY
Edmond T. & Inge E. Conway, Antioch, TN
Edward & Iris Lee, Gay, WV
Edward C. & Coreen D. Jackson, Antioch, TN
Edward L. Cummings, Ripley, WV
Edwin L. & Stephanie D. Linzie, Antioch, TN
Edwin P. and Barbara J. Winters, Milwood, WV
Elaine J. Newsom, Antioch, TN
Elaine Taylor, Gallipolis Ferry, WV
Eleanore M. Fox, Glen Easton, WV
Electa J. Smith, Nitro, WV
Elenor Dyer, Nashville, TN
Elizabeth A. & Robert E. Ray, Antioch, TN
Elizabeth Garber, Nashville, TN
Ella & Roger Underwood, Salem, WV
Ella Lee & Ebony C. Beech, Antioch, TN
Elmer & Rose Thornberry, Grayson, KY
Elmer Bergum, Liberty, WV
Elmer L. Aston, Moundsville, WV
Elmer W. Pierce, West Union, WV
Elton C. & Susan H. Felts, Antioch, TN
Elwood P. & Elizabeth Rill, Glen Rock, PA
Emerson Lewis Jr., Grayson, KY
Emery Casto, Leon, WV
Emily Cobb, Red house, WV
Emma Swanson, Red House, WV
Emmitt C. & Dorothy H. Nicholas, Culloden, WV
Emory H. & Elsie C. Smith, Antioch, TN
Ereny & John Yakoub, Antioch, TN

Eric Bernhardt, TRC, West Union, WV
Eric Duvall, Grayson, KY
Eric Engle & Ashley Stover, Ripley, WV
Erick Bergman, Antioch, TN
Erik Duncan, Charleston, WV
Erin Cornell, Red House, WV
Ernest E. Lanham, Newburg, WV
Ernie E Gilkes, Antioch, TN
Ernie R. Pritt, West Union, WV
Eron & Cathy Diane Hatchett, Antioch, TN
Estate of Joe Nelson, Attn: Greg Nelson, Scott Depot, WV
Ethel Irene Barker, Morehead, KY
Eugene & Shirley Carra, Grayson, KY
Eugene Depue, Harrisburgh, NC
Eugene Testamentary Trust, Imperatore, Antioch, TN
Evans Equipment Rental, Evans, WV
Evelyn Davila, Winfield, WV
Everett RIchards, Jr, Canton, OH
Evie Parke, Summer Shade, KY
Fadhila A. Al-Jazairi, Antioch, TN
Falon Felts, Antioch, TN
Falton O. & Cornelia Mason, Oxford, MS
Family Cemetery c/o Regina Lemley, Reader, WV
Faye Rogers, Ripley, WV
Federal National Mortgage Association, Dallas, TX
Ferenc & Luz C. Andi, Antioch, TN
Fidelity Bank, Wichita, KS
Flora Conley, Red House, WV
Floyd & Daniel Melott, New Martinsville, WV
Forest Jr. & Tina Glover, Jacksonburg, WV
Foster & Terri Lyons, Ripley, WV
Fran & Ollie Cole, Antioch, TN
Frank & Donna Race, West Union, WV
Frank C. & Paula S. Wilkens, Antioch, TN
Frank E. Larson, Creston, WV
Frank K., Jr & Mia M. Vickers, Antioch, TN
Frank Randolph, West Union, WV
Frank Simons, Sterling, VA
Franklin Cunningham, Pine Grove, WV
Franklin T. Barker, West Union, WV
Fred E. Barnes, Nashville, TN

Fred R. & Frances L. Dailey, Milton, WV
Fred Strickland, Clinton, OH
Fred W. Kirby Jr., Parkersburg, WV
Freda Casto, Given, WV
Freda E. Byrd, Berea, WV
Frederick & Barbara Hall, Ripley, WV
Frederick & Jo Ann Perry, Barboursville, WV
Frederick E. & Kimberly A. Davis, New Cumberland, WV
Fredrick & Mary Boyce, Ripley, WV
Freo Tennessee, LLC, Tampa, FL
G. Yancey, Antioch, TN
Gail Stalnaker, etal, Kenna, WV
Gail Thompson, Given, WV
Gary & Jackie Carney, Given, WV
Gary & Joyce Rizer, Antioch, TN
Gary Clendenin, St. Albans, WV
Gary Cooper, Brohard, WV
Gary Douglas, etal, Valley City, OH
Gary E. Guy, BGE - Chief FERC Counsel, Baltimore Gas & Electric Company, Baltimore, MD
Gary Erwin, Hurricane, WV
Gary J. Belt, Chardon, OH
Gary R. Rose, Leon, WV
Gary Stewart, Charleston, WV
Gayle Carter, Grayson, KY
Gena D. Smith, LeRoy, WV
Gene Kuehner, Reedy, WV
George & Barbara Adrian, New Milton, WV
George & Blanche Caudill, Morehead, KY
George & Susan Gagnon, West Union, WV
George B & Suzette L Bradford, Grayson, KY
George C., Jr & Lillian L. Hawkins, Antioch, TN
George Cullers, Salem, WV
George Jr & Beverly Allin, Antioch, TN
George K & Shirley & Jana F Conley, Grayson, KY
George Lagos, Moundsville, WV
George R. Gore, West Union, WV
George Stansberry, etal, West Union, WV
George T. & Sherre R. Mayes, Norton, OH
Gerald & Geraldine Carra, Grayson, KY
Gerald F & Christi M Thompson, Grayson, KY

Gerard Elswick, Ravenswood, WV
Gerawork Tesfaye & Seblewongel Ejigu, Antioch, TN
German M. Baratto & Marielena Ramos, Antioch, TN
Gerson Woodlands, LLC, Flushing, NY
Gertie Hill, Grayson, KY
Gholam & Sevda Kheshti, Brentwood, TN
Gilbert Painter, Winfield, WV
Ginger Richman, Director, NJR Energy Services Company, Wall, NJ
Gini Mogan, Reedy, WV
GJ Syew LLC, Grayson, KY
Glen and Ruth Thompson, c/o Wade Thomas Thompson, Ashland, KY
Glen O.Gibson, Hurricane, WV
Glenda & Norris Morris, Antioch, TN
Glenn & Ramona Cunningham, Proctor, WV
Glenn Long, et al, West Union, WV
Glenn Painter, Winfield, WV
Glenn R Mann, Ripley, WV
Glenn R. Jr & Sharon Mann, Ripley, WV
Glenn Doyle & Fay Thompson, Ripley, WV
Gloria Faye Coleman, Antioch, TN
Gloria Jean Nunn, Summer Shade, KY
Glyne A. Griffith, Antioch, TN
Goran & Marijana Kebara, Antioch, TN
Gordon E. O'Dell, St Albans, WV
Gordon Yost, etal, Reader, WV
Grace C. Omatu, Antioch, TN
Grant F. Redd, Moundsville, WV
Greg & Michelle Taylor, Antioch, TN
Gregory & Crystal Dulaney, Pine Grove, WV
Gregory B. Carroll, Culloden, WV
Gregory D. Hatfield, Culloden, WV
Gregory K & Jayne A Clinton, Paint Lick, KY
Gregory T. Simmons, Associate, Cullen and Dykman LLP, Washington, DC
Greystone Properties, LLC, Brentwood, TN
Guillermo L. & Julia C. Valencia, Antioch, TN
Guss Kelley, Salem, WV
Gwin & Robert Orr, Antioch, TN
Gwyen T. & Allen Yancey, III, Antioch, TN
H & H Construction Inc., Greenwood, MS
H3, LLC, Milton, WV
Haessley Land & Timber, LLC, Marietta, OH

Hamilton & Moore LP, Nashville, TN
Hannah E. Toney, Red House, WV
Harold & Helen Edens, Ripley, WV
Harold & Ruth Bell, Big Springs, WV
Harold B. & Connie S. Crow, Moundsville, WV
Harold D. Villers, Elizabeth, WV
Harold W. & Lucy A. Sullivan, Culloden, WV
Harry & Patricia Bradley, Big Springs, WV
Harry Allred, Fraziers Bottom, WV
Harry Beasley, Charleston, WV
Harry C. Goudy, III, Easton, MD
Harry D. Barker, Smithville, WV
Harry G. Cooke, Jr., Pineville, WV
Harry L. Allfred, Fraziers Bottom, WV
Harvest Homes, LLC, Brentwood, TN
Harvey Ghiz, Hurricane, WV
Haught Farms, LLC, Harrisville, WV
Hayes Living Trust, Grayson, KY
Hayward R. Davis, Salem, WV
Heartwood Forestland Fund IV, LP, Parkersburg, WV
Heather & Jason C. Mcgovern, Antioch, TN
Heather Hixson-McGovern, Keep Southeast Nashville Healthy, Cane Ridge, TN
Heber & Sandra Richardson, Dunbar, WV
Hector Martinez, Antioch, TN
Heirs of James Henson, Buffalo, WV
Heisel & Myrtle Ledsome, Reedy, WV
Helen & Donald Casto, Given, WV
Helen K. White, Ripley, WV
Helen R. Payne, Moundsville, WV
Helin S. Tahir, Antioch, TN
Henry Arvis & Elizabeth Riffe, Grayson, KY
Henry Caudill Jr & Teresa L. Caudill, Morehead, KY
Heran Berwary, Antioch, TN
HFP, LLC, Kenova, WV
HG Energy, LLC, Parkersburg, WV
Hidden Creek Homeowners Assn Inc., Nashville, TN
Hindes Farm Trust, Attn: Donald & Betsy Hindes, Columbus, OH
Hneng Thang & Khaw A. Ling, Antioch, TN
Hoa Thi Nguyen & Van Huang Lich, Antioch, TN
Holly Ashby, Antioch, TN
Holly Greene, Nashville, TN

Homer & Delores Weekley, West Union, WV
Hong K. & Young M. Yang, Antioch, TN
Hope Natural Gas Company, Clarksburg, WV
Howard & Clara Bucher, Reader, WV
Howard C. Burchett, South Charleston, WV
Howard Hollow LLC, Edmonton, KY
Huey Moore, Arbuckle, WV
Hundred Resources, Inc., Fairmont, WV
Hurley-Y, Murfreesboro, TN
I. L. (Ike) Morris, Attn: Steve Holloway, Glenville, WV
I.C. Young Estate, Glen Easton, WV
Ifeoma C. Nwankwo, Antioch, TN
Illena Booher & Donald J Thomas, West Union, WV
Imelda A Reynolds, Grayson, KY
Inez Brotherton, LeRoy, WV
Irene Nocilla, Nashville, TN
Isaac & Stephanie Selbe, Ripley, WV
Isabelle Snider, Lake Milton, OH
J. H. Lowther Estate Attn: Rob Lowther, etal, Columbus, TX
J. Jeannie Myers, Senior Counsel, Chevron USA Inc., Houston, TX
J. W. Owens, Antioch, TN
J.D. Geelhaar, New Milton, WV
J.F. Crow Estate c/o Lloyd Baker, Moundsville, WV
Jack & Bonnie Tracy, Antioch, TN
Jack & Joan Blazer, New Milton, WV
Jack & Julie Campitelli, Antioch, TN
Jack & Rick T. Yeager, Dunbar, WV
Jack Black, Milton, WV
Jack F. Davidson, Waynesboro, TN
Jack Garton, Red House, WV
Jackie L. Scott, Eleanor, WV
Jackie R. & Carolyn S. Bailey, Red House, WV
Jaclyn & Dalaina McLaughlin, Fraziers Bottom, WV
Jacqueline Moore, LeRoy, WV
Jacqueline R. Monaghan, Antioch, TN
Jamal S. Albarati, Nashville, TN
James & Angela Bland, West Union, WV
James & Arnold Campbell, Grayson, KY
James & Betty McCoy, Jacksonburg, WV
James & Christopher Bithell, Irwin, PA
James & Cynthia Hodgson, Parkersburg, WV

James & Ester Miller, Washington, WV
James & Gary K. Bunner, Belleville, WV
James & Heather Patrick, Chester, SC
James & Joretta Ritchea, New Martinsville, WV
James & Linda LeMasters, West Union, WV
James & Melanie Pierson, Ripley, WV
James & Roberta McCoy, Smithville, WV
James & Sharron Lindsey, West Union, WV
James A. Haggard and Annette Haggard, Waynesboro, TN
James and Jennifer Patrick, Louisa, KY
James Andrew Wiley, Antioch, TN
James B. Stanford (LE) C/O Samantha Morris, New Albany, MS
James BoHannon, Given, WV
James Booth Estate, Steubenville, OH
James C. Moore, New Martinsville, WV
James C., Romie L., Kelly, & Brian Milhoan, LeRoy, WV
James D & Sharon Kay Kretzer, Grayson, KY
James D. Dunbar, Leavittsburg, OH
James E. Futrell, Et Ux, Antioch, TN
James E. Snyder, etal, Charleston, WV
James Gossett Et Ux, Franklin, TN
James H. & Deborah D. Sullivan, Antioch, TN
James Herbert Maggard, Catlettsburg, KY
James Johnson, Grayson, KY
James L. Cummings, Milton, WV
James L. Shier, Mill Valley, CA
James Luke Roberson, New Albany, MS
James M. Winter, Ripley, WV
James Marshall, Reedy, WV
James N. Tokarski & Donna M. Harvey, Antioch, TN
James N. Tokarski, Antioch, TN
James Newton Dominey, Jr & Brooke A. Dominey, Antioch, TN
James O. Frye, Jr, Antioch, TN
James O. Shannon & Dale E. Shannon, Antioch, TN
James Olson, Vinson & Elkins LLP, Antero Resources Corporation, Houston, TX
James Panaro, Eleanor, WV
James Patty, LeRoy, WV
James R. Carden, Culloden, WV
James Ray & Star E Carroll, Morehead, KY
James R-R Martin Boone Et Al, Borchard, WV
James Shier, Mill Valley, CA

James T. Ester & Heather H. Hayes, Antioch, TN
James W. Barber Et Ux, Antioch, TN
James Webb, West Union, WV
Jamshid Mirzamukhamedov & Gulchekbra Ibragimova, Antioch, TN
Jane Immerfall, Antioch, TN
Jane Watson, Mcmechen, WV
Janet Cain, Given, WV
Janet Hodge, Smithville, WV
Janet Hodge, Smithville, WV
Janet Sue Nolan Miller, etal, Pine Grove, WV
Janet Vanfleet & Linda D. Virkus, Antioch, TN
Janet Wair & Victor Nolasco, Antioch, TN
Janice E. Miller, Milton, WV
Janice Ellifrill Cox, West Union, WV
Janice McIntyre, Big Bend, WV
Janice Petersen, Ripley, WV
Jared & Lora Hughes, Ripley, WV
Jarrett Depue, Vienna, WV
Jason & Casey Napier, Barboursville, WV
Jason K Davis, West Union, WV
Jason McGovern, Cain Ridge, TN
Jason T. & Virginia F. Howell, Antioch, TN
Jason Travis, West Union, WV
Javier & Yvonne Solis, Antioch, TN
Jean R. & Kelda R. Altidor, Antioch, TN
Jeff & Mary Goforth, Antioch, TN
Jeff L. Kern, Administrator, KO Transmission Company, Cincinnati, OH
Jeff Morgan, Nashville, TN
Jeff Perryman, FERC Compliance Manager, Atmos Energy Corporation, Dallas, TX
Jeffery & Ashley Shelton, Nashville, TN
Jeffery D. Cobb, Eleanor, WV
Jeffery S. Starcher, Winfield, WV
Jefff Yarbro, Nashville, TN
Jeffrey and Lorie Callihan, Morehead, KY
Jeffrey Burdette, Reedy, WV
Jeffrey C. & Mary L. Black, Culloden, WV
Jeffrey Callihan, Morehead, KY
Jeffrey David & Robin Lynn Wilcox, Grayson, KY
Jemal Mamma & Mariya M. Burka, Antioch, TN
Jenevi Nguyen, Antioch, TN
Jennifer A. Clemence, Antioch, TN

Jennifer Burke, Naperville, IL
Jennifer M. Johnson, West Union, WV
Jennifer Patton, Red House, WV
Jennifer R. Villaeal, Antioch, TN
Jennifer Tomlin, Nashville, TN
Jermaine Smith, Antioch, TN
Jerry & Diana Legg, Red House, WV
Jerry & Greta Williams, Browns Mills, NJ
Jerry & Karen Mason, Reader, WV
Jerry D. & Martha Myers, Exton, PA
Jerry Davis, Milton, WV
Jerry Don & Jennifer Johnson, Antioch, TN
Jerry L. Sparks, Grayson, KY
Jerry L. Walker, Buffalo, WV
Jerry M Garmon, Edmonton, KY
Jerry M. Booth, Wellsburg, WV
Jerry W. Slater, Ripley, WV
Jerry Walters, Jacksonburg, WV
Jesse & Miranda Walker, Antioch, TN
Jesse Rhodes, Ripley, WV
Jesse & Cathy Napier, Culloden, WV
Jessica Kerr, Antioch, TN
Jill Montgomery Barker, Mineral Wells, WV
Jimmie & J. Roberta Templeton, Milton, WV
Jimmy D. Hill, Et Ux, New Albany, MS
Jimmy Dean Parker C/O Ed Stacy, Morehead, KY
Joan & Clellan Warmoth, Paint Lick, KY
Joan Eads, Buffalo, WV
Joan Runyon, Buffalo, WV
Joanne Palermo, Antioch, TN
Joanne Umstead, Antioch, TN
Jodi Collier, Grayson, KY
Joe Casto, Ripley, WV
Joe Henderson, Benwood, WV
Joe M. & Glenna R Brammell, Grayson, KY
Joe Singer, Nashville, TN
Joel & Lauren Evrist, Antioch, TN
Joel & Rosa Perales, Antioch, TN
Joey B. Tolley, Eleanor, WV
John & Angela Coulter, Antioch, TN
John & Barbara McCrady, Mineral Wells, WV

John & Barbara Upton, Evans, WV
John & Brenda Cunningham, Ripley, WV
John & Chrystal Wilenski, Kissimmee, FL
John & Collette Turner, Ripley, WV
John & Kristie Manley, Ripley, WV
John & Linda Strickling, West Union, WV
John & Sandra Day, Paint Lick, KY
John & Tammy Chandler, Grayson, KY
John A. McMillan, Norton, OH
John A. Nixon, Jr & Jana L. Nixon, Antioch, TN
John Arvel Caudill, Morehead, KY
John B. & Kelly L. Bancroft, Antioch, TN
John Berisford, Moundsville, WV
John Christman, Wellsburg, WV
John D. & Helen A. Northcutt, Morehead, KY
John D. Dobbs, Moundsville, WV
John D. Sadler Ii & Linda M. Hendrich, Antioch, TN
John E. & Karen Kurtz, Antioch, TN
John E. Allocca, Cullen and Dykman LLP, Washington, DC
John E. Kay, Reynoldsburg, OH
John Elswick, Hurricane, WV
John H. Mitchell, New Albany, MS
John Hudson, Jennings, OK
John III & Casey Coelho, Pembroke Pines, FL
John J. & Shantel E. Watson, Antioch, TN
John Jones, Brohard, WV
John K. Mason, Jr., Moundsville, WV
John Knight, Akron, OH
John M. & Connie S. Irrevocable Trust Underwood, West Union, WV
John M. & Bertha M. Frazier, Pullman, WV
John M. & Lovie F. Chapman, Milton, WV
John Mark Estes, et ux, Hurricane, WV
John Myer, New Martinsville, WV
John Nathan & Trista A Greer, Grayson, KY
John P. & Ann Stevens, Summer Shade, KY
John Parker, Moundsville, WV
John Phillip & Connie Gail Sturdivant, Antioch, TN
John R. Reed, Ripley, WV
John R. & D. Germaine Umstead, Pullman, WV
John Reid, LeRoy, WV
John Reynolds, Antioch, TN

John Rolfe, Inwood, WV
John Snider, Debra Morris & Lori L. Jenkins, Lake Milton, OH
John Stephens, Ripley, WV
John T. Parker, Moundsville, WV
John T. & Laurlee Howarth, Columbus, NJ
John W. Fore Jr., The Villages, FL
John W. Hall, Palestine, WV
Johnnie Harper, Red House, WV
Johnson & Goebel Inc., Grayson, KY
Jolene Jones, West Union, WV
Jon Kazmierski- District Ranger, Daniel Boone National Forest, Morehead, KY
Jonathan L. Wentworth & Monica J. Moore, Antioch, TN
Jonathan Lemin, Antioch, TN
Jonathan Wentworth, Nashville, TN
Jose D. & Yasmin Gonzales, Antioch, TN
Joseph & Anita Bianchini, Spotsylvania, VA
Joseph & Minnie Shiben, New Martinsville, WV
Joseph C. & Ordelia T. Redmon, Antioch, TN
Joseph D. & Joan F. Yeager, Antioch, TN
Joseph Dudley, Jacksonburg, WV
Joseph Hornbeck, New Martinsville, WV
Joseph Macca & John Giombattista, Nashville, TN
Joseph Moore, Arbuckle, WV
Joseph S. & Kelley A. Ellis, Antioch, TN
Joseph Vespa, Wheeling, WV
Josephine Donnahoe, West Union, WV
Josh Jefferson, Regional Economic Development Authority, Wheeling, West Virginia
Joshua & Sheena Wolfe, Given, WV
Joshua C. & Kerri G. Wood, Culloden, WV
Joshua J. & Alyssa J Kurtz, Antioch, TN
Joshua Morris West & Denise Leann Fields, Antioch, TN
Joshua S. Gull & Alexandra M. Fontana, Antioch, TN
Joshua W & Tracy D Mcguire, Grayson, KY
Joshua W. & Amanda C. Mangrum, Antioch, TN
Joyce A. and Eric V. Griffith, Catlettsburg, KY
Joyce Eidon & Kesiena Idahosa, Antioch, TN
Joyce S. Boggess, Southport, NC
Joylyn C. Benson, Antioch, TN
Juanita M. Leggett, West Union, WV
Judith C. Andrews, Antioch, TN
Judith King Vulcano, Trustee, Antioch, TN

Judy Ann Howard, Tomkinsville, KY
Judy Caudill, Morehead, KY
Julia Yuan, Ellicott City, MD
Julie Kerns, Glen Easton, WV
Julius M. Shook, Antioch, TN
Justin Adams, Culloden, WV
Justin Casto, Liberty, WV
Justin Lucas Caudill, Morehead, KY
Justin Morehouse, Morehead, KY
Kaine Howard & Angela McCombs, Proctor, WV
Kalil & Vyan Sofi, Antioch, TN
Kamiran Abdalrahman & Berivan Mhsen, Antioch, TN
Kamton Kunce, Cane Ridge, TN
Karen Bell & Roger Dunham, Glen Easton, WV
Karen Cooper, Parkersburg, WV
Karen Gribben, Eleanor, WV
Karen Miles, Catlettsburg, KY
Karen Neal, Antioch, TN
Karen Sue Prim, Harrisville, WV
Karen Tabor, Culloden, WV
Karin M. & Brian M. Cook, Antioch, TN
Kat Cadle, Culloden, WV
Katherine A. & Nolan Fall, Antioch, TN
Katherine Allen, Red House, WV
Katherine C. Tierny & Seth B. Cox, Antioch, TN
Katherine L. Blake, Antioch, TN
Katheryn Barter, West Union, WV
Kathleen & David Vandenbergh, Thompsons Station, TN
Kathleen & Steven D. Carter, Antioch, TN
Kathryn A. Weed, Charleston, WV
Kathy Fraley, Olive Hill, KY
Kathy Phillips, Reader, WV
Keith & Angela Nelson, Antioch, TN
Keith A & Kathryn Y Forster, Grayson, KY
Keith Brotherton, LeRoy, WV
Keith G. Donahue, Culloden, WV
Keith Miller, Reedy, WV
Keith Smith, Grayson, KY
Kelley A. Woodside, Antioch, TN
Kelly & Denise Davis, West Union, WV
Kelly Tucker, Buffalo, WV

Kelly Wilson, Antioch, TN
Kelsey Y. & Nichole R. Williams, Antioch, TN
Kelvin & Tracey Lusk, Antioch, TN
Kelvin E. & Kathryn D. Creameans, Milton, WV
Kema Sabe Inc., Tupelo, MS
Kendall B. & Tracy J. Hodge, Harrisville, WV
Kendall Marie Stevens, Summer Shade, KY
Kenneth & Kimberly McCloy, LeRoy, WV
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Ruby Ballenger, West Union, WV
Rudy Bradley, Hurricane, WV
Rudy R. and Clyda L. Hester, Catlettsburg, KY
Rudy Raynes, Eleanor, WV
Ruel Jones, Nashville, TN
Russell & Carol Stackpole, Middlebourne, WV
Russell L. & Regina K. Hupp, Creston, WV
Russell Ray Payne, Antioch, TN
Russell Ripley, Milton, WV
Russell W. & Flista H. Hanshaw, Reedy, WV
Rutendo Farai Pasipanodya, Antioch, TN
Ruth E. Gaughan, Timonium, MD
Ruth E. Gibson, Grayson, KY
Ruth E. Phillips, etal, Harrisonburg, VA
Ryan J. & Michelle L. Riddle, Callahan, FL
Ryan N & Cooksey Brooke H Knipp, Grayson, KY
Ryan Talbott, Appalachian Mountain Advocates, Lewisburg, WV
Sabrina Williams, Antioch, TN
Sadik Yusuf Ahmed, Antioch, TN
Sally Keffer, Grayson, KY
Salt Rock Sewer Public Service, Ona, WV
Sam Cartozzo, Antioch, TN
Samantha J. & Stephen R. Swanson, Antioch, TN
Samara A. Jaffe, Cullen and Dykman LLP, Washington, DC
Samir Atwan, Nashville, TN
Sammy & Nancy Kozee, Grayson, KY
Samuel & Glenda Gilbert, Antioch, TN
Samuel & Sherri Hammett and Robert Hammett, Waverly, WV
Samuel & Wilma Morris, Reader, WV
Samuel A. Berry, Antioch, TN
Samuel and Clara Haught, Reader, WV
Samuel and Lesa McCrary, Antioch, TN
Samuel T. & Paula J. Weekley, West Union, WV
Samuel Witalley, Cane Ridge, TN
Samy N Badie Abd El Massih & Fadia Boutrous, Antioch, TN
Sandor Manyoky, Anchorage, AK
Sandra Bergum, Liberty, WV
Sandra Fertruy, Pine Grove, WV

Sandra Johnson, Grayson, KY
Sandra W. Jaudon, Nashville, TN
Sandy Joe & Lottie Faye Brady, Nashville, TN
Sandy Sonrel, Culloden, WV
Sarah Bradford, Antioch, TN
Sarah G. Novosel, ESQ, Senior VP and Managing Counsel, Calpine Corporation, Washington, DC
Sarhan A. & Aljowfi Salah, Wadad Mohamed Hizam, Antioch, TN
Scott Butler, Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc., New York, NY
Scott Castlemen, Charleston, WV
Scott H. & Tram Mays, Antioch, TN
Scott J. & Bassma M. Phillips, Antioch, TN
Scott Kitchen, Scott Depot, WV
Scott Nickerson, Wheeling, WV
Scott Patrick & Franci Rena Burchett, Grayson, KY
Scott Russom, Antioch, TN
Sealand Waste LLC, Rush, NY
Sean T. Spradlin, Antioch, TN
Sean Wasmer, et al, Middle River, MD
Serena Bower, Parkersburg, WV
Sergio Guitierrez, Antioch, TN
Seth Justice, Grayson, KY
Shaikh Rahman & Nujat Jabeen, Antioch, TN
Shannon Tompson, Antioch, TN
Shara Farag, Antioch, TN
Sharon Christ, Reedy, WV
Sharon Garton, Red House, WV
Sharon J. Davis, Milton, WV
Sharon Lanham, Kenna, WV
Sharon Powell, Allison Park, PA
Sharon Tucker, Moundsville, WV
Shawn A. Glaspell, West Union, WV
Sheila D. Curtis, Antioch, TN
Sheila Fisher, Triadelphia, WV
Shelby Ann & Benjamin Phillip Peterson, Antioch, TN
Sheldon L. & Wendy D. Bailey, Red House, WV
Shelton & Rhonda Malone Cammon, Antioch, TN
Sherman & Arlita D. Black-Swanson, Antioch, TN
Sherman Swanson, Antioch, TN
Sherri Crane, St. Albans, WV

Shirley Jackson, Grayson, KY
Shirley P. Taylor, Culloden, WV
Shivan T. & Sipan T. Galnasky, Antioch, TN
Sibyl Haggard Et Al, Waynesboro, TN
Sidney W. Wair & Arthur E. Wair, Jr., Antioch, TN
Sidney W. Wair & Larry M. Mullins, Antioch, TN
Slema Walker, Buffalo, WV
Smithfield Foods Inc., Grayson, KY
Solaiman Chowdhury, Md, Antioch, TN
Sonia L. Byrd, Antioch, TN
Southern Jackson Co. Public Service Dist., Ripley, WV
Sparks Enterprises, Given, WV
Sperry Hardwoods, Salem, WV
Stacey Hagemeister, Nashville, TN
Stacey Lynn Hall, Antioch, TN
Stacy L. & David W. Cox, Antioch, TN
Stanford Village Homeowners Association, Nashville, TN
Stanley & Hilda Smith, Littleton, WV
Stanley & Rebecca Lewis, Charleston, WV
Stanley G. and Clara R. Alsip, Catlettsburg, KY
Stanley Morrison, Ripley, WV
Stanley Wheeler, Given, WV
Stephan Swanson, Antioch, TN
Stephanie & Scott Maclaughlin, Antioch, TN
Stephanie & Tyrone Dickerson, Antioch, TN
Stephanie M. Davis Moore, Grayson, KY
Stephanie Michelle Davis, Grayson, KY
Stephen & Pamela Moore, Ripley, WV
Stephen & Teresa Eagle, LeRoy, WV
Stephen A. & Norma J. Kiper, Grayson, KY
Stephen Caudill, Morehead, KY
Stephen F. Salese, Manager, FERC Matters, Direct Energy Business, LLC, Woodbridge, NJ
Stephen K & Jennifer H. Witthrow, Grayson, KY
Stephen Michael & Taylor Winters, Antioch, TN
Stephen P. Glover, Jacksonburg, WV
Stephen P. Winter, Ripley, WV
Stephen Parish & Katie L. Miller, Antioch, TN
Stephen Ryan Holbrook, Grayson, KY
Stephen Shepherd, Antioch, TN
Stephen T. & Miriam Tedeschi, Antioch, TN
Stephen T. George, Antioch, TN

Stephen & Myrna Farley, Life Estates, Fraziers Bottom, WV
Steve McDiffitt, Glen Easton, WV
Steve & Monica Bratton, Antioch, TN
Steven & Alvin Crane, St. Albans, WV
Steven & Amanda Carper, West Union, WV
Steven & Amanda Shaffer, Ripley, WV
Steven & Shirley Hawkins, Antioch, TN
Steven A. Browning, Barboursville, WV
Steven A. & Terrian J. Morrison, Culloden, WV
Steven Ferrusi, Antioch, TN
Steven G. Inman, Antioch, TN
Steven H & Mary Frances Shaffer, Grayson, KY
Steven V. & Cheri L. Call, Culloden, WV
Steven W. & Tanya Stone, Antioch, TN
Steven, William E., & Ronald S. Jones, & Lisa J. Haddock, Lawrenceburg, TN
Stonegate Mortgage Corporation, Dallas, TX
Stonewall Jackson Et Ux, Brentwood, TN
Storall King LLC, Grayson, KY
Stout Family Trust, Parkersburg, WV
Sucheta Misra, Antioch, TN
Sue Ann Spiker, Jane Lew, WV
Sugar Valley, GP, Murfreesboro, TN
Suong T. Tran & Xuan Mai & Son T., Antioch, TN
Susan & Roger Walters, North Canton, OH
Susan B. & Geoffry A. Haddad, Charleston, WV
Susan C. (Sager) Caldwell, Harrisonburg, VA
Susan Couch, Cane Ridge, TN
Susan Francis, New Cumberland, WV
Susan Maher, Antioch, TN
Sutton Farms, LLC, Springfield, VA
Suzanne D. Goodman, Cane Ridge, TN
Suzanne Perry, Ripley, WV
Talton Family Investment LLC, Belden, MS
Tamara P. & Joseph A. Ross, Antioch, TN
Tamatha Cheke, Milton, WV
Tammy Beamer, Salem, WV
Tanja M. Marchman, Antioch, TN
Tawanda L. Bryant, Antioch, TN
Ted A. Garmon, Edmonton, KY
Ted W. & Maryna V. Miller, Antioch, TN
Teigh & Mary Byrne, New Milton, WV

Teresa L. Counts, Given, WV
Terrance L. Campbell, Ripley, WV
Terrence Allums, Leon, WV
Terri Parke, Summer Shade, KY
Terry & Carol Jean Hall, Morehead, KY
Terry Ash, Fairmont, WV
Terry Davis, Chester, WV
Terry Flesher, St. Johns, LF
Terry L. & Dawn D. Hudson, Antioch, TN
Terry L. Long, Mansfield, OH
Terry Norman, Antioch, TN
Terry Smith, Antioch, TN
Thad A. & Judith A. Edwards, Antioch, TN
Thanh Vo & Thuytien Thi Tran, Antioch, TN
The Estate of Ernest Goff, Harrisville, WV
The Haught Family Trust, Harrisville, WV
The Hite Family Trust, Marietta, OH
Theodore & Paula Adamerovich, Latrobe, PA
Thomas & Annette Clark, Glenn Easton, WV
Thomas & Brenda Smith, Smithville, WV
Thomas & Victoria Bates, West Union, WV
Thomas A. & Rachel N. Hoffman, Antioch, TN
Thomas Brian Rucker, Antioch, TN
Thomas F. Simmons Jr., Edgewater, MD
Thomas H & Melissa J Voeltz, Marietta, OH
Thomas J. Cummings Jr., Buffalo, WV
Thomas Miller & Jimmie Duke Reed, Chester, WV
Thomas P. Thackston, Associate General Counsel, Direct Energy Business, LLC, Woodbridge, NJ
Thomas R & Marcia L Riffe, Grayson, KY
Tiffany Michele Waugh, Grayson, KY
Tim Holt, New Albany, MS
Tim Roberson, New Albany, MS
Timmey Orr, Antioch, TN
Timmy & Elizabeth Morris, Reader, WV
Timothy & Amanda Parsons, LeRoy, WV
Timothy & Elizabeth Stalnaker, Antioch, TN
Timothy & Rebecca Clyne, West Union, WV
Timothy & Robin Schiele, Atwater, OH
Timothy Cart, Red House, WV
Timothy D. Carey, Antioch, TN

Timothy Edward and Erma Jane Cottrill, West Union, WV
Timothy G. & Susan B. Saxe, Barboursville, WV
Timothy J. & Becky J. Cooper, Red House, WV
Timothy Jordan, Red House, WV
Timothy S. Owens, Baltimore, MD
Timothy Tosh, Reedy, WV
Timothy Wells, New Martinsville, WV
Tina D. Dallison, New Martinsville, WV
Tina Del Prete, West Union, WV
Tina L. Osborne, West Union, WV
Tina L. Sampson, Antioch, TN
TLM LLC, Vienna, WV
Tod J. & Irene Faller, Culloden, WV
Todd & August King, Given, WV
Todd & Micah Dailey Douthit, Antioch, TN
Todd & Tracey Jones, Ripley, WV
Todd E. & Anna Roberson, Antioch, TN
Tomas S. & Roselle Abana, Antioch, TN
Tommy Bassett, Pine Grove, WV
Tommy H. Huff, Jr & Rachel E. Huff, Antioch, TN
Tommy Parke & Shirley Parke, Summer Shade, KY
Tony Kelly & Crystal R. Murphy, PHH Mortgage Corporation, Mount Lauren, NJ
Tony W. Weatherford, Et Ux, Antioch, TN
Traci Daun Wair Cooper, Antioch, TN
Tracy & Mary Beth, Troy & Deborah Wilson, Given, WV
Trampus Shannon, Astor, FL
Travis B. French, Waynesboro, TN
Travis L & Amanda Mccall, Grayson, KY
Trisha Kuhl, etal, Ripley, WV
Trixie Robinson, Augusta, WV
Troy Carpenter, Ripley, WV
Two Mile Real Estate, LLC, Parkersburg, WV
Tyler Lejeune, Antioch, TN
U.S. Bank National Association, Owensboro, KY
Vafa Alieyvali & Parisa Heidari, Antioch, TN
Valdeacourt Farm Limited Partnership, Charleston, WV
Valerie A. Lamb, Goleta, CA
Valerie Crockett, Tennessee Valley Authority, Chattanooga, TN
Vanessa Harmon, Leon, WV
Vanessa Harmon, Leon, WV
Veatrice E. Storey, Antioch, TN

Veril Blake, etal, Baltimore, MD
Vernon L. Randolph, Smithburg, WV
Veronica Mayes, Antioch, TN
Vester E & Peggy A Stephens, Grayson, KY
Vicki J. Livingston, Antioch, TN
Vicki Moore, Vandalia, OH
Victor & Peggy Smith, West Union, WV
Victor L. & Soutsaha Bustillo, Antioch, TN
Victor W. Burden, Antioch, TN
Viginia Parsons, Barboursville, WV
Vilma Acosta, Inwood, WV
Virgil Lee & Sue Messer, Grayson, KY
Virginia D. Tracy, Reader, WV
Virginia I. Milhoan, LeRoy, WV
Viscose Athletic Association, Eleanor, WV
Vivian Irene Ferguson, Holcomb, MS
Vivian Parks, etal, Pine Grove, WV
Vivian Stockman, Ohio Valley Environmental Coalition Project Coordinator, Huntington, WV
William & Marianne Hughes, Ohio Valley Environmental Coalition, Huntington, WV
Viyan Aziz & Hawar M. Hasan, Antioch, TN
W. Bracey & Allison B. Halbrook, Antioch, TN
W. C. Tate, New Albany, MS
W. Clyde Crane, Harrisville, WV
W. Garcia, Antioch, TN
W. Williams, Nashville, TN
Walker Thompson, Given, WV
Walter and Dorisann Mullins, Grayson, KY
Walter and Loretta Jeffrey, Milwood, WV
Walter L. & Amy J. Jacques, Antioch, TN
Walter Lee & Grace Jacques, Antioch, TN
Wanda & Gary Dillon, Culloden, WV
Warren Haught, Smithville, WV
Wayne Conley, Red House, WV
Wayne Douglas & Lora Art, Paint Lick, KY
Wayne L. Goddard, New Martinsville, WV
Welby J. Sandidge, Edmonton, KY
Wendy Romine, Reedy, WV
Wesley L. Landers Sr., Given, WV
West Virginia Properties LLC, Lakewood, OH
Wheeling Jesuit University, Wheeling, WV
William & Barbara Wagner, New Martinsville, WV

William & Georgette Healy, Smithville, WV
William & Geraldine Hensley, etal, Williamson, WV
William & Kara Casto, Ripley, WV
William & Kathy Johnson, Given, WV
William & Linda Hamilton, West Union, WV
William & Melissa Sheets, Ripley, WV
William & Pamela Heis, LeRoy, WV
William A. Sala, Jr., Sr. Counsel, TransCanada, Houston, TX
William and Rosemary Kartune, Grayson, KY
William B. Meador, Iuka, MS
William DePaulo, Director & Counsel, Keeper of the Mountains Foundation, Charleston, WV
William E. Walden, Antioch, TN
William Glenn Brannen, Antioch, TN
William J. & Ann M. Woods, Grenada, MS
William K. Stern, Glen Easton, WV
William L. Young, Et Ux, New Albany, MS
William P. Hatton, III, Antioch, TN
William Potter, Poca, WV
William R Milton, Culloden, WV
William R. & Janet B. Huffman, Antioch, TN
William R. Hardbarger, Harrisville, WV
William R. Milton, Culloden, WV
William Robert Helton Etux, Antioch, TN
William Trent, Elgin, IL
Williams Ohio Valley Midstream LLC, Attn: Amy DiMaria, Tulsa, OK
Willie S. Swanson, Et Ux, Antioch, TN
Young & Young Lumber Company, Inc., Nitro, WV
Yousef Khallilollahi & Heather Pham, Union City, CA
Yves J. Bourgeois, Manager Regulatory Affairs, Anadarko Energy Services Company, The Woodlands, TX
Zachary M. Blair, Glen Dale, WV
Zachary Raynes, Eleanor, WV
Zachery Shamblin, Ravenswood, WV

APPENDIX B-1
Mapping and Construction Drawings for the Mountaineer XPress Project

Mountaineer XPress Project

Project Overview Mapping

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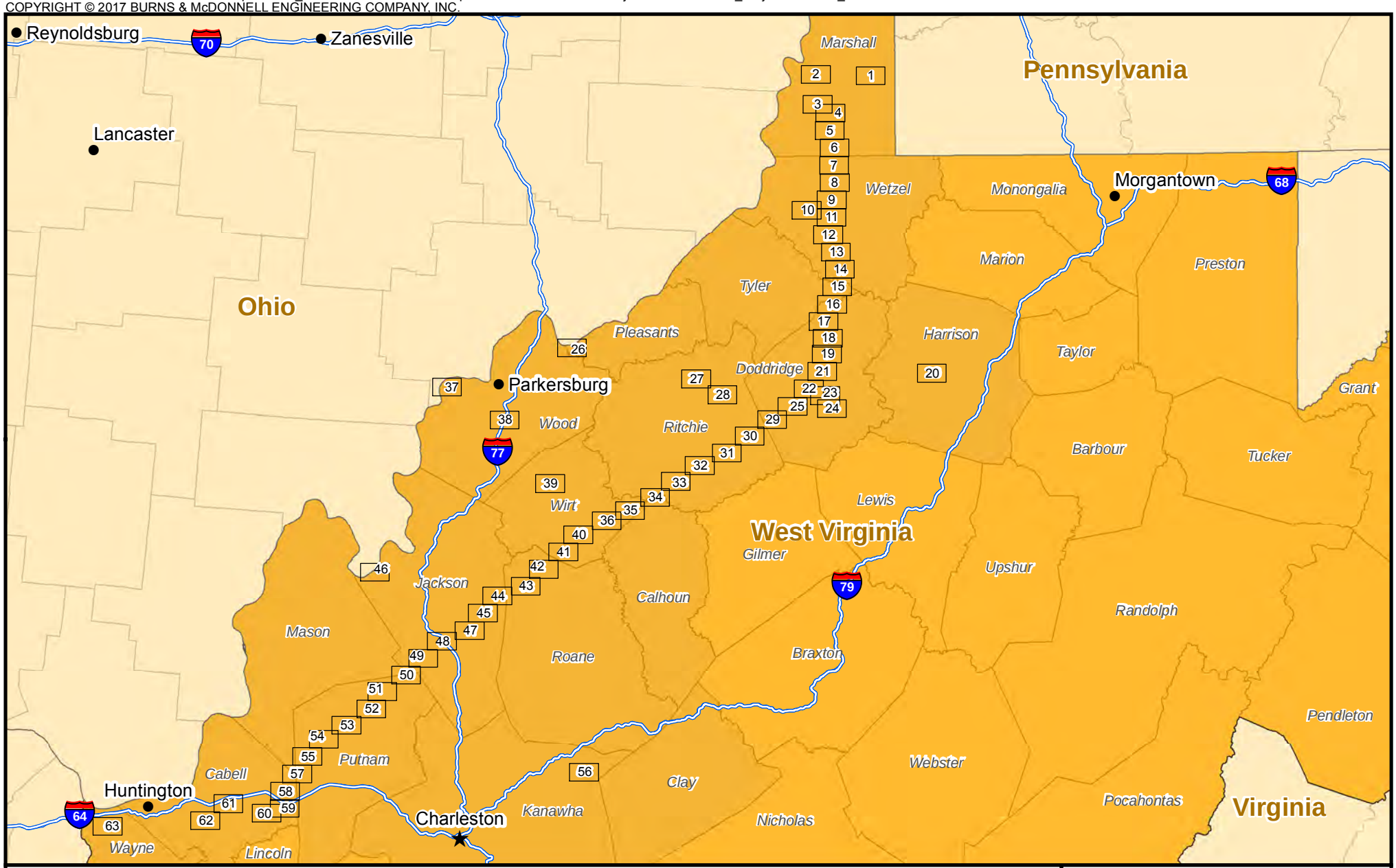

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Mountaineer XPress Project
Project Overview Map
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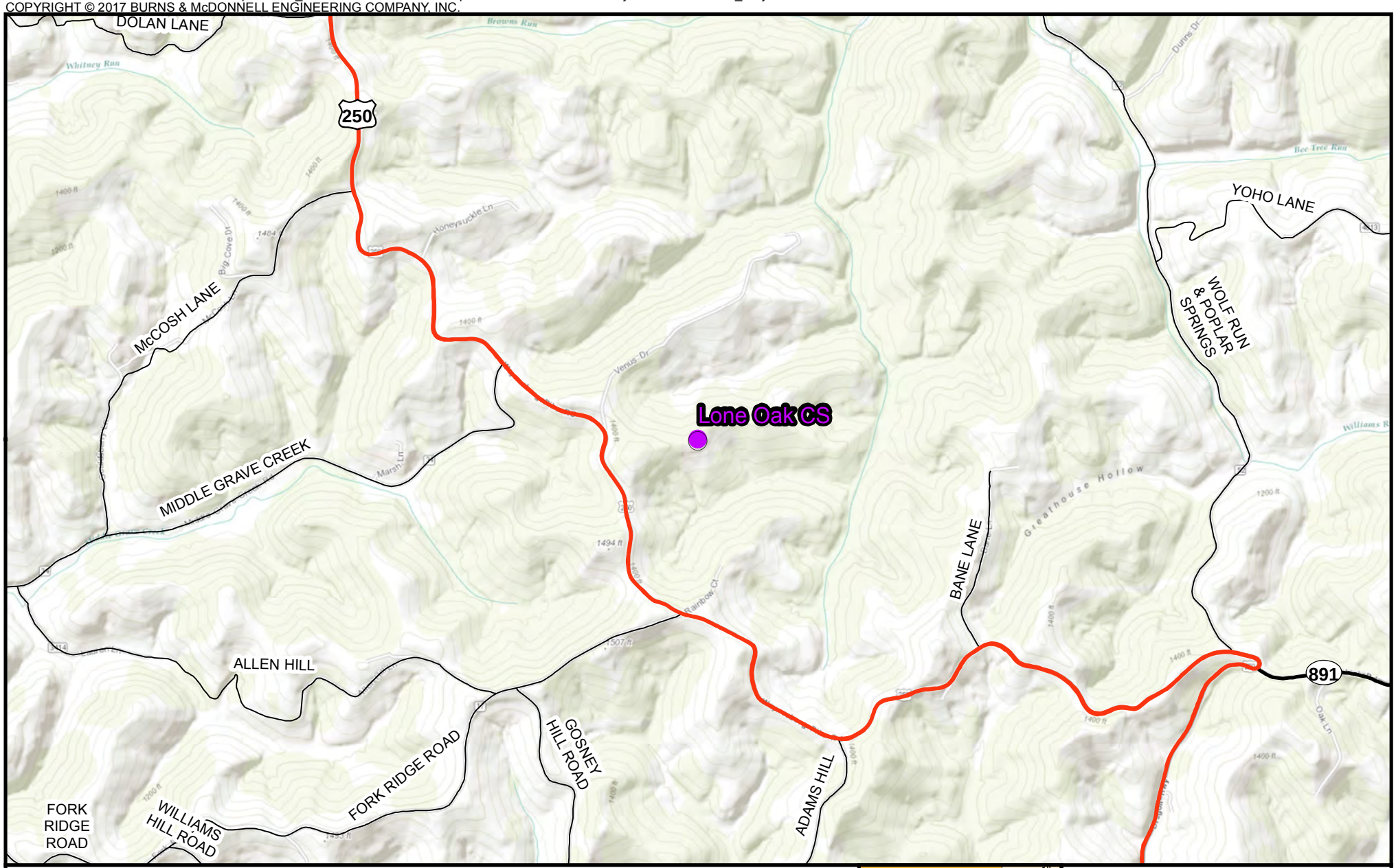

Compressor Station

NORTH

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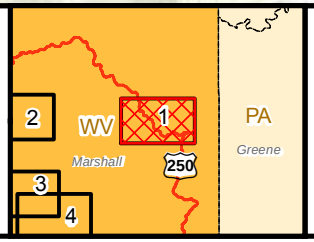
Scale in Feet



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Project Overview Map
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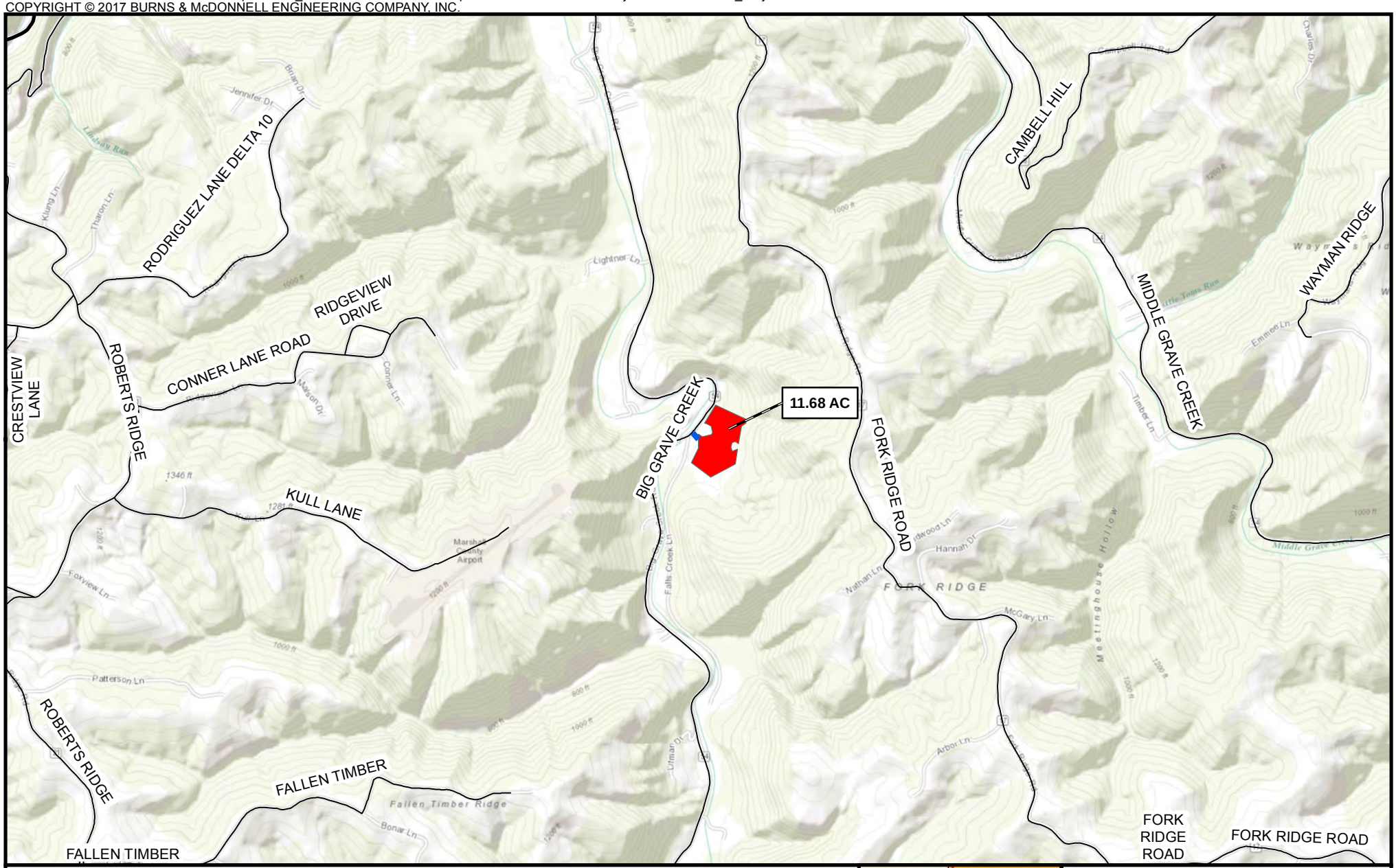


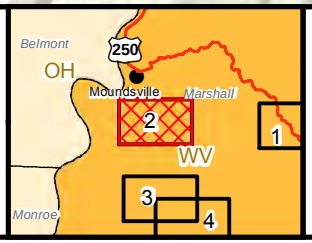
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



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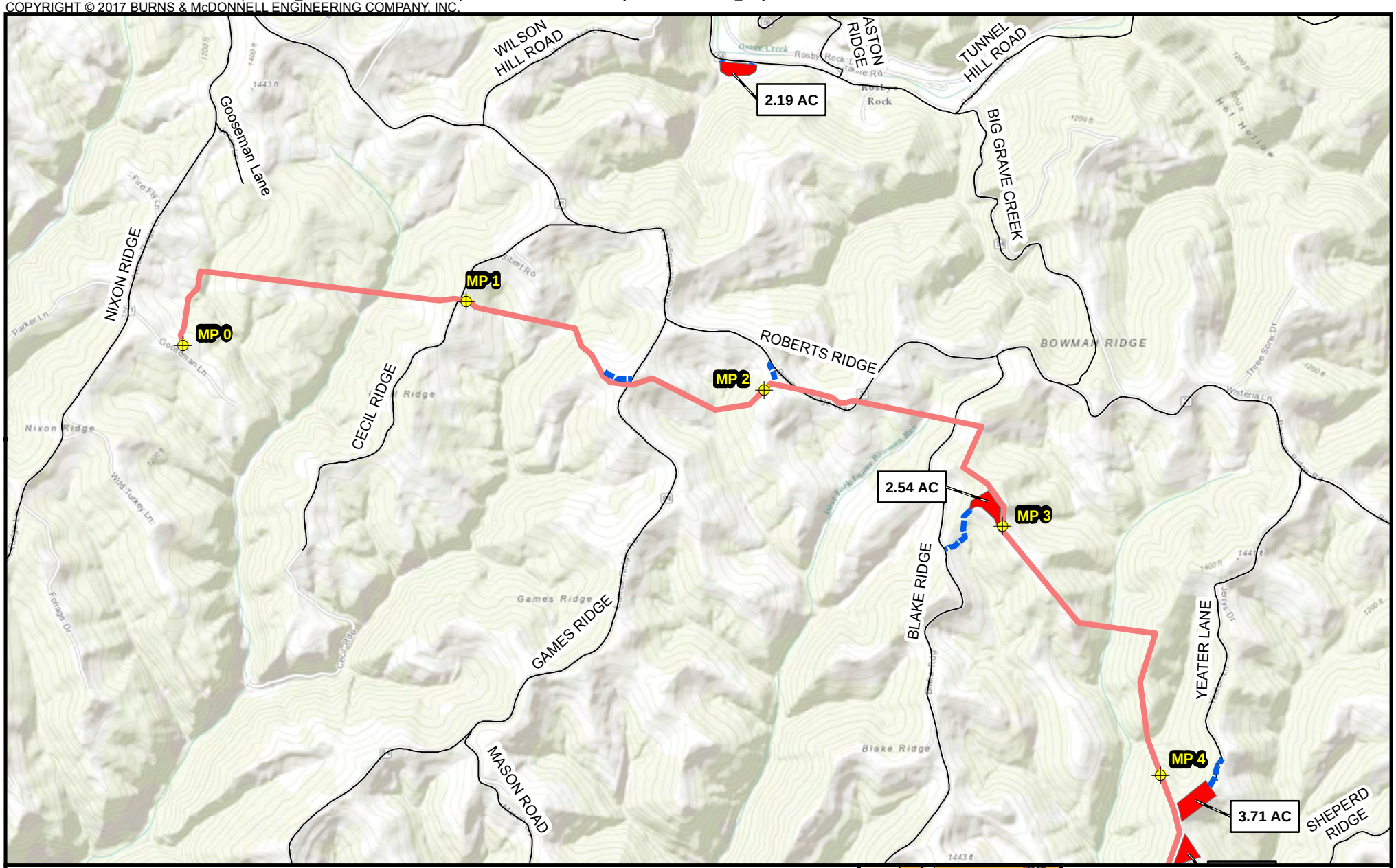


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

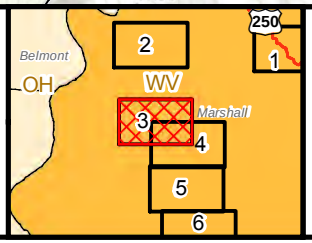
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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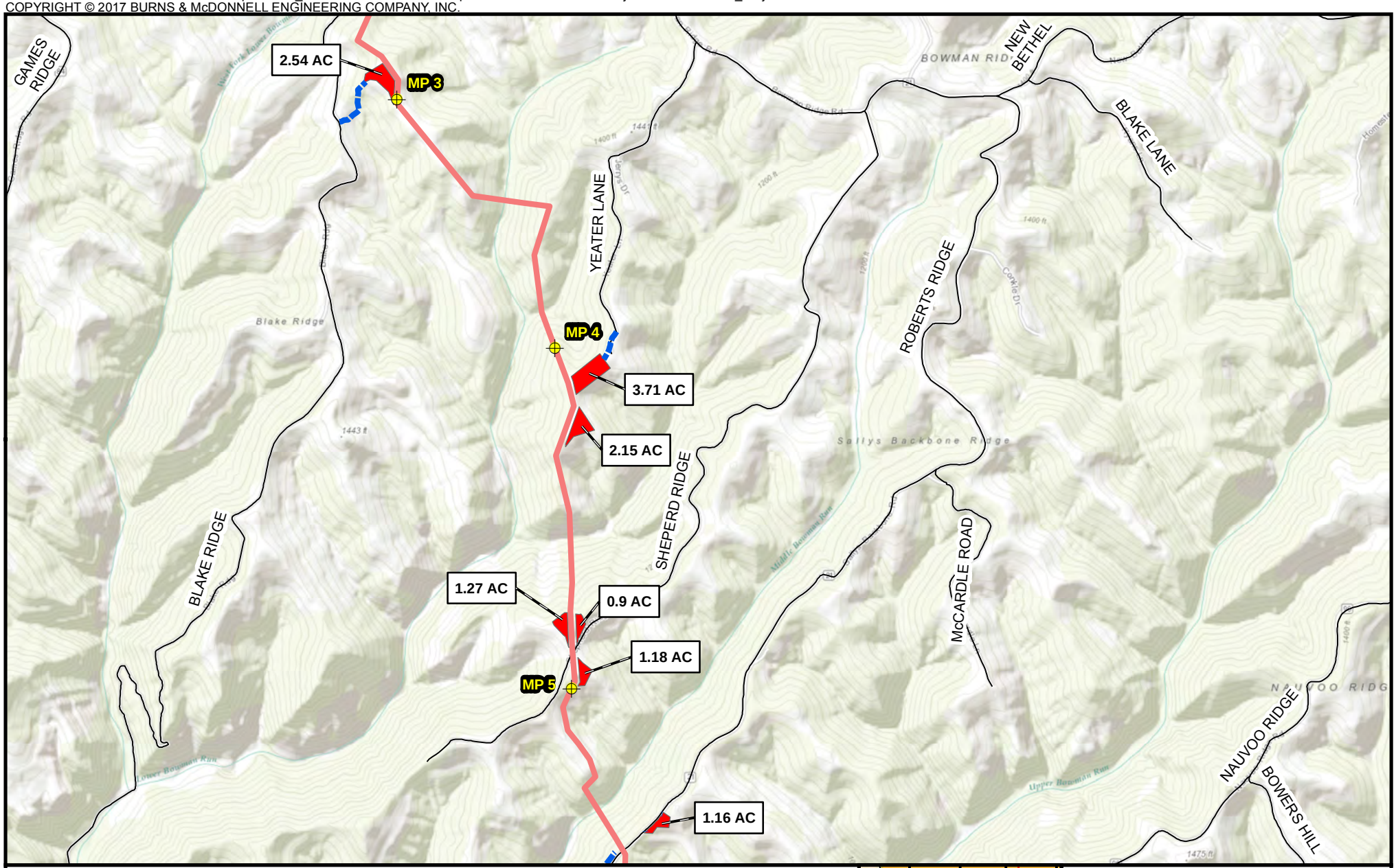

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Access Road

Pipe\Contractor Yard, Staging Area

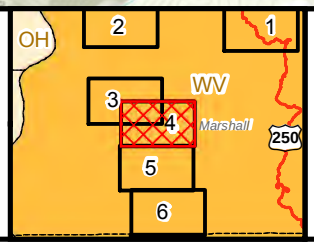
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
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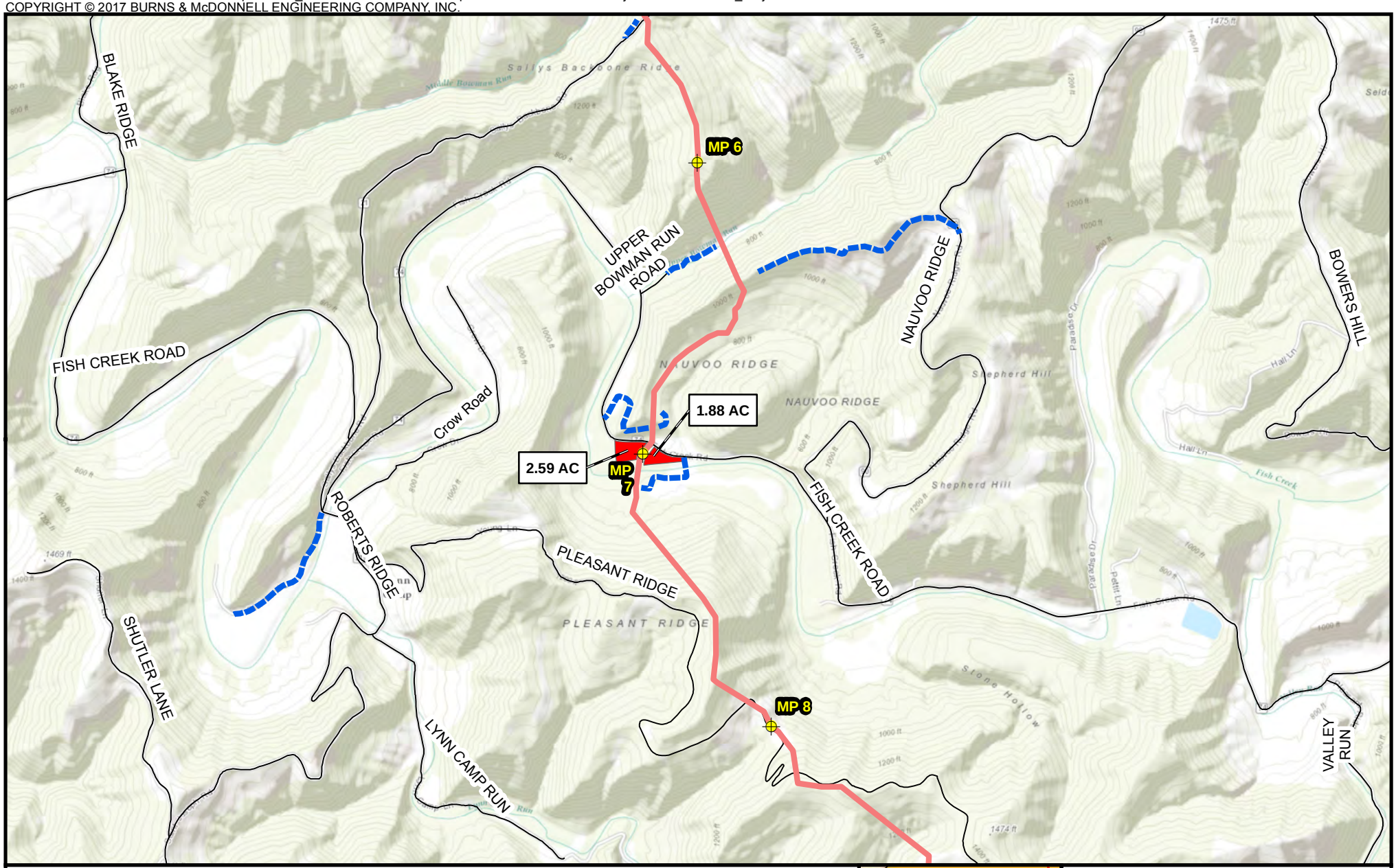


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

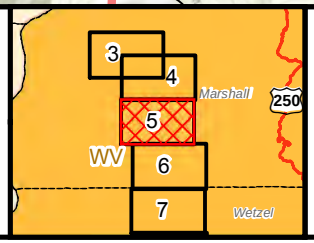
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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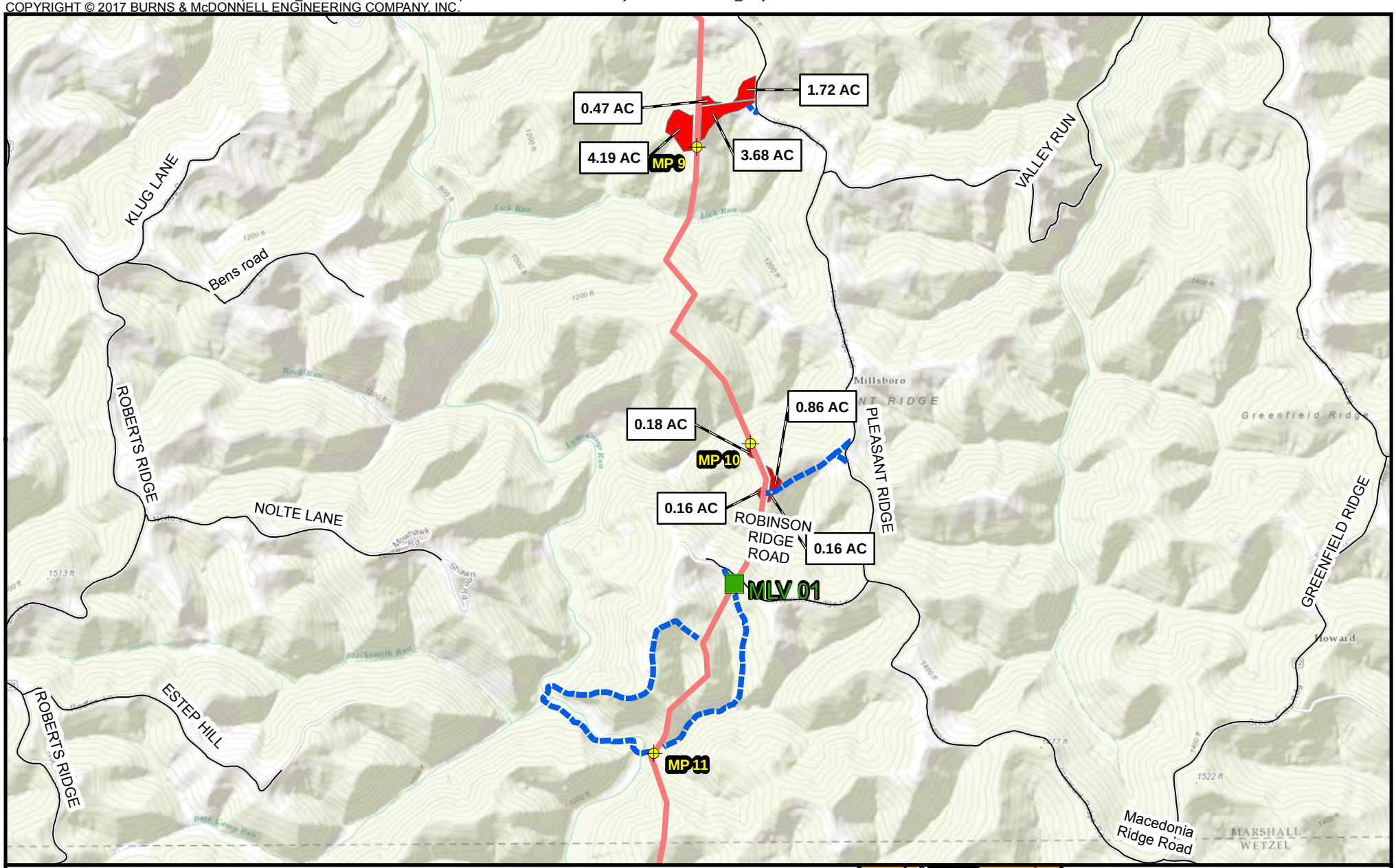


Milepost

Mainline Valve

Access Road

Pipe\Contractor Yard, Staging Area

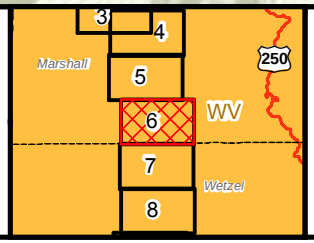
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Project Overview Map
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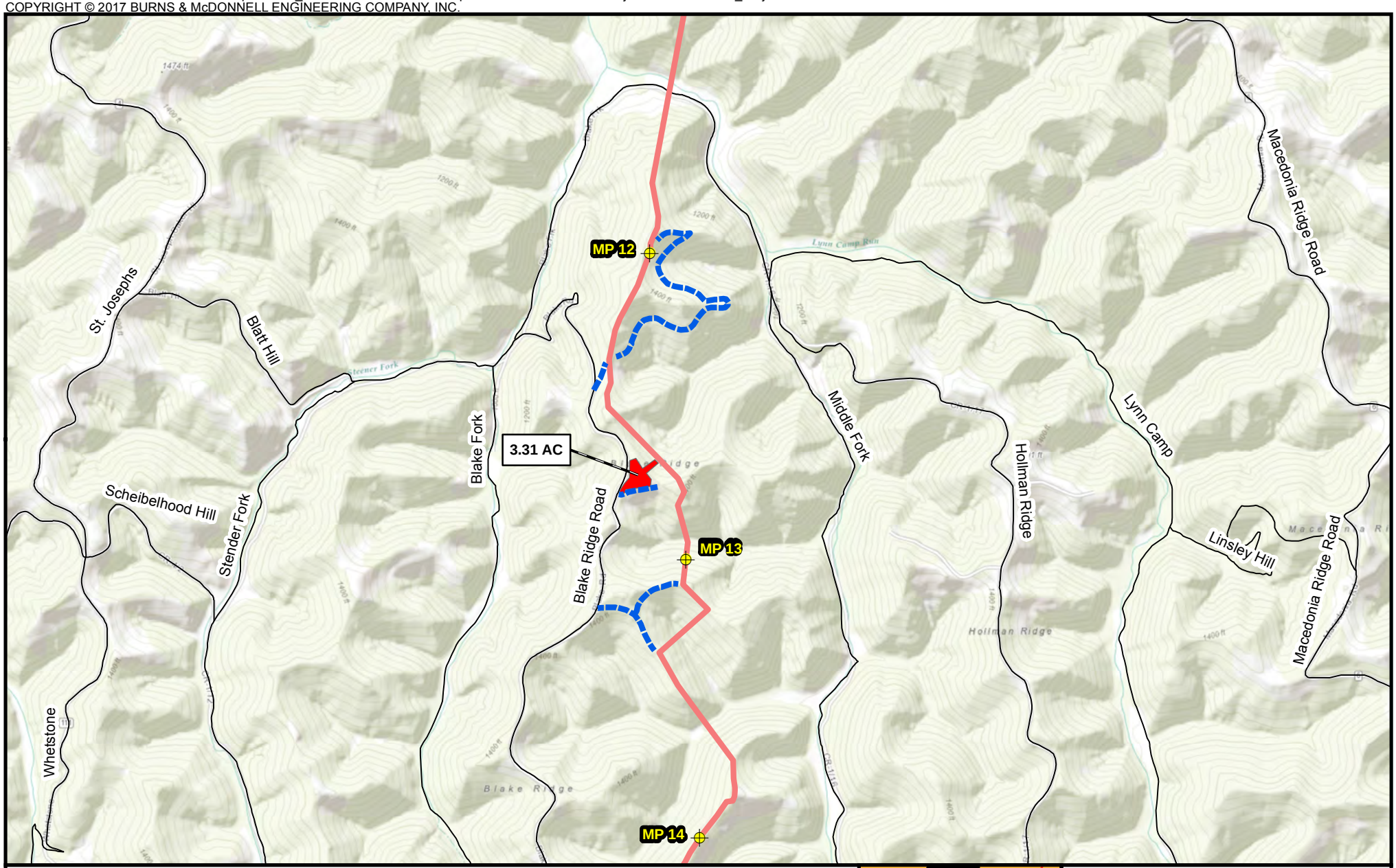


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

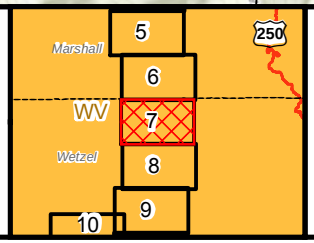
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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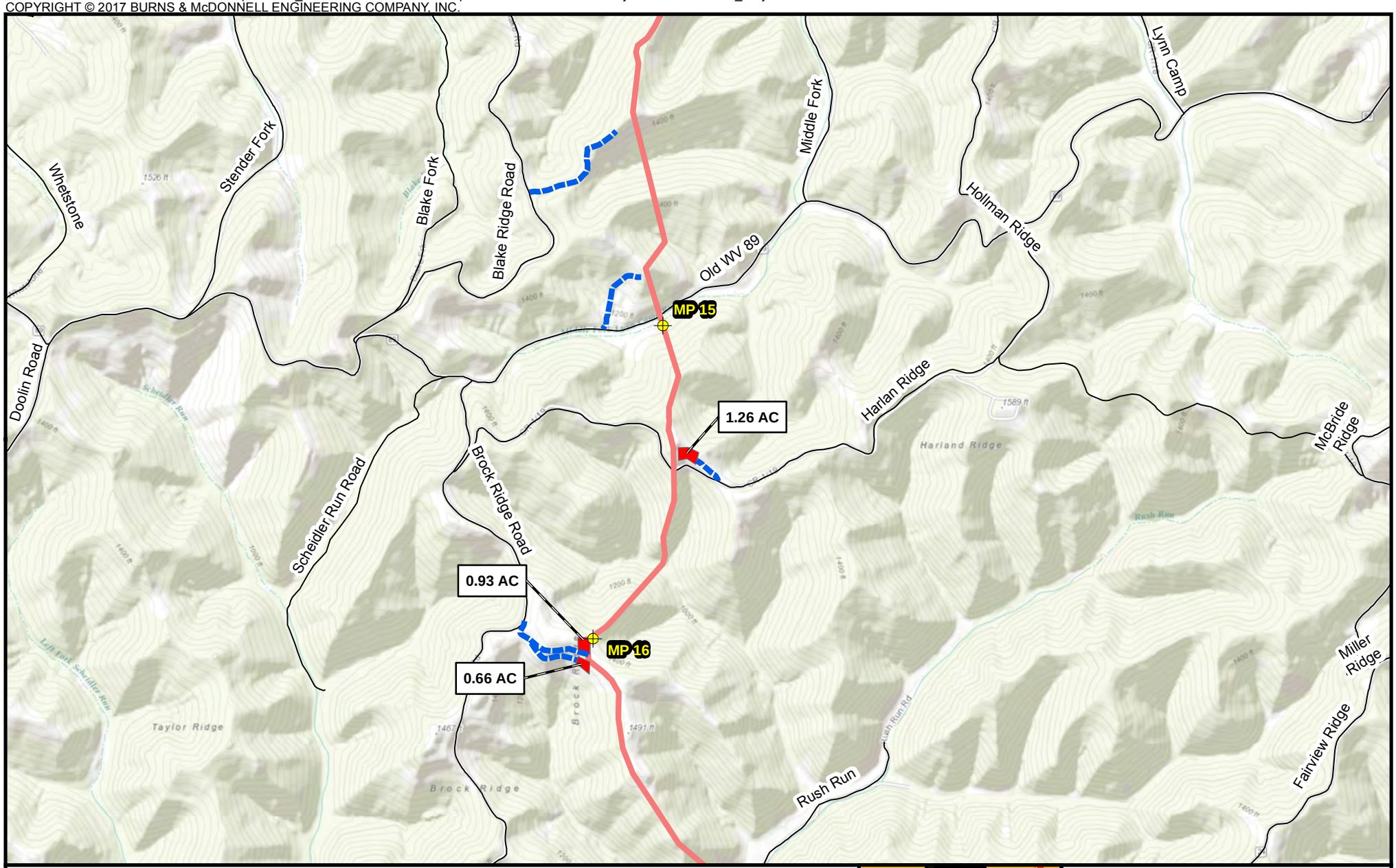

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Access Road

Pipe\Contractor Yard, Staging Area

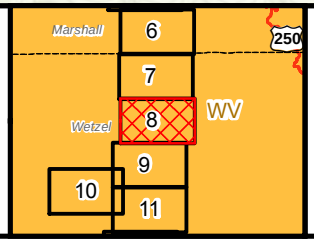
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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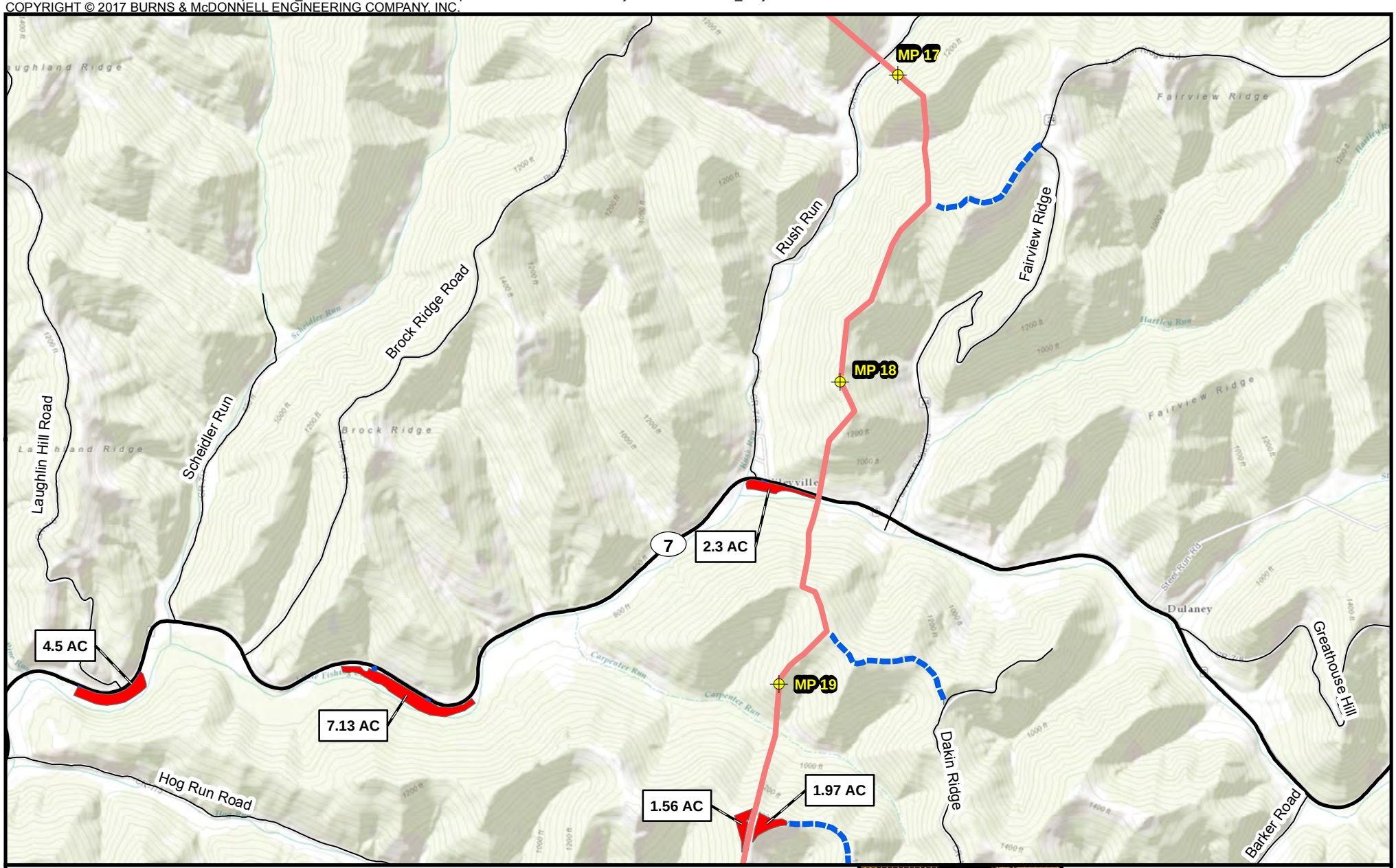
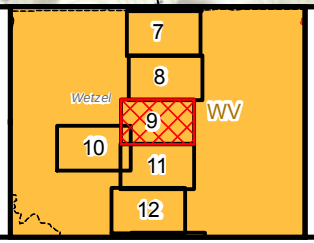


Milepost
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
Page 9 of 63

Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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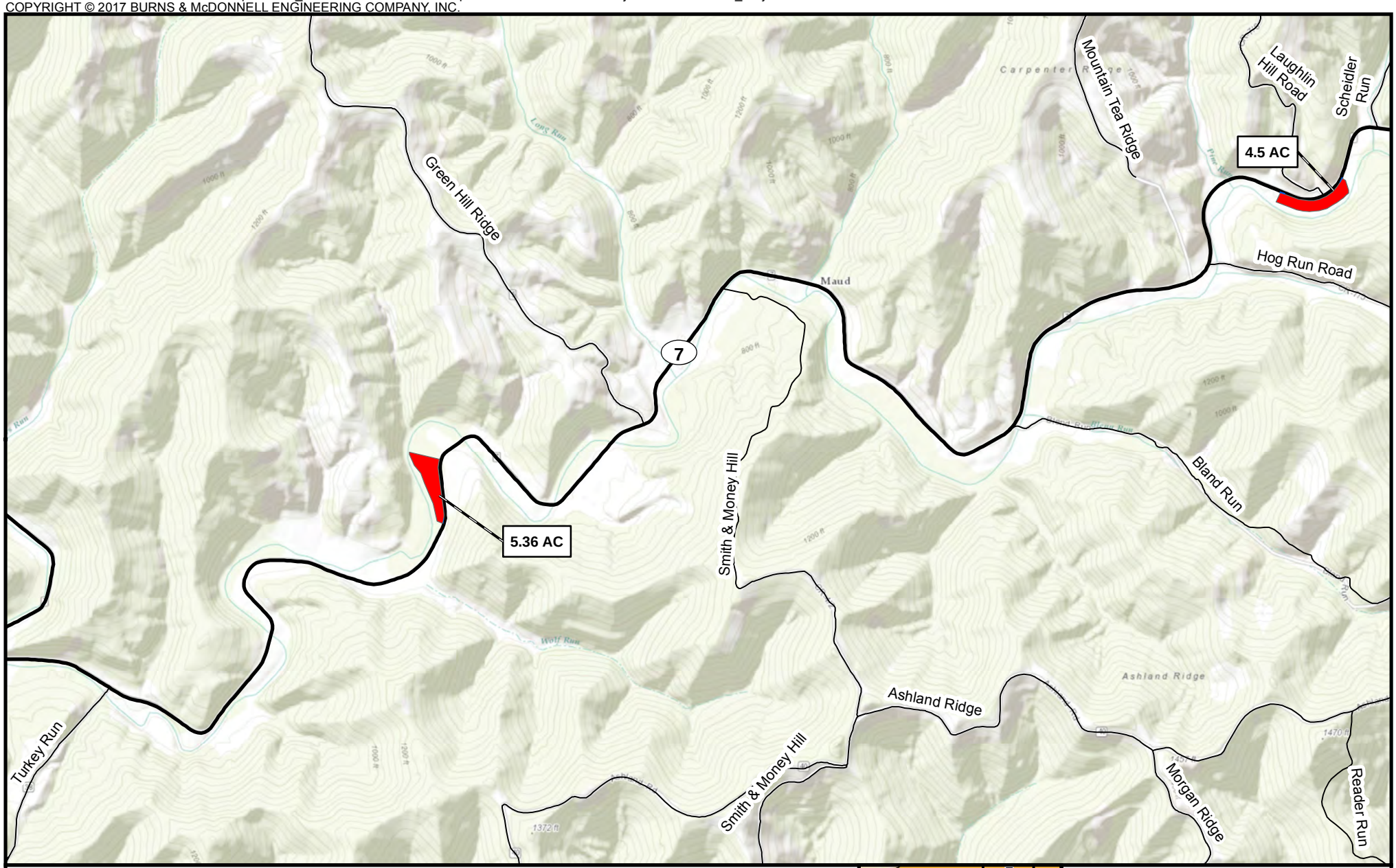


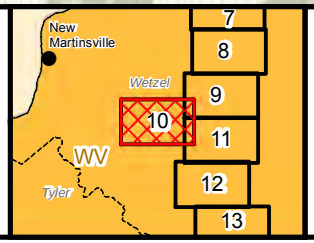
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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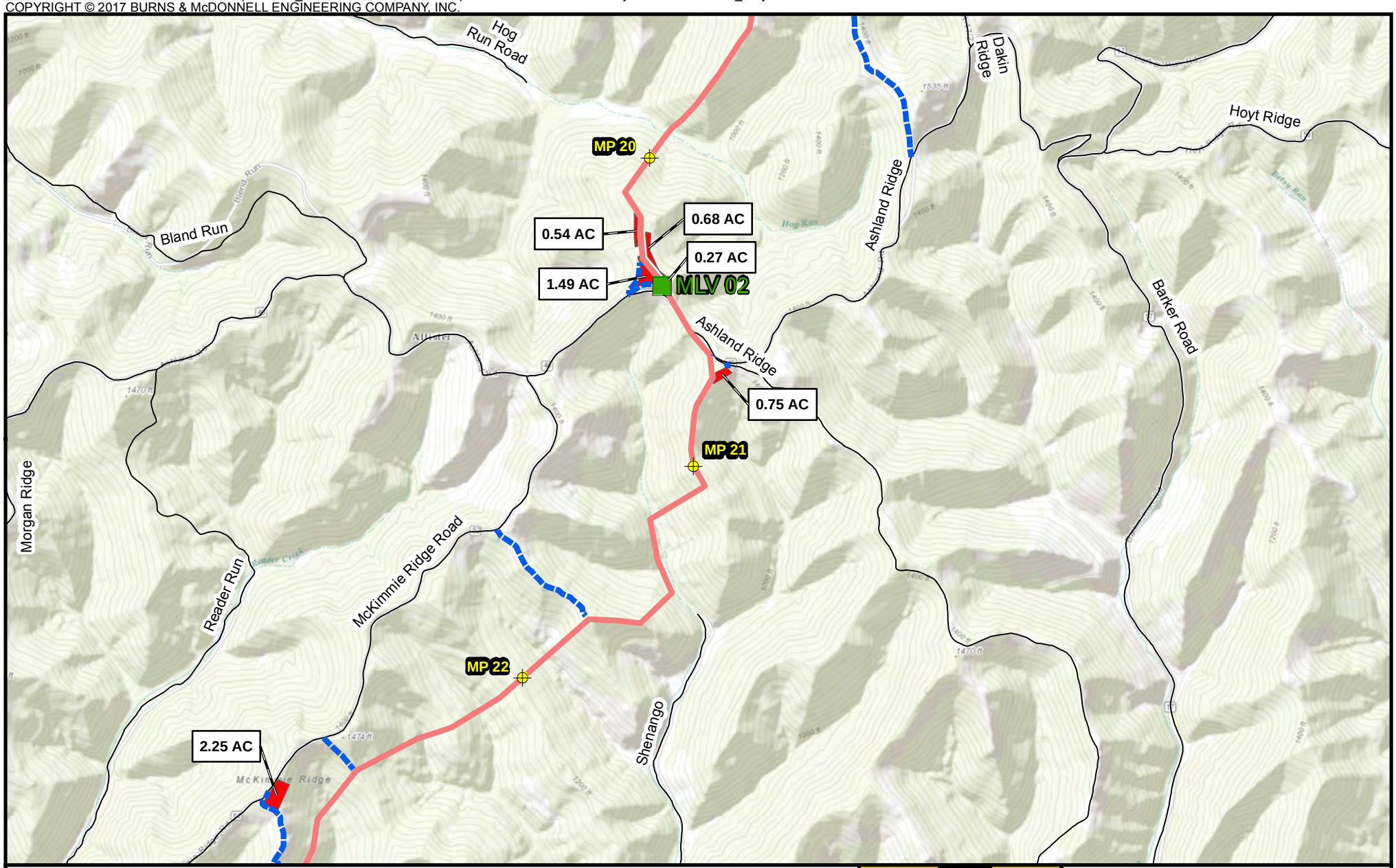
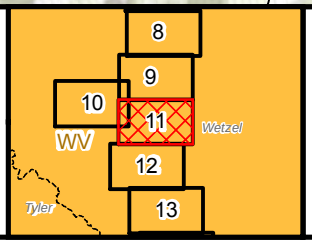


Milepost
Mainline Valve
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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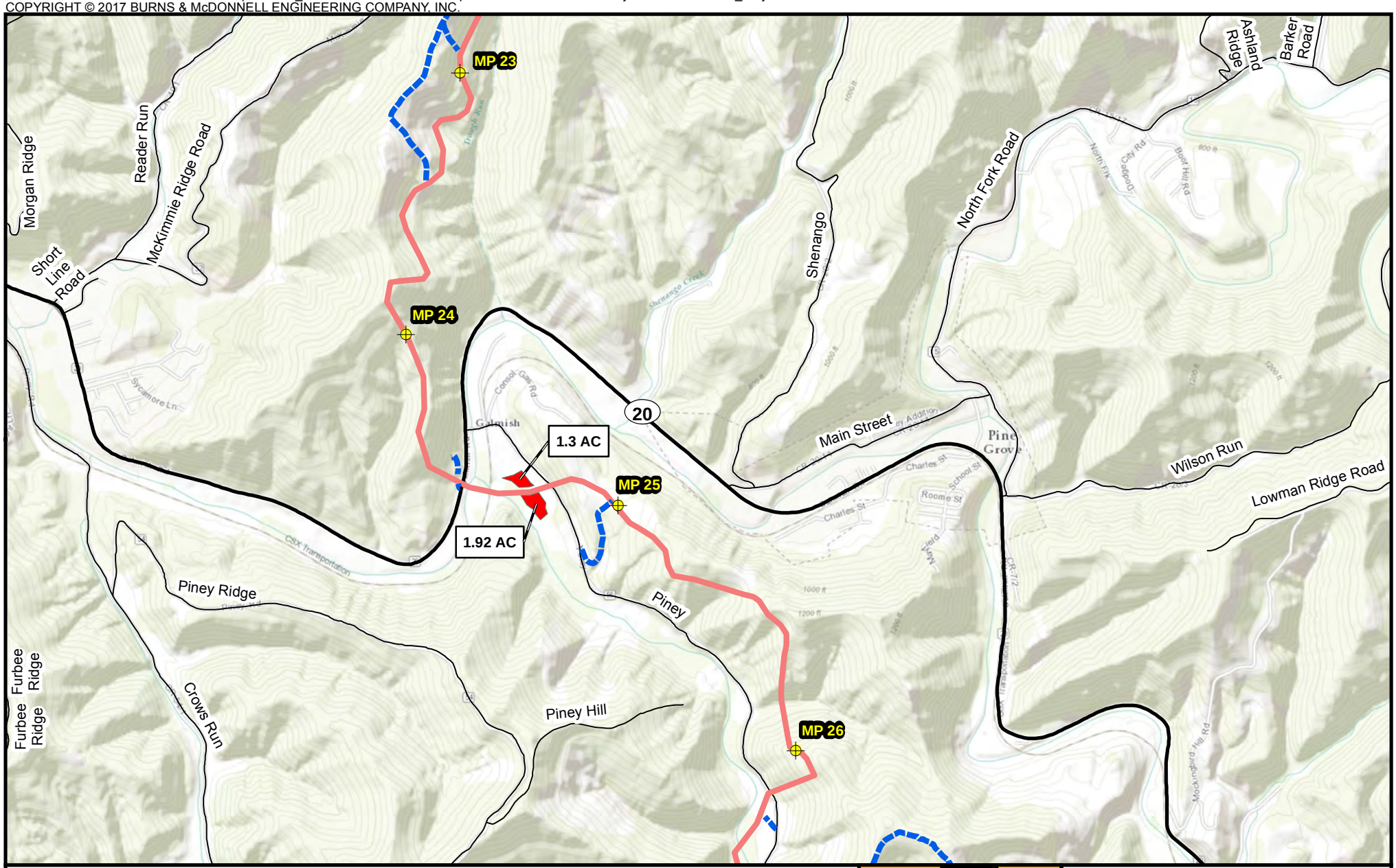

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Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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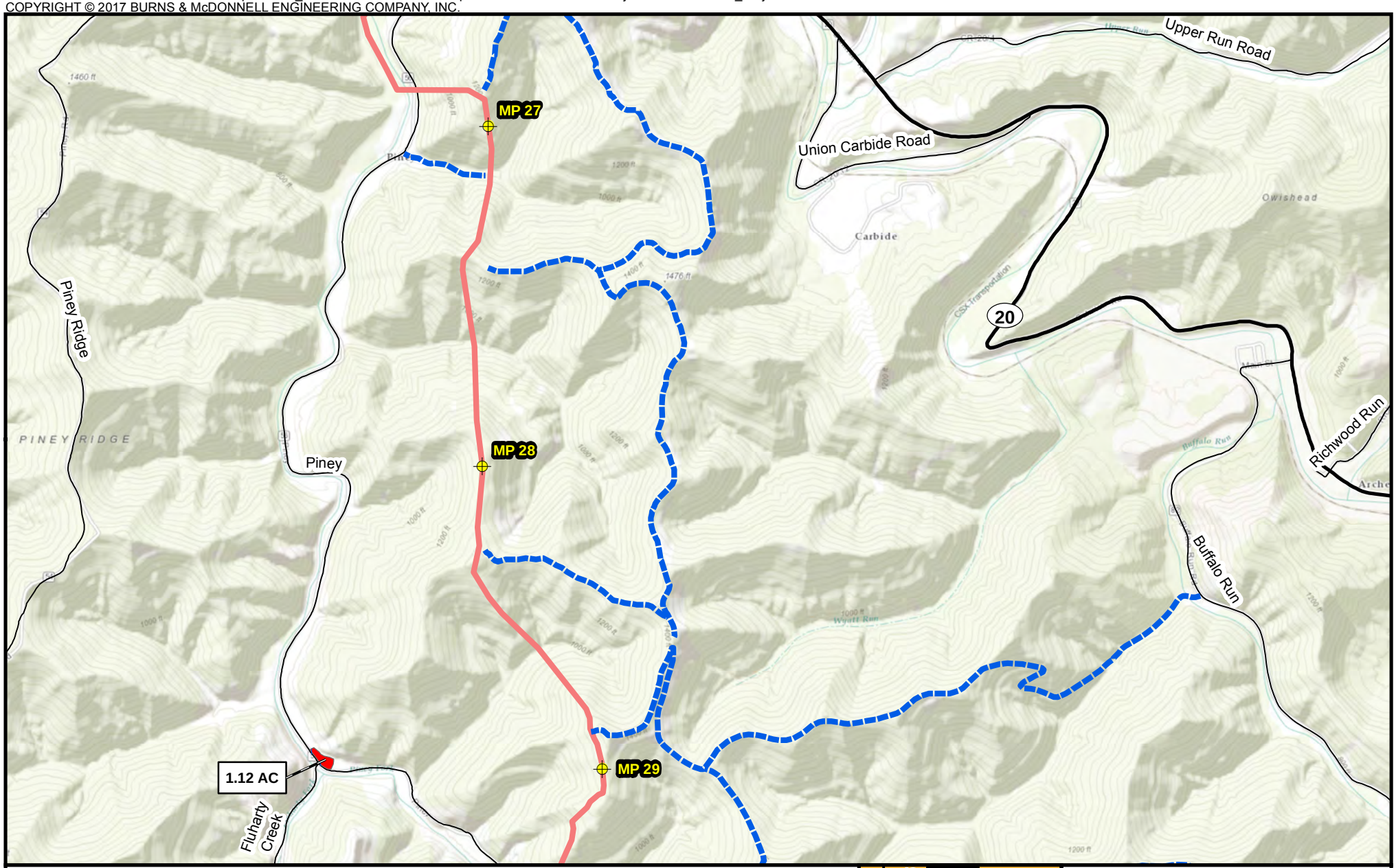
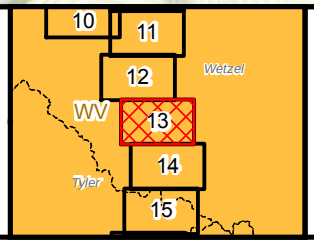


Milepost
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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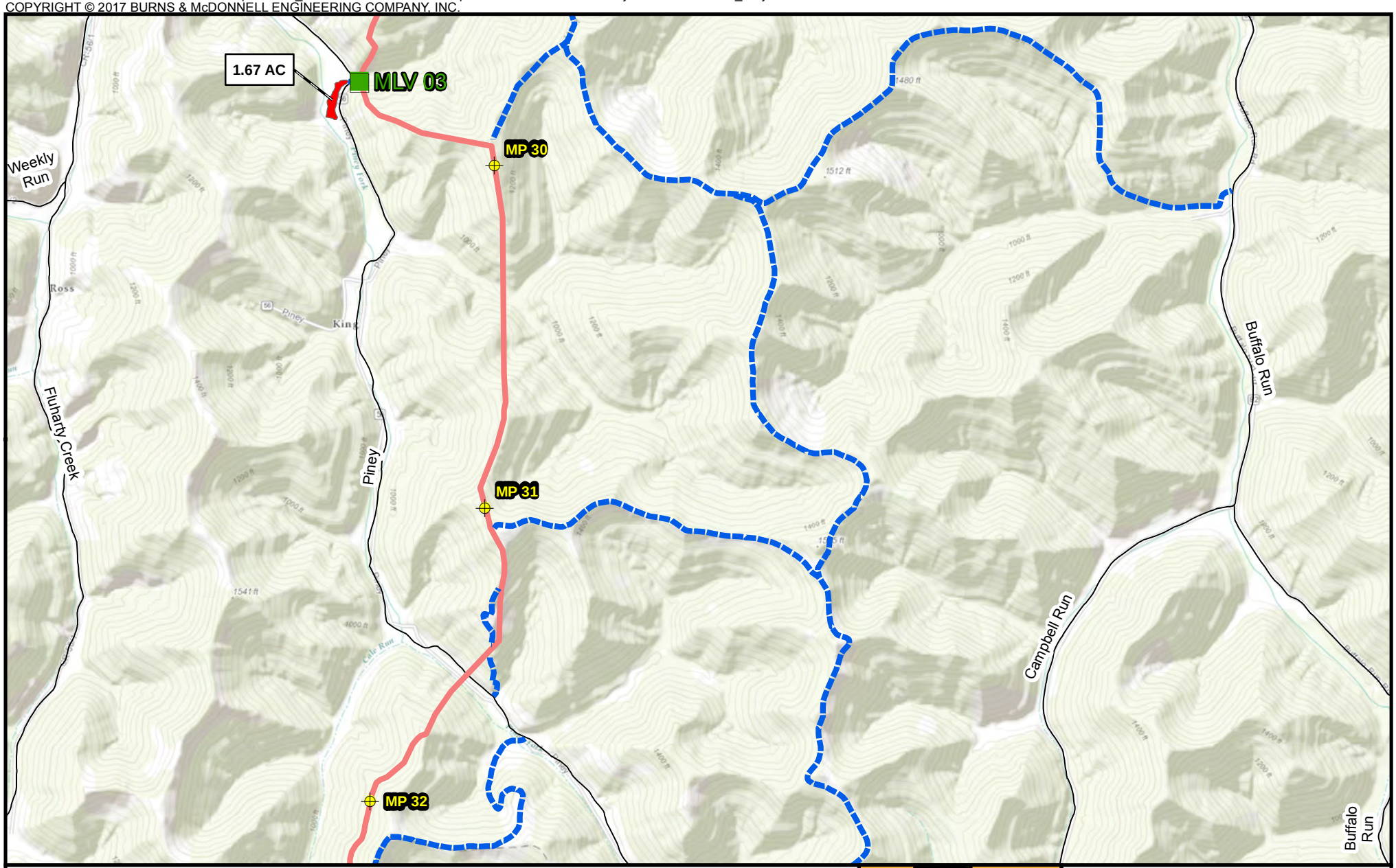
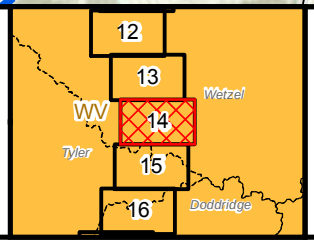


Milepost
Mainline Valve
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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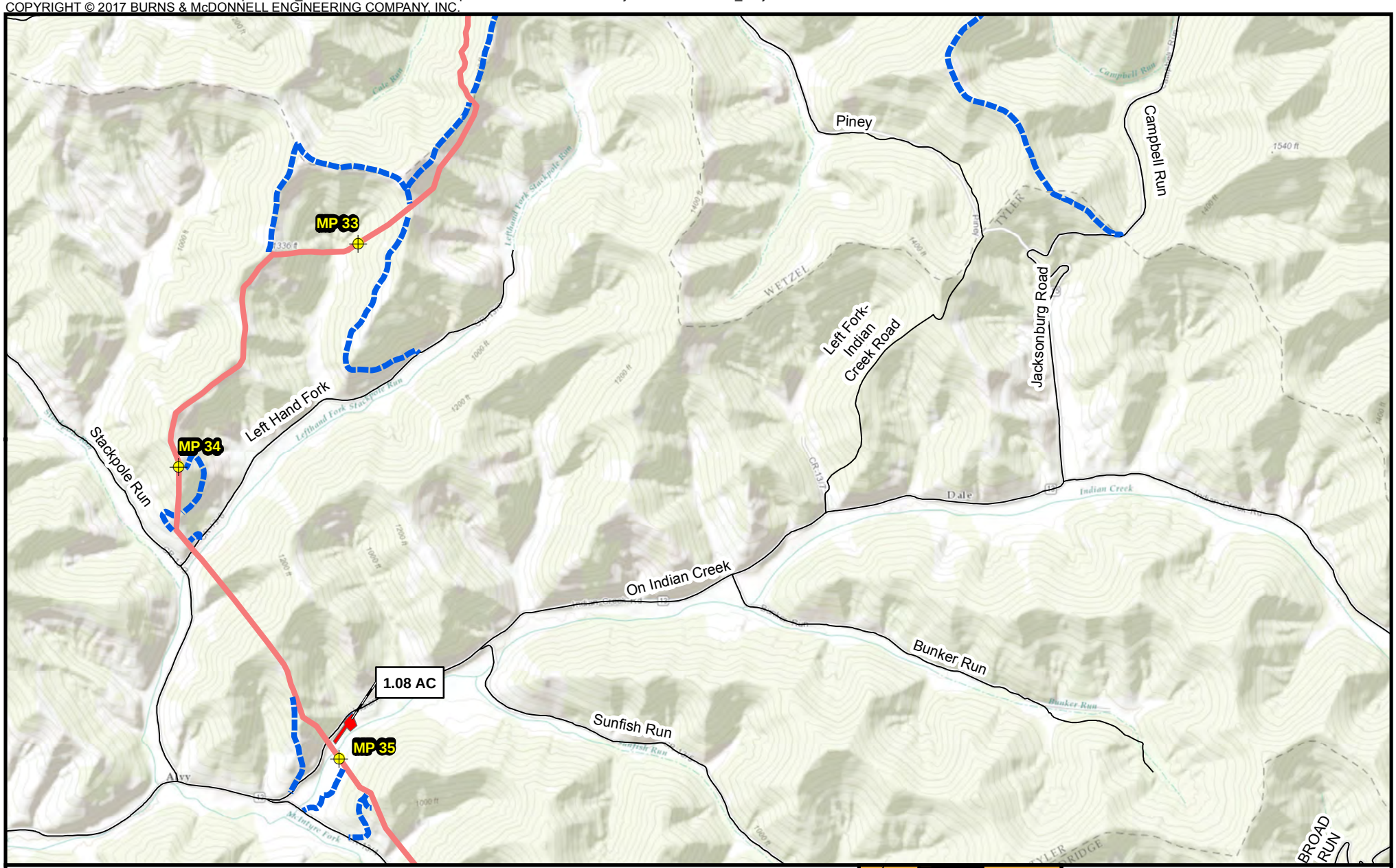
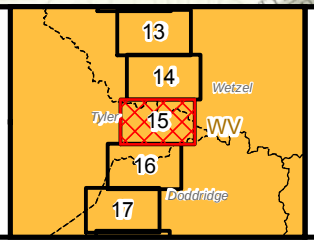


Milepost
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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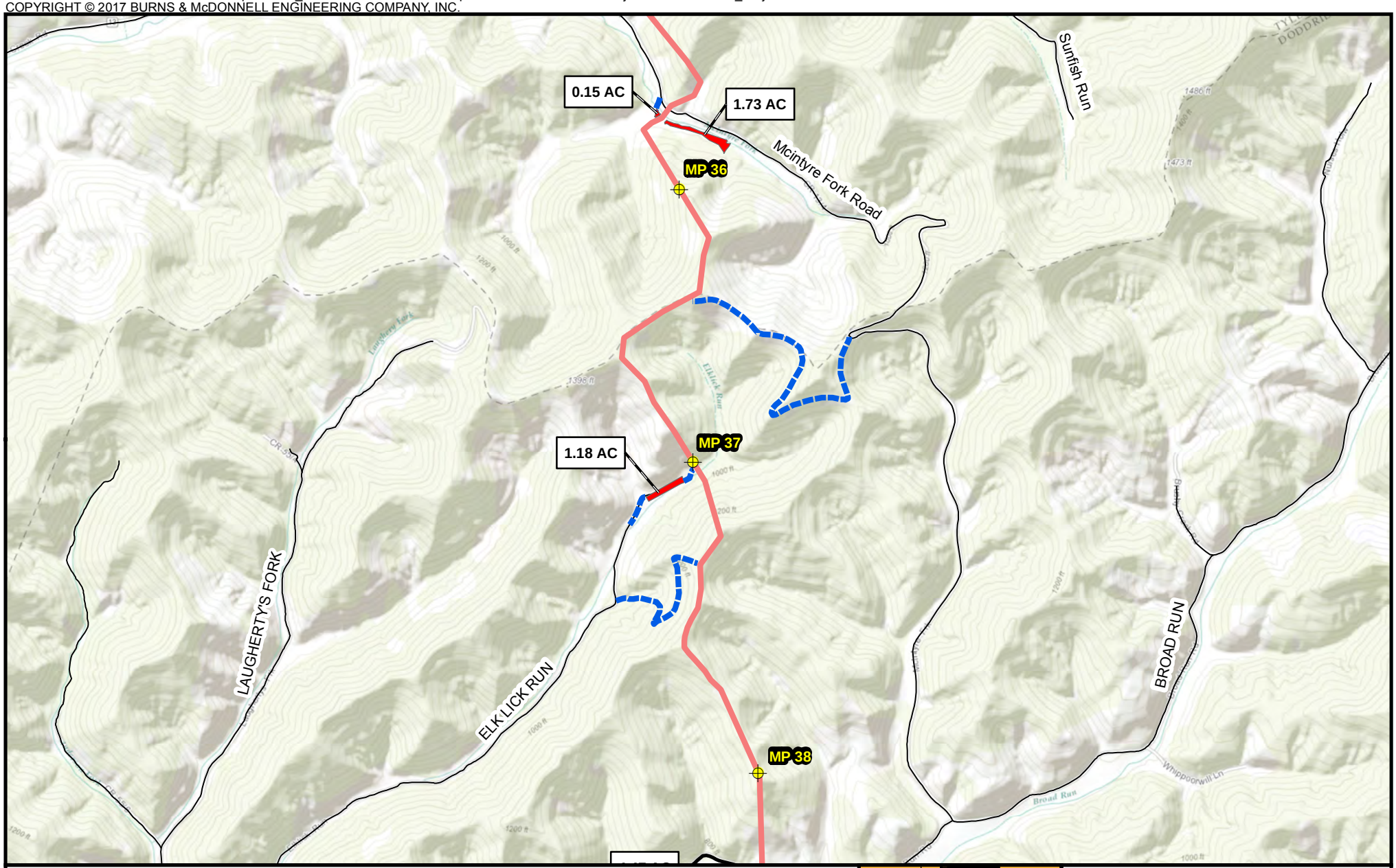
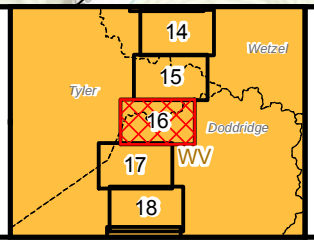


Milepost
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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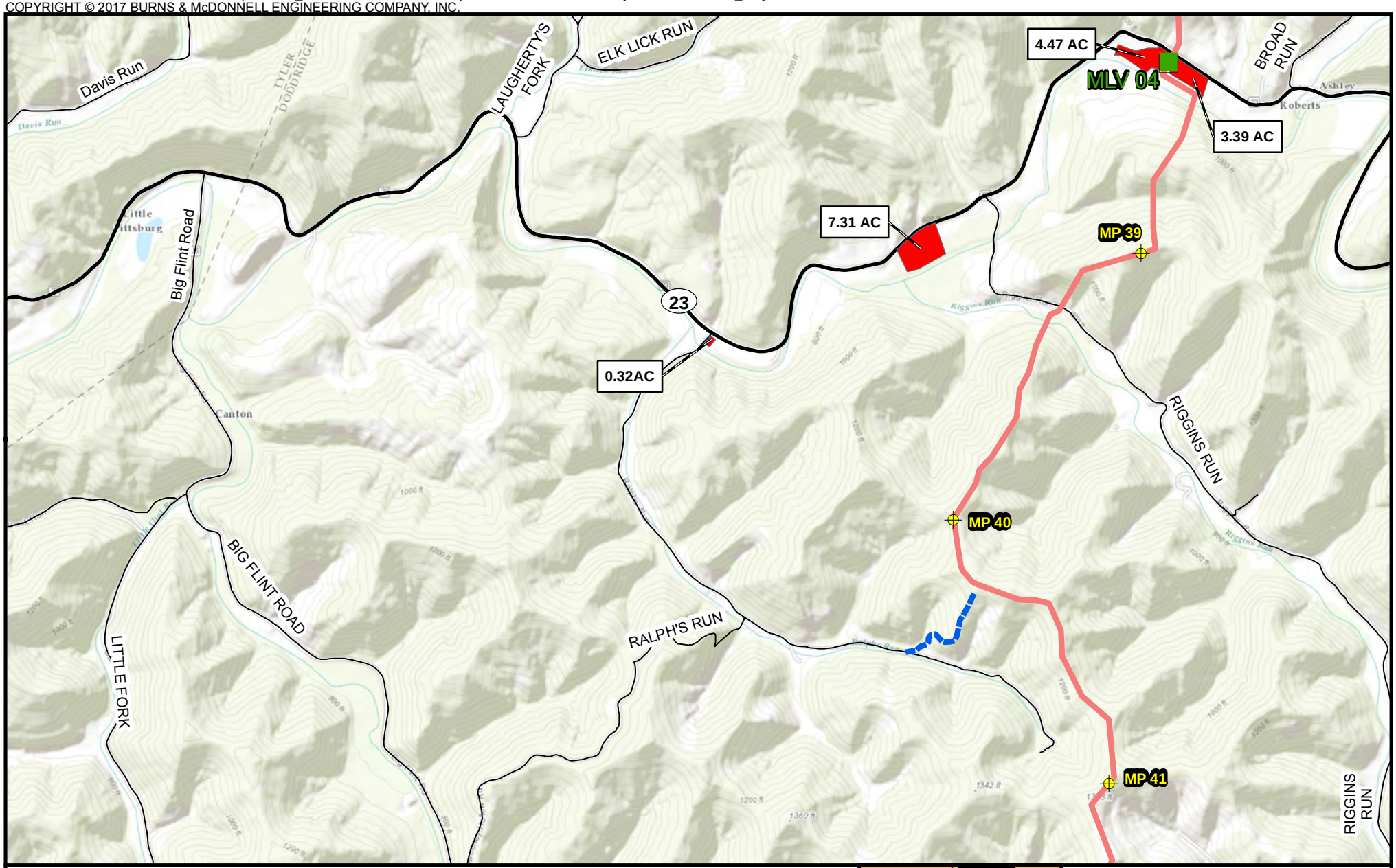


Milepost

Mainline Valve

Access Road

Pipe\Contractor Yard, Staging Area

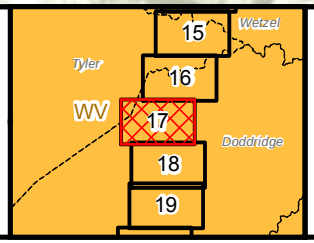
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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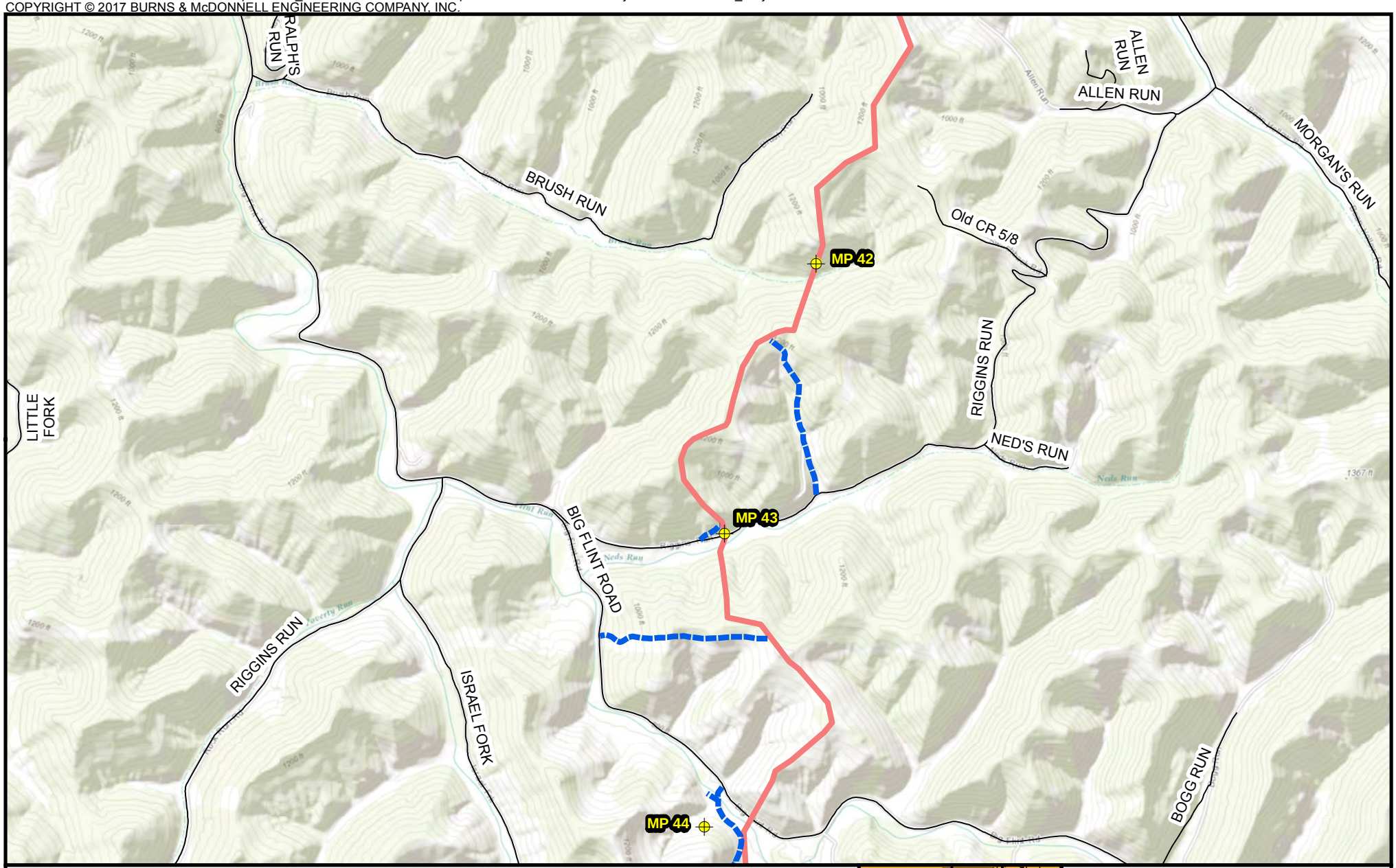
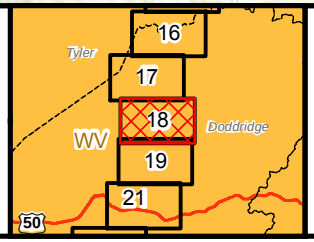


Milepost
Access Road

Proposed Pipeline
MXP-100

NORTH

2,000 1,000 0
Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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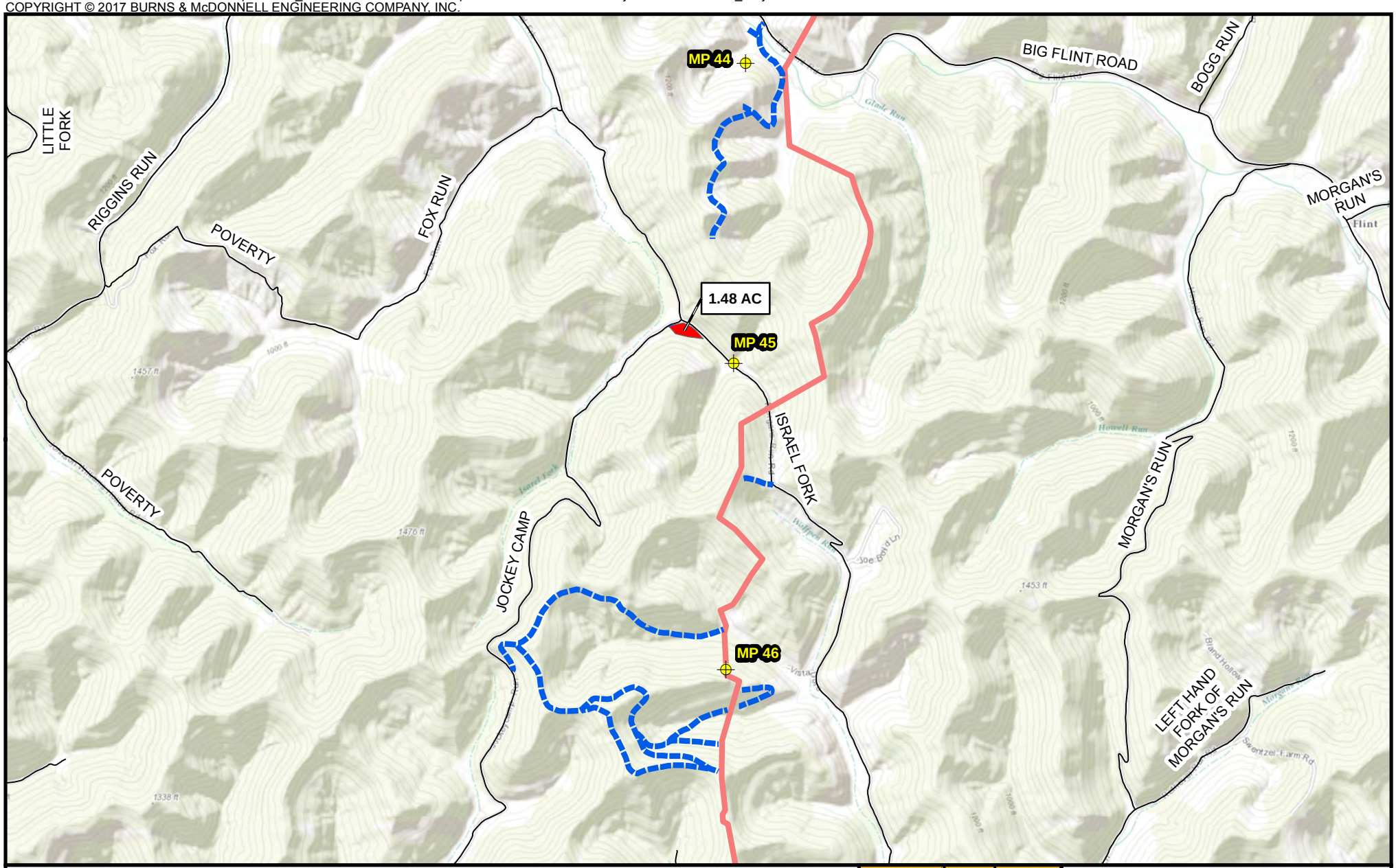


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

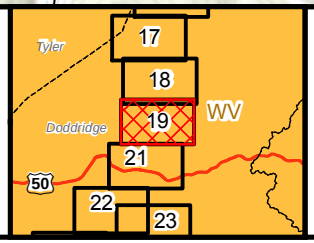
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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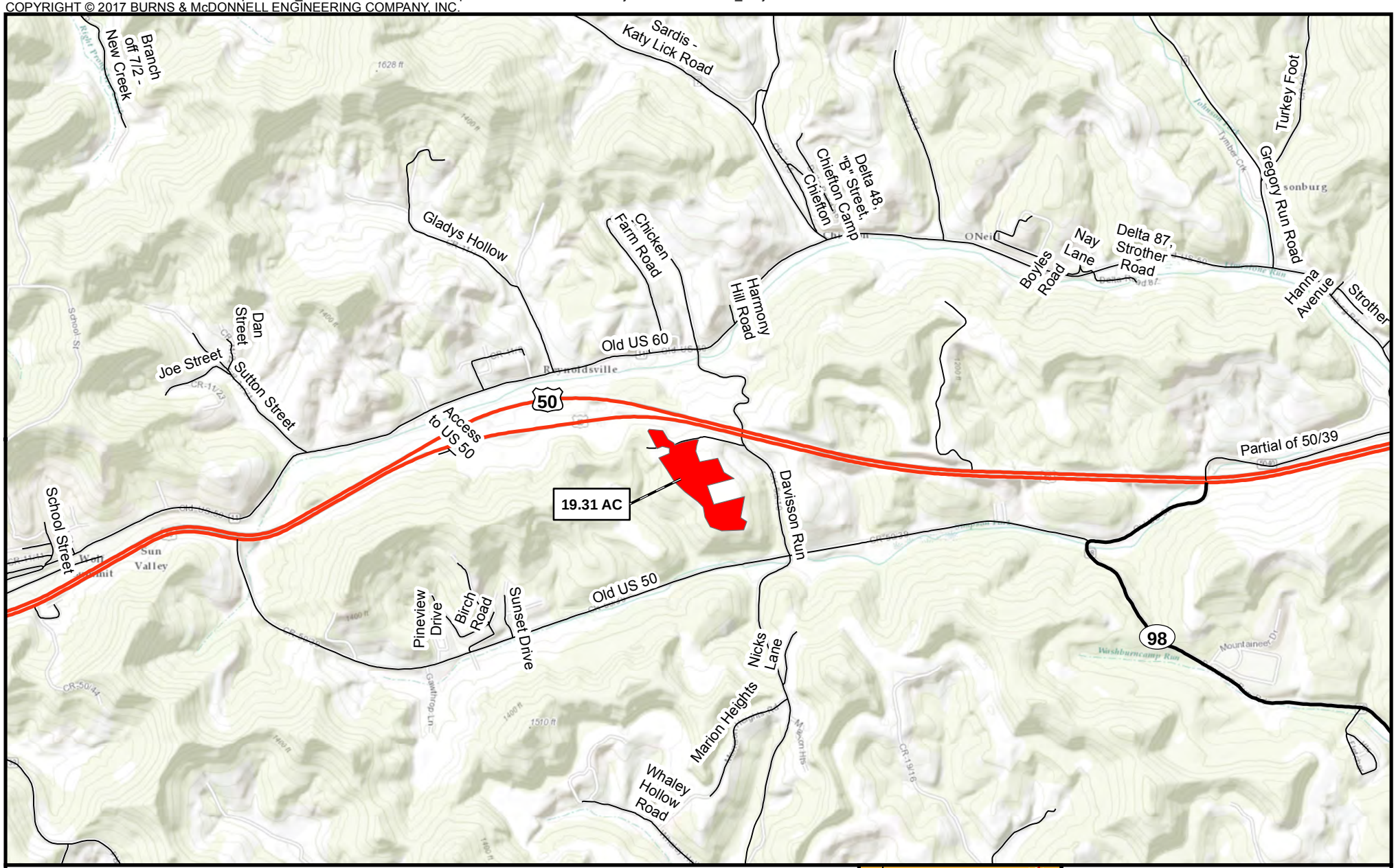
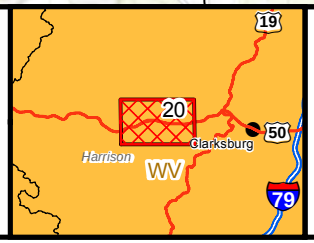


Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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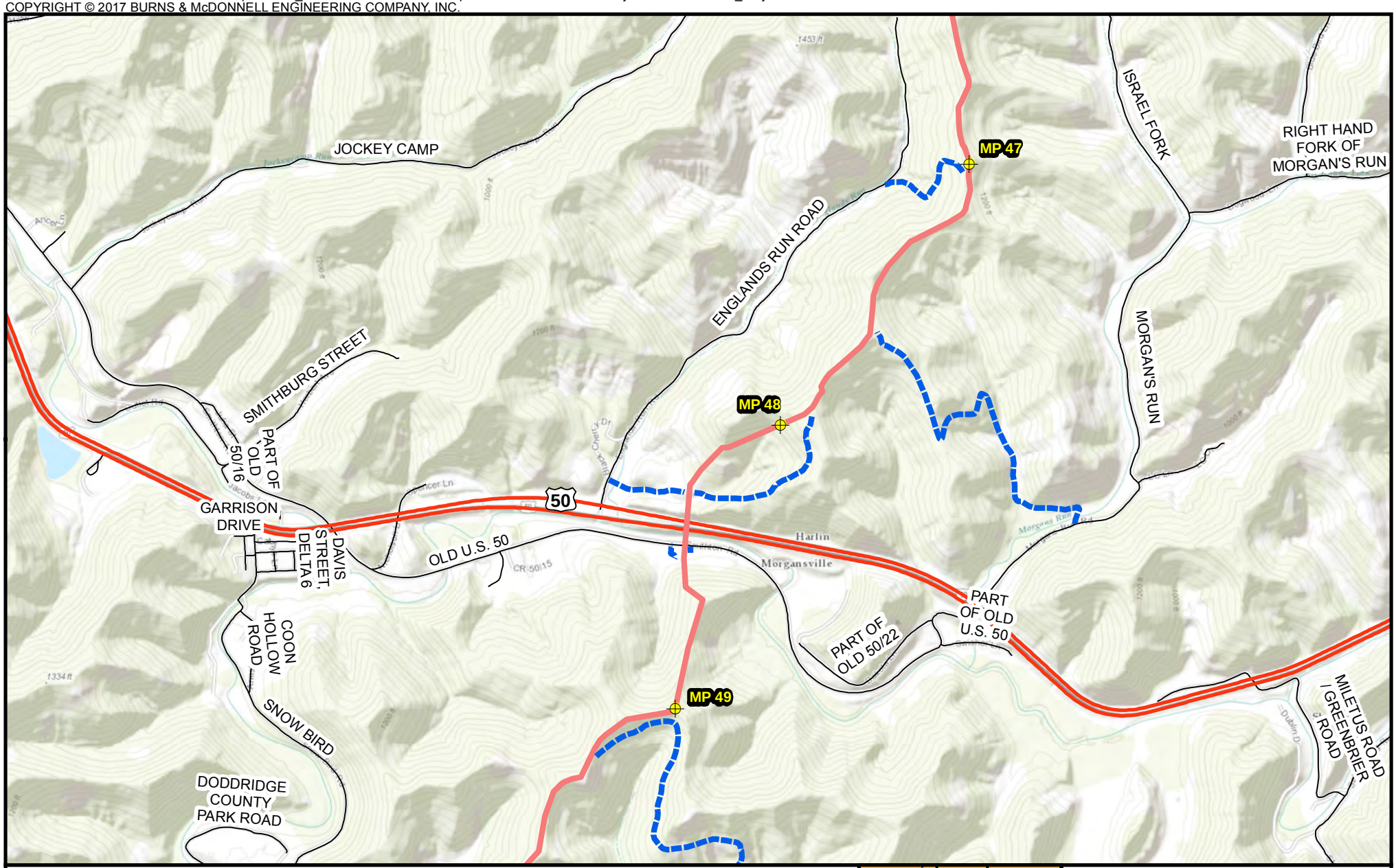


Milepost

Access Road

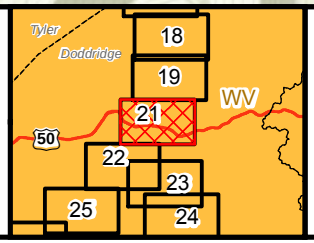
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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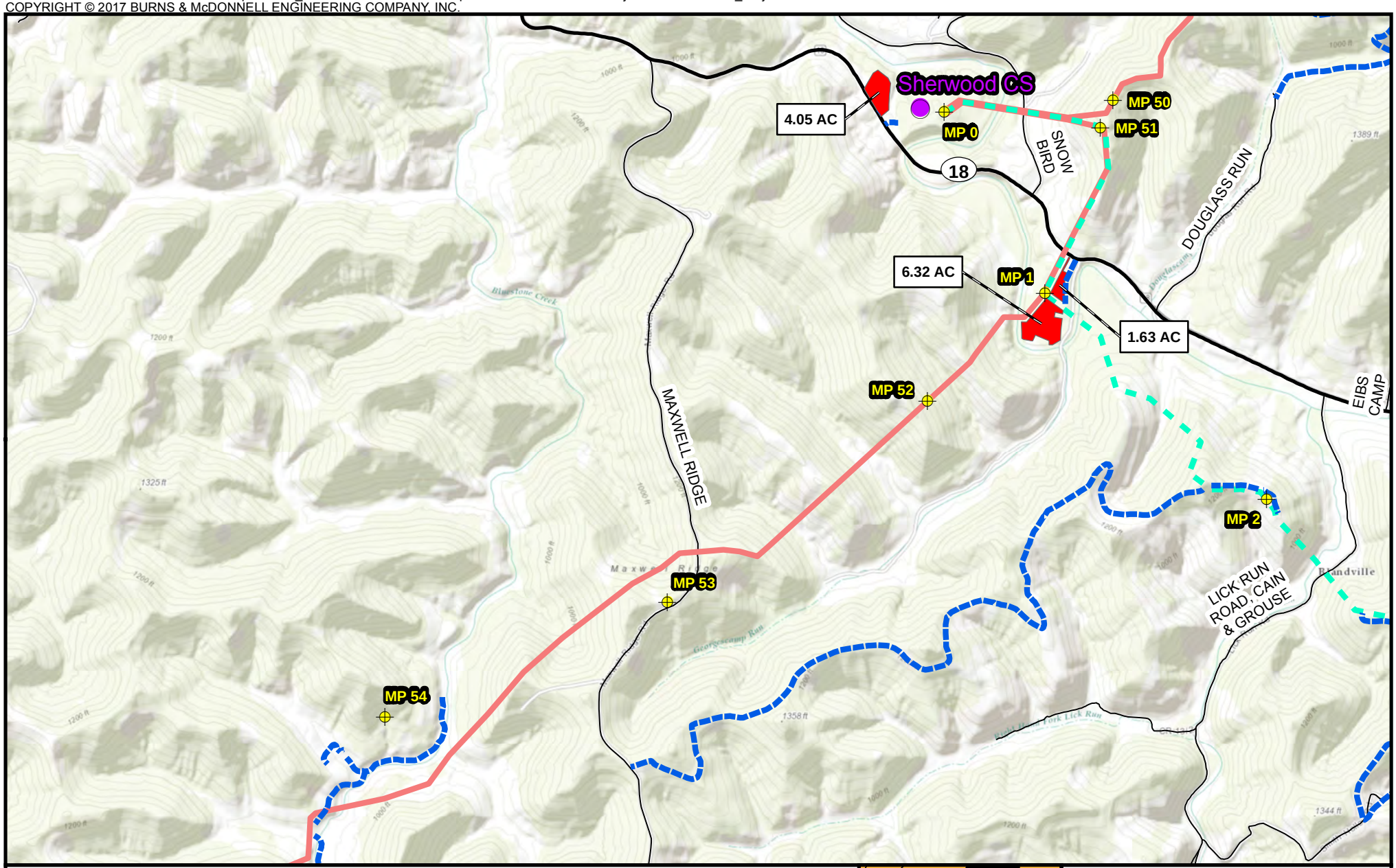
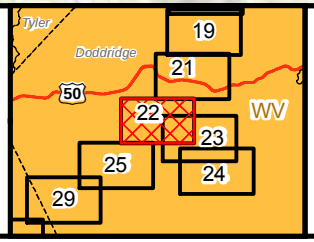


Milepost
Compressor Station
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100
MXP - 200

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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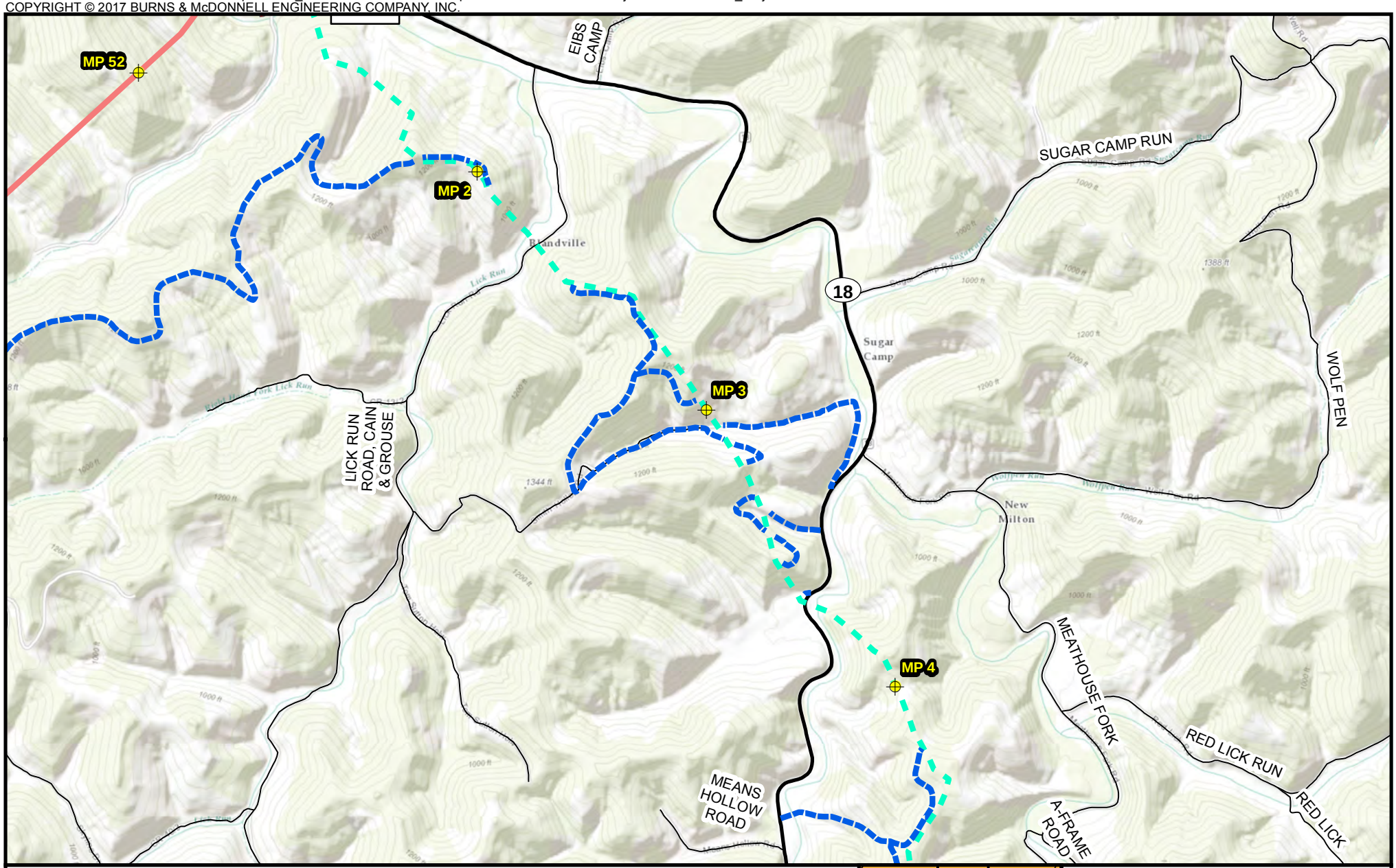


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

Proposed Pipeline

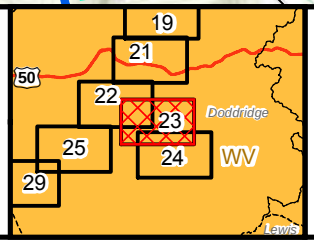
MXP-100

MXP - 200

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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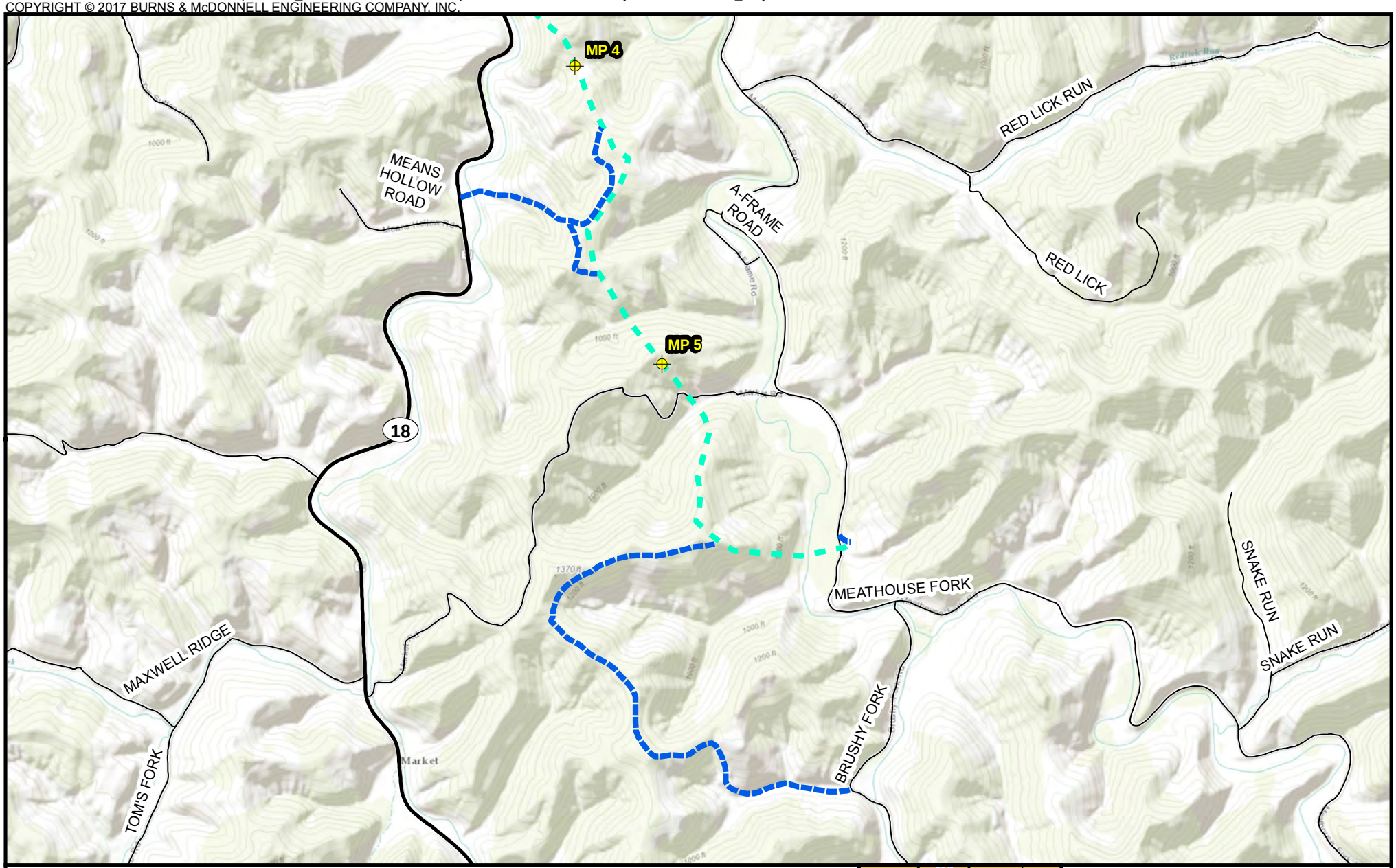


Milepost

Access Road

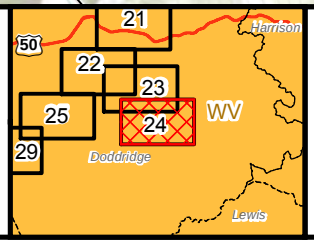
Proposed Pipeline

MXP - 200

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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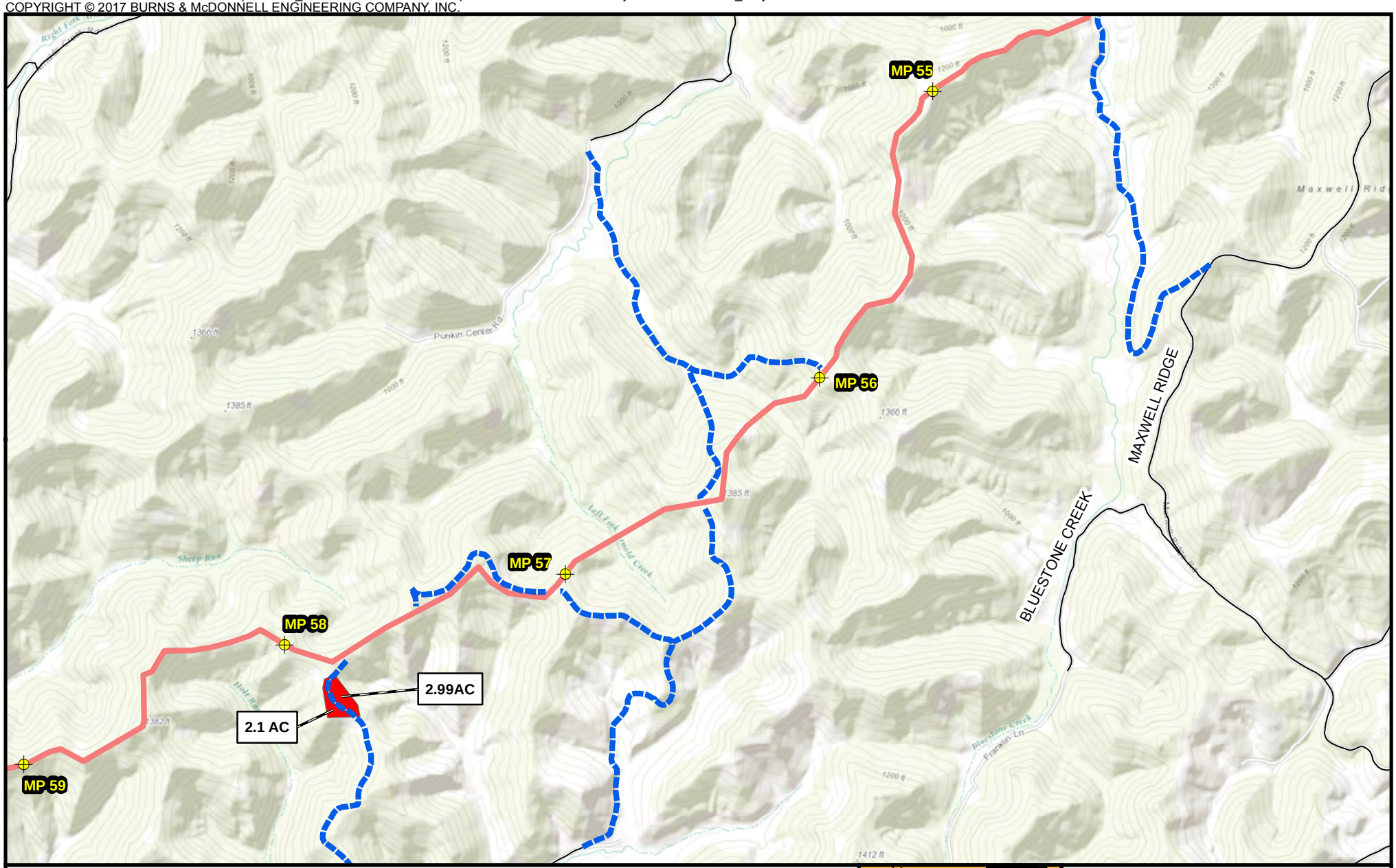


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

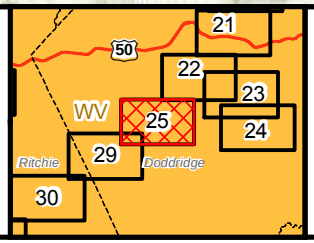
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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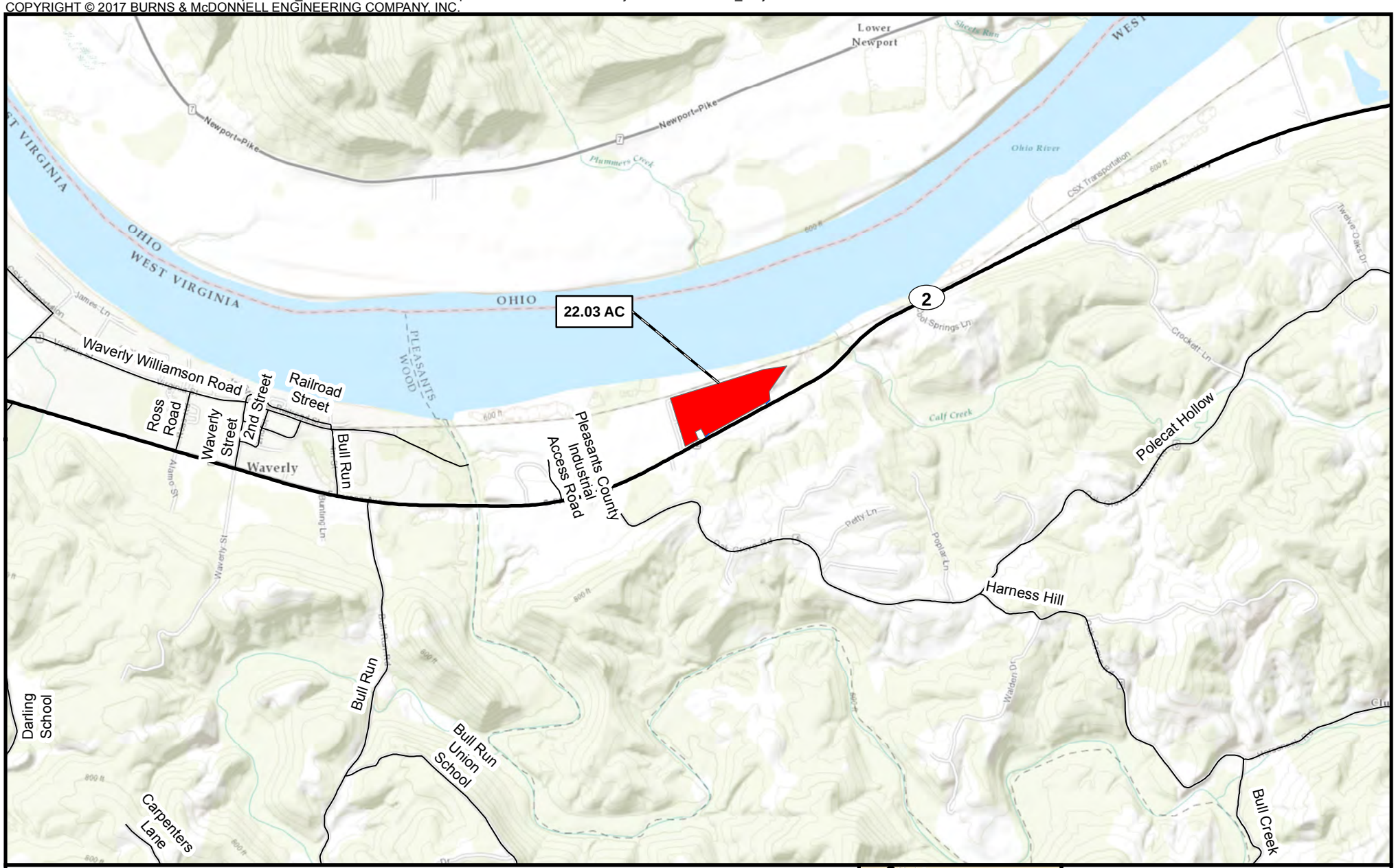


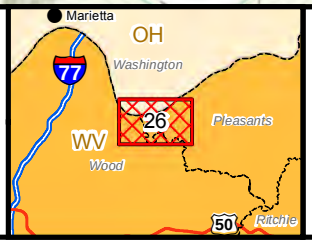
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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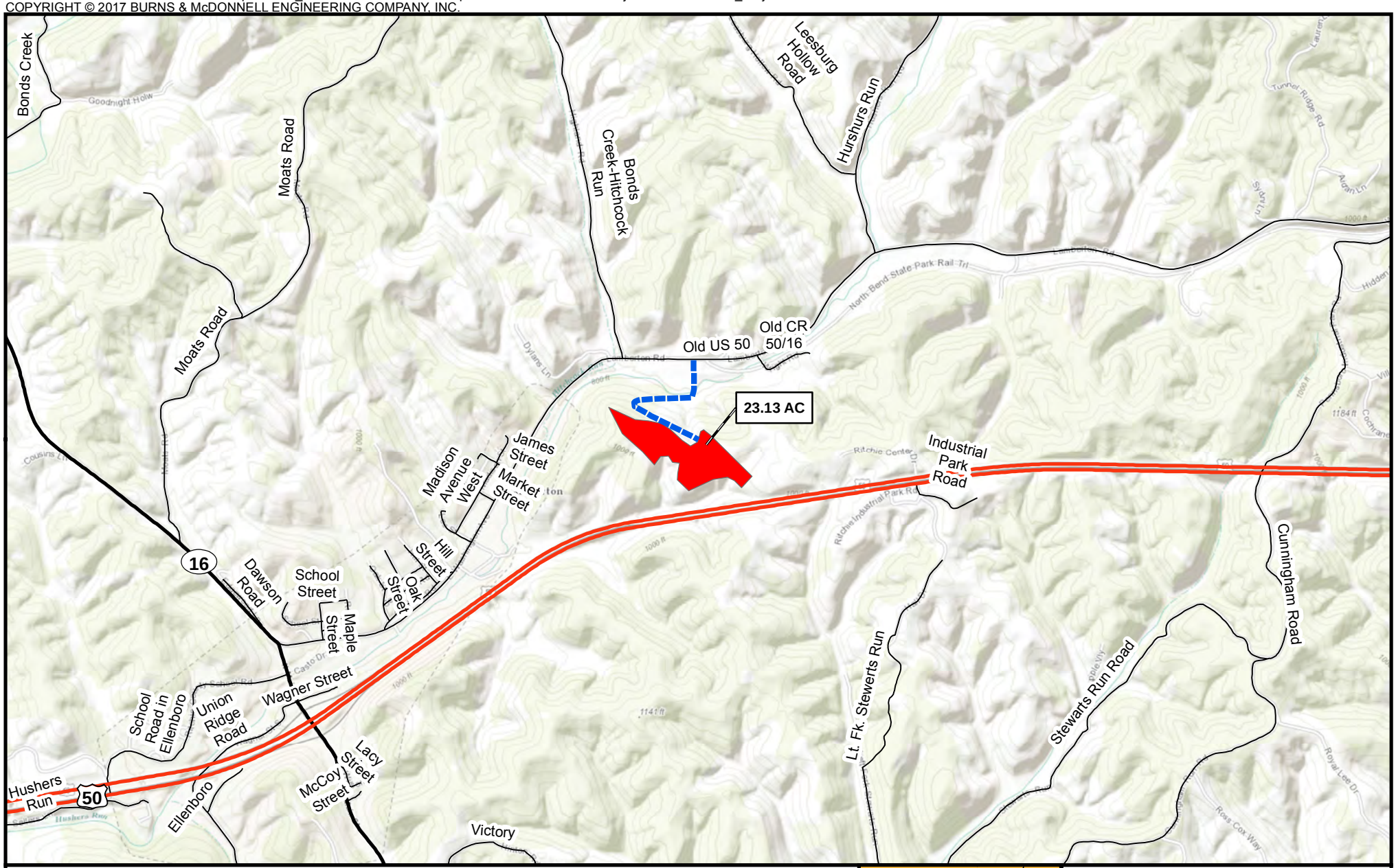


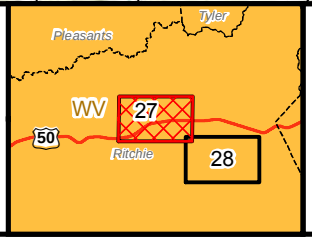
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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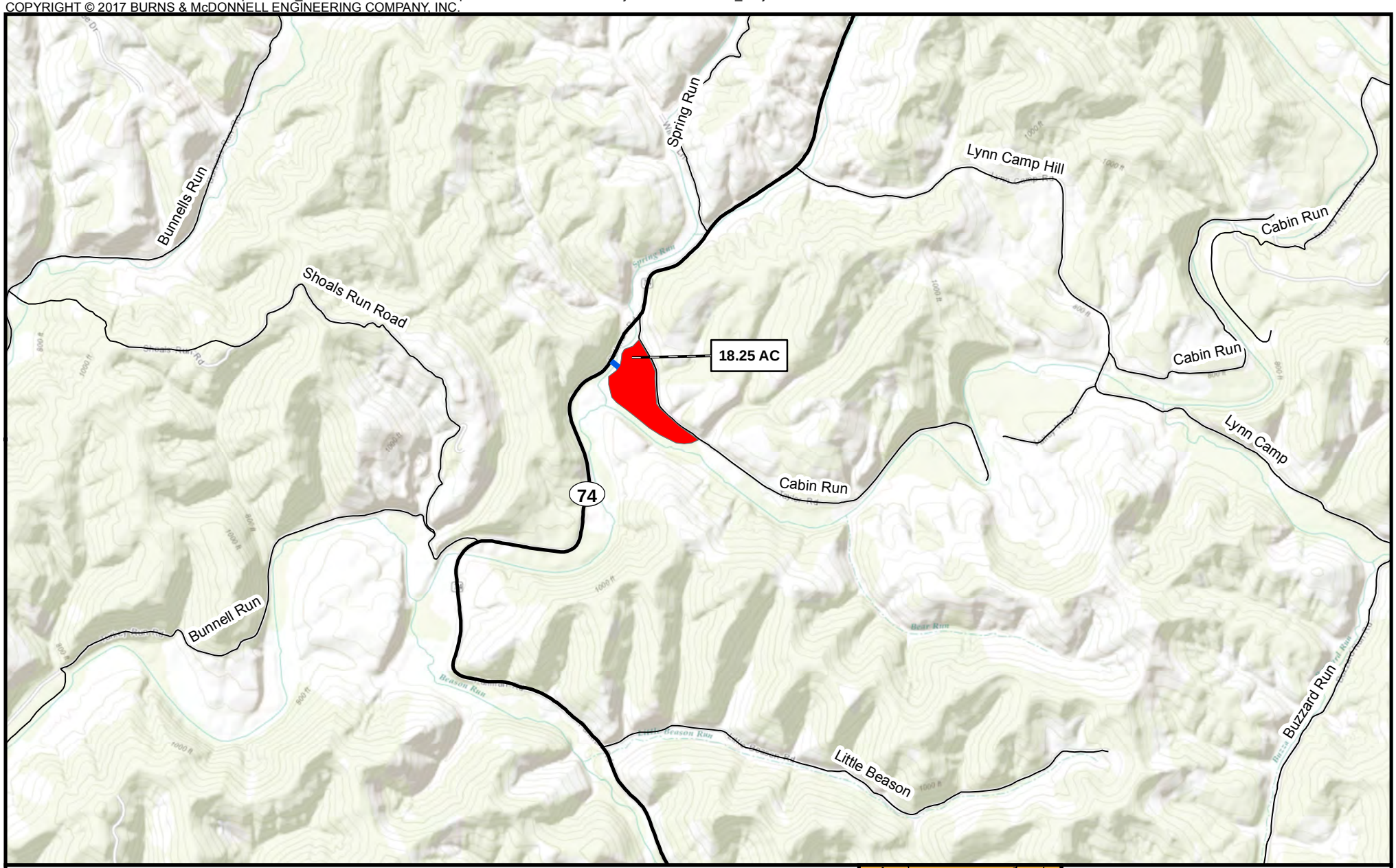


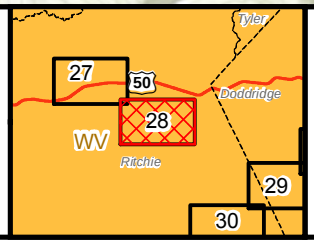
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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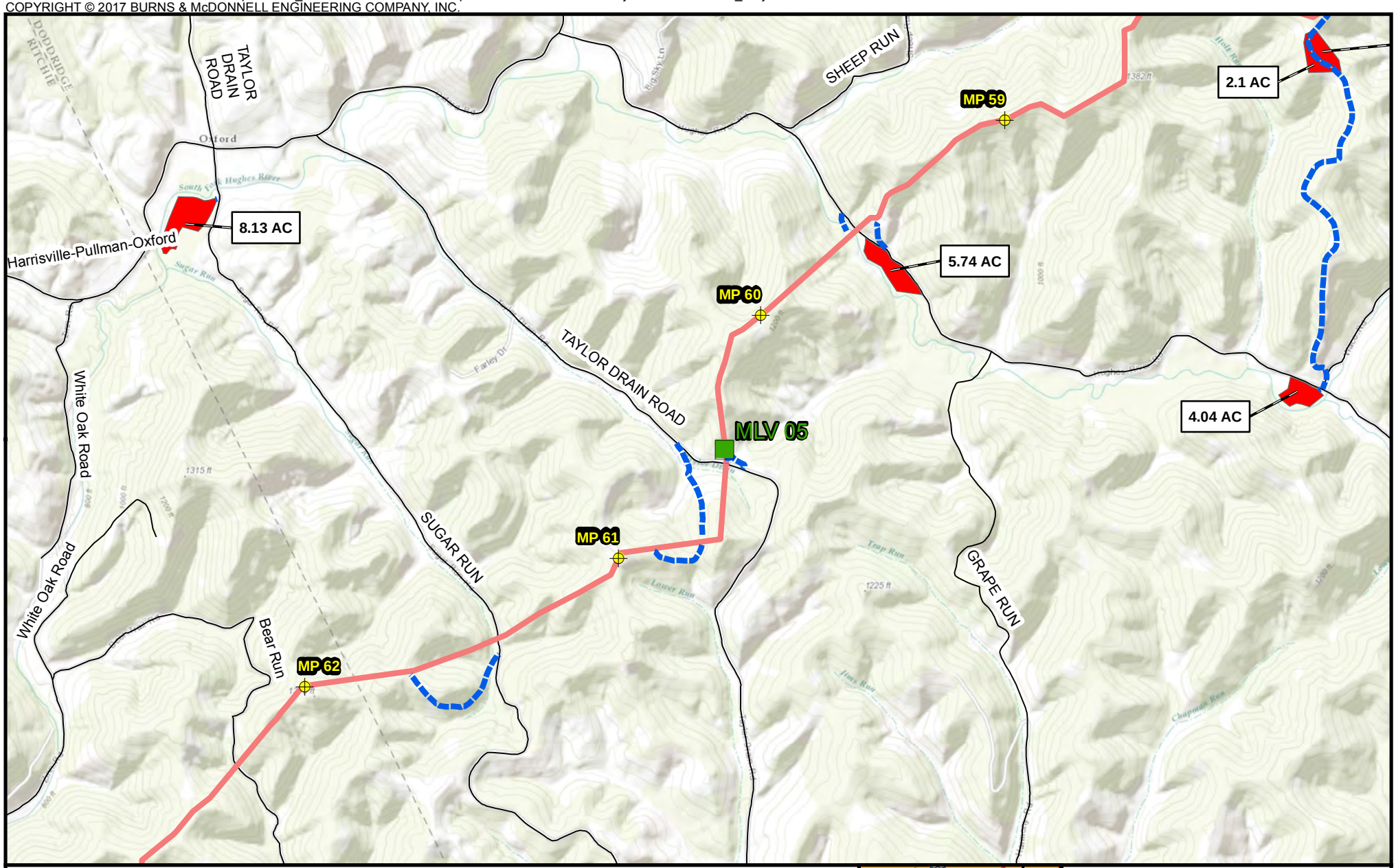


Milepost

Mainline Valve

Access Road

Pipe\Contractor Yard, Staging Area

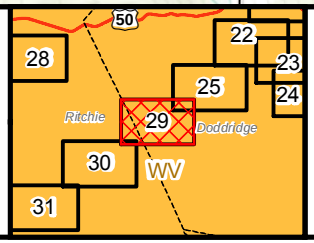
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



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Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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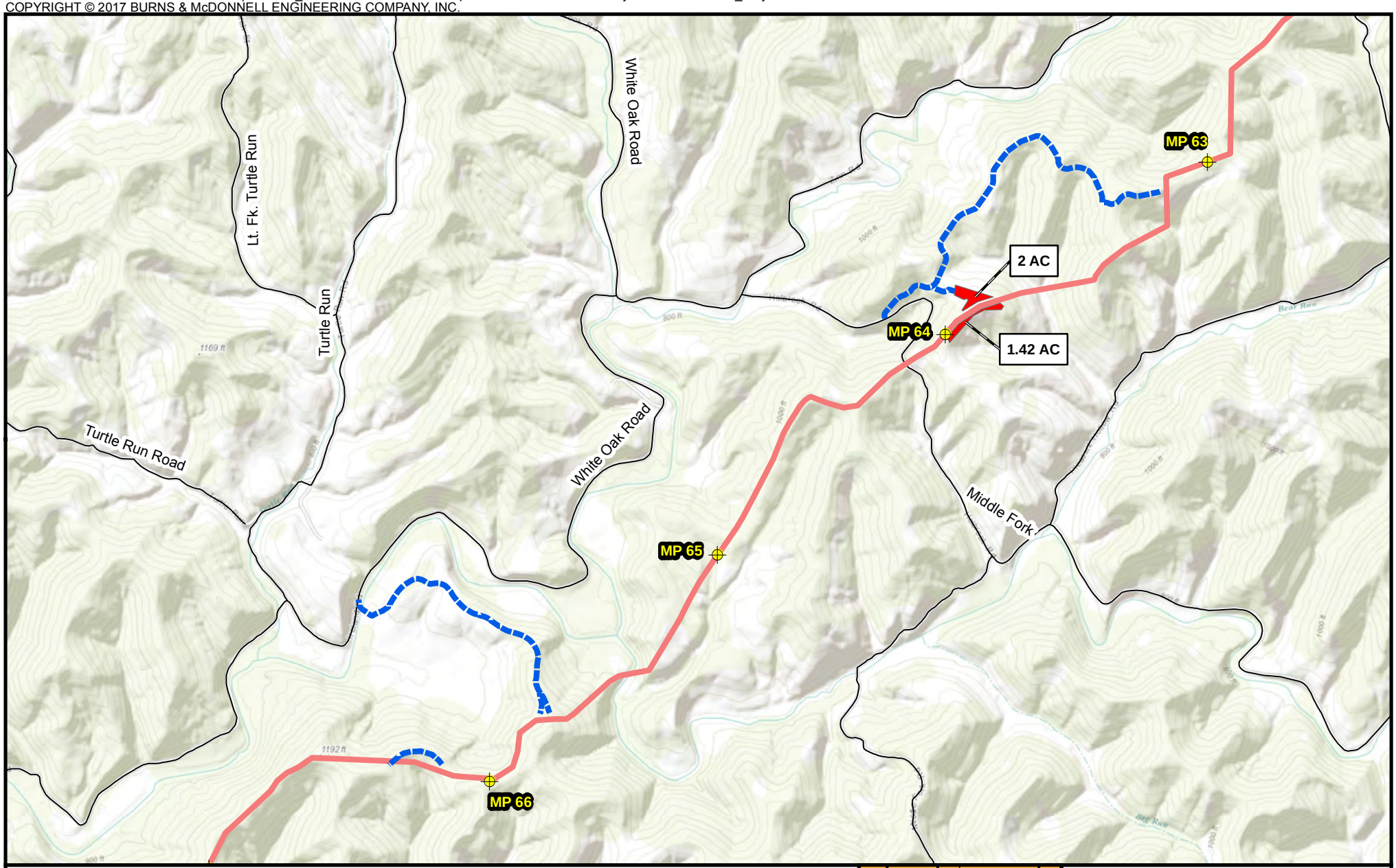


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

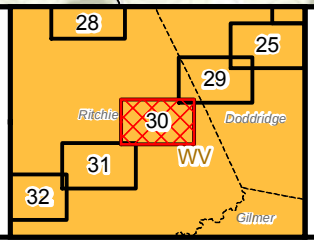
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

Issued: 3/16/2017

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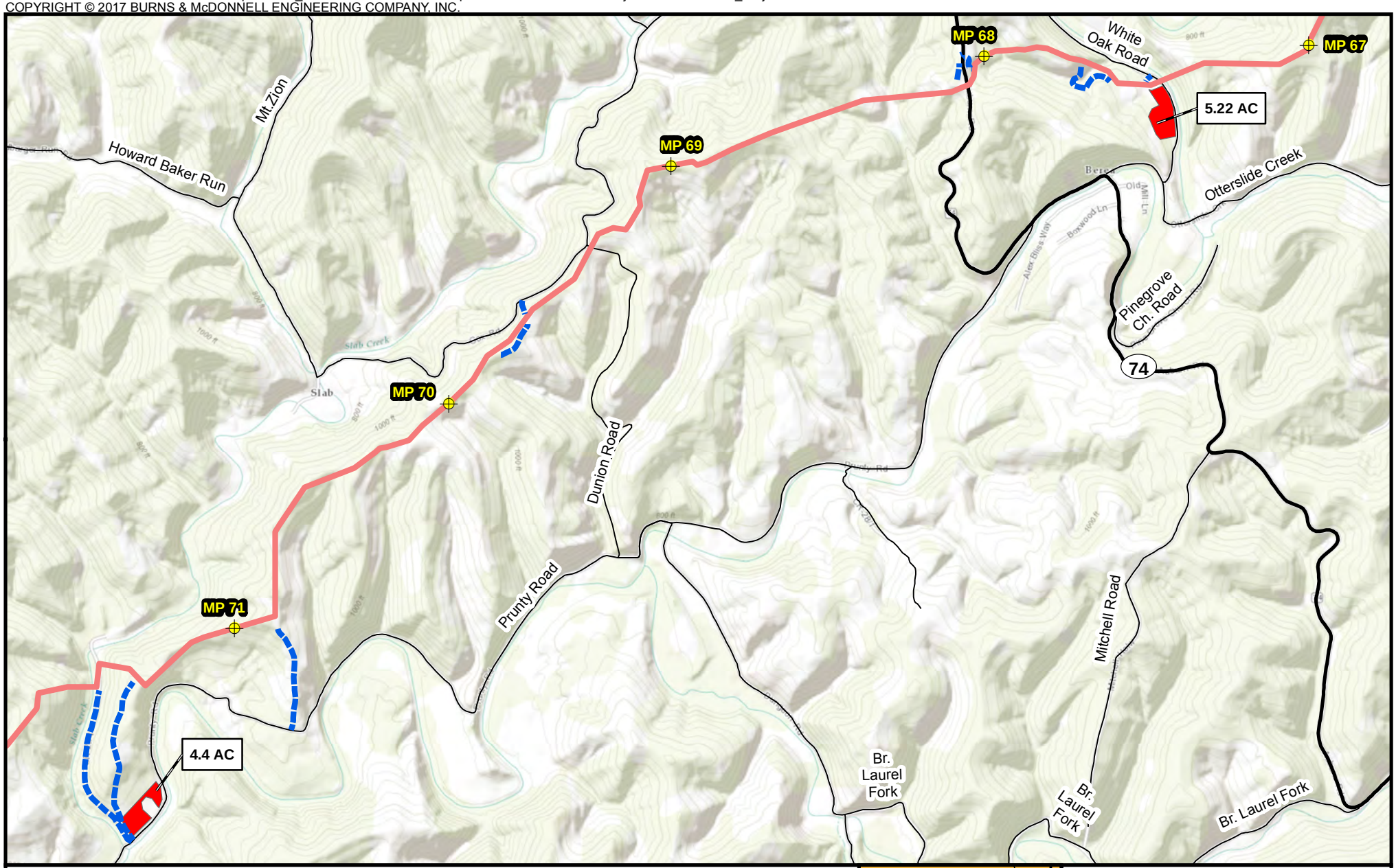


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

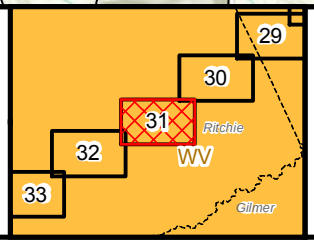
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
Page 31 of 63

Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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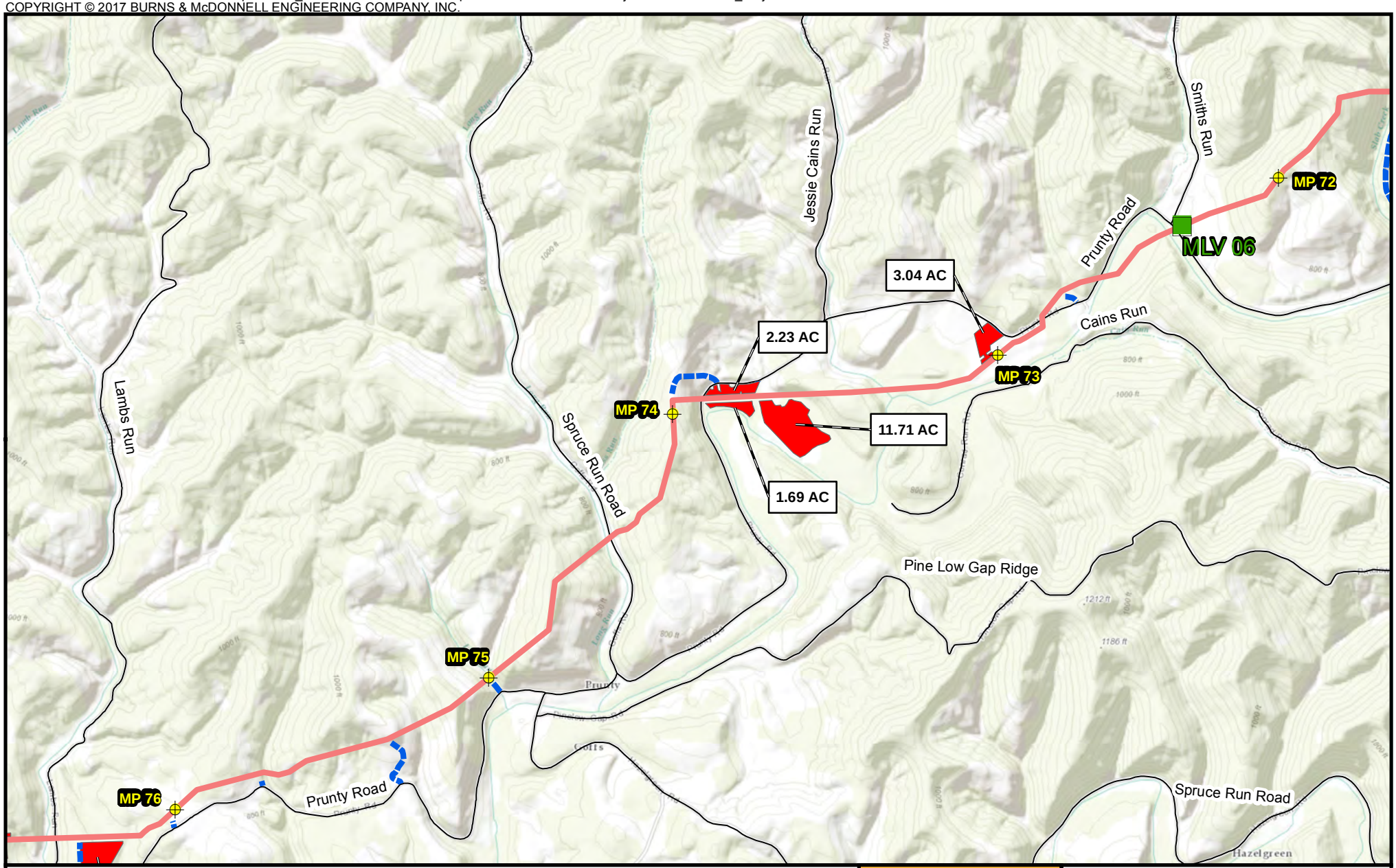


Milepost

Mainline Valve

Access Road

Pipe\Contractor Yard, Staging Area

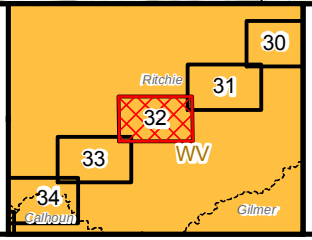
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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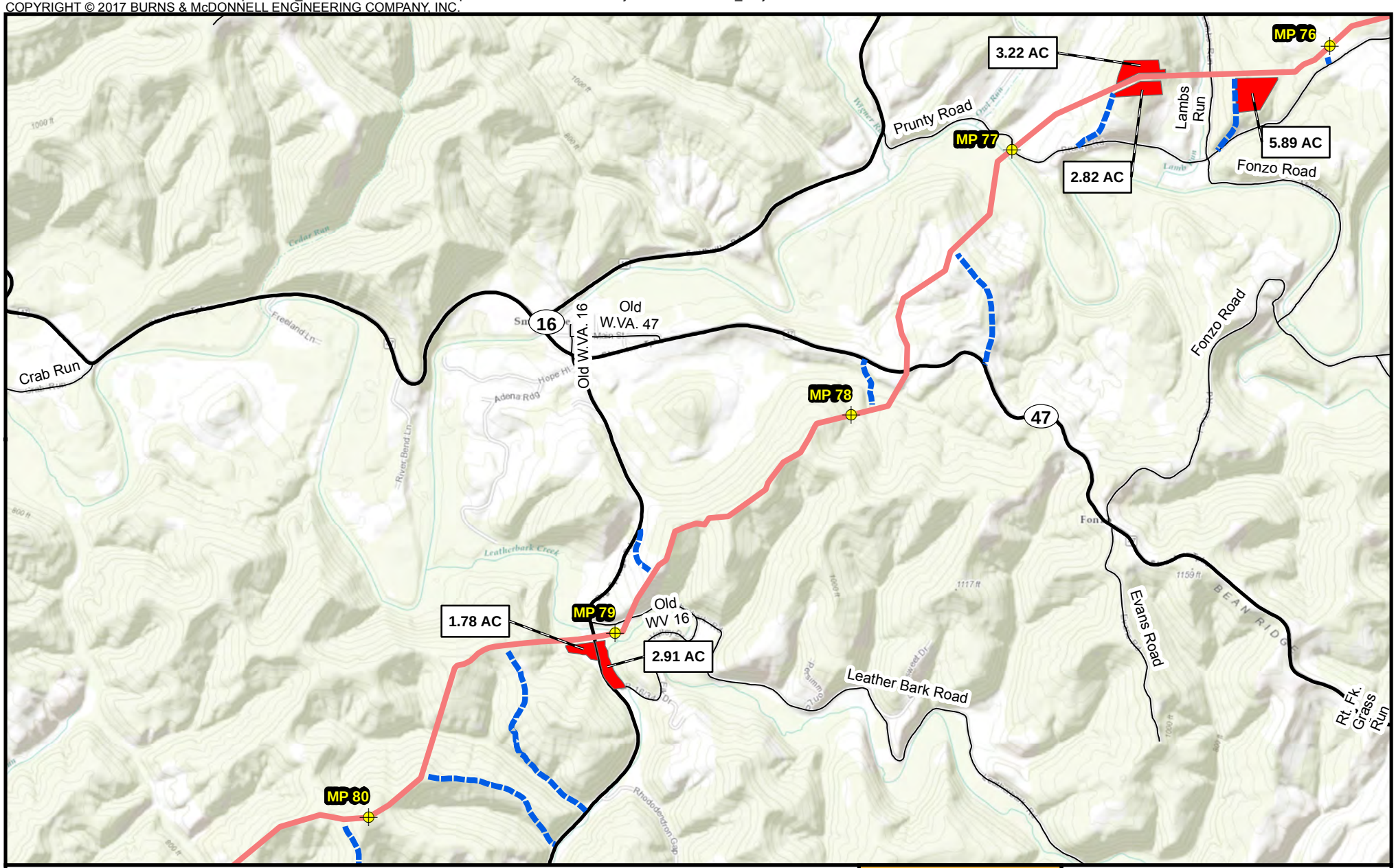


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

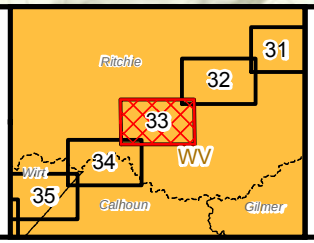
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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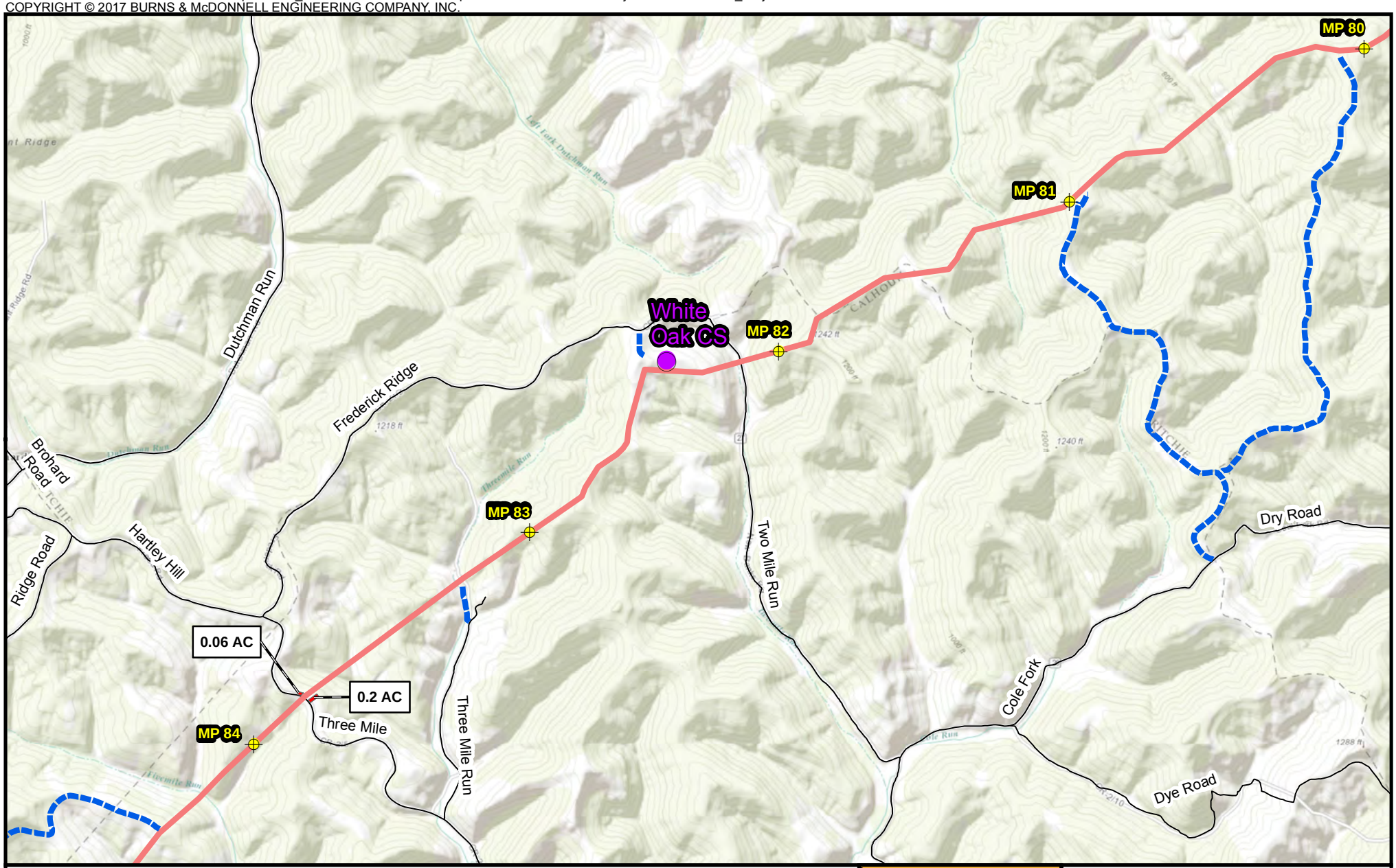
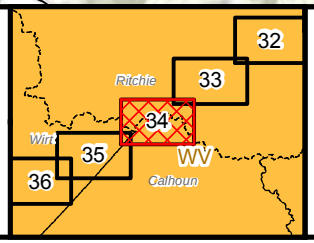


Milepost
Compressor Station
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
Page 34 of 63

Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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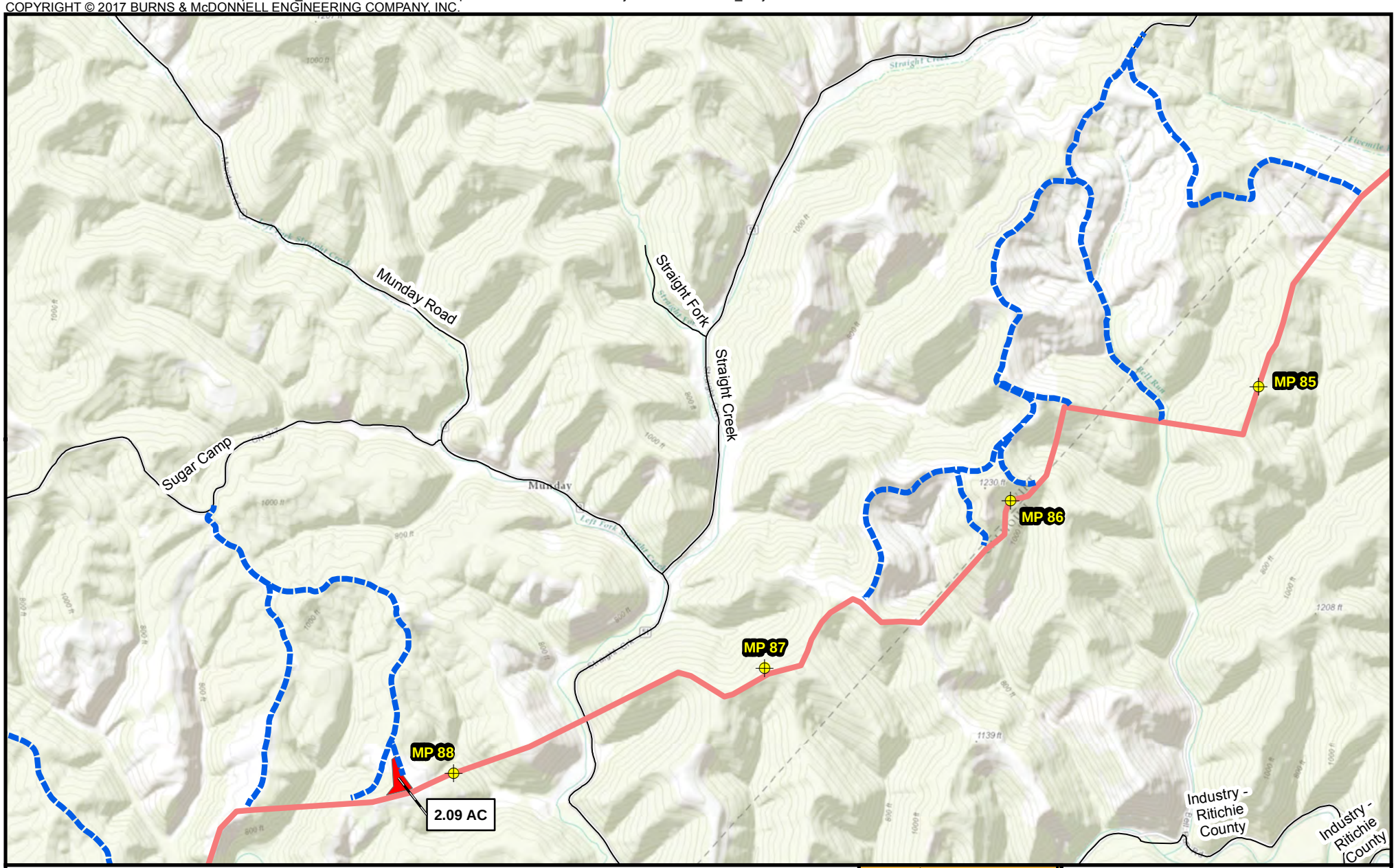
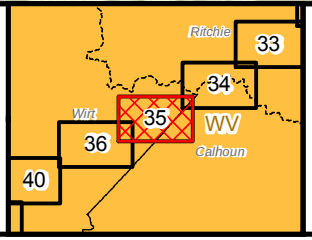


Milepost
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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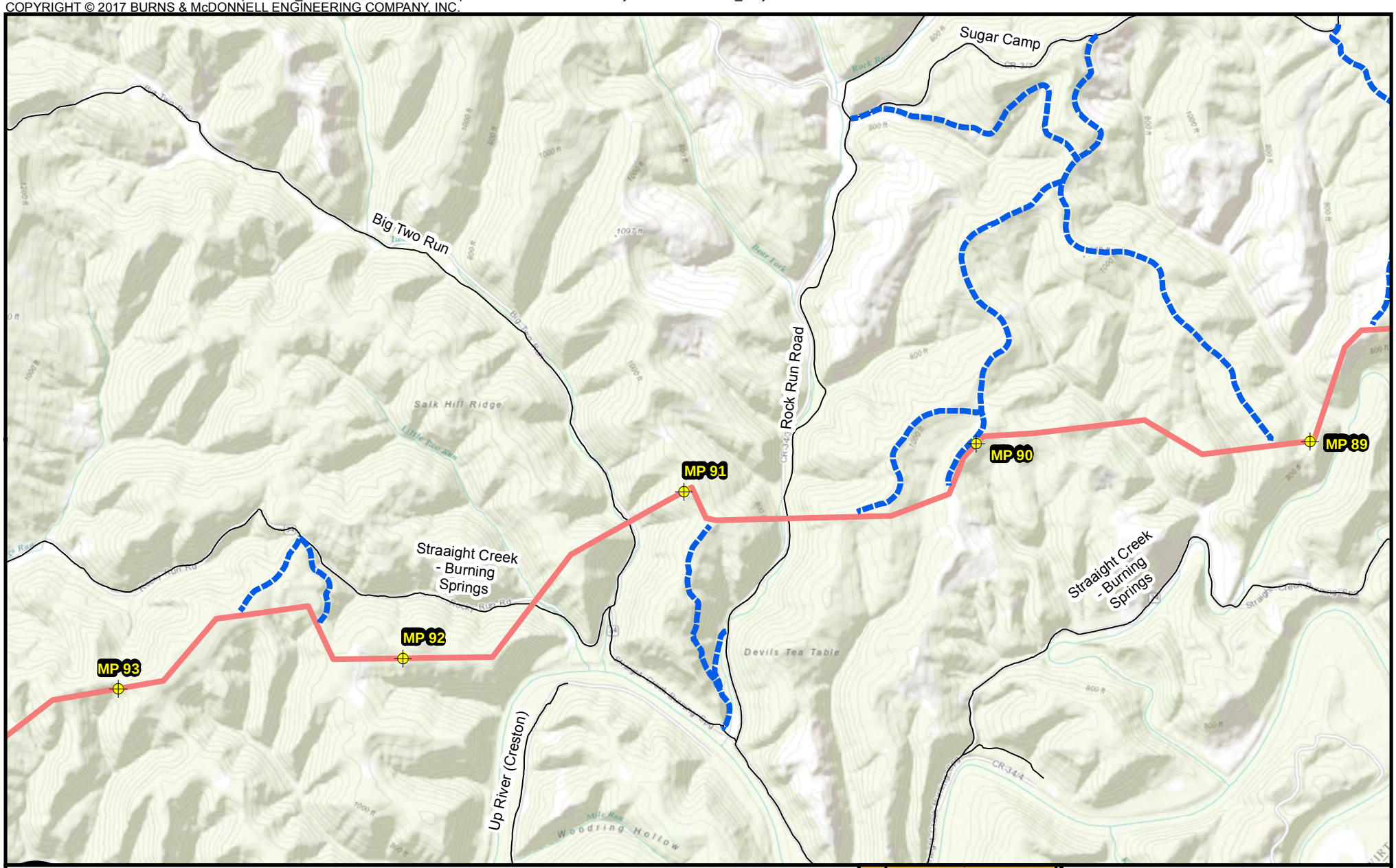
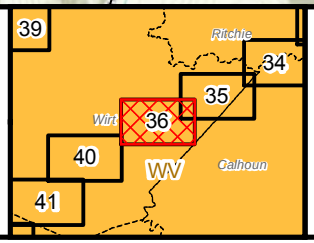


Milepost
Access Road

Proposed Pipeline
MXP-100

NORTH

2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
Page 36 of 63

Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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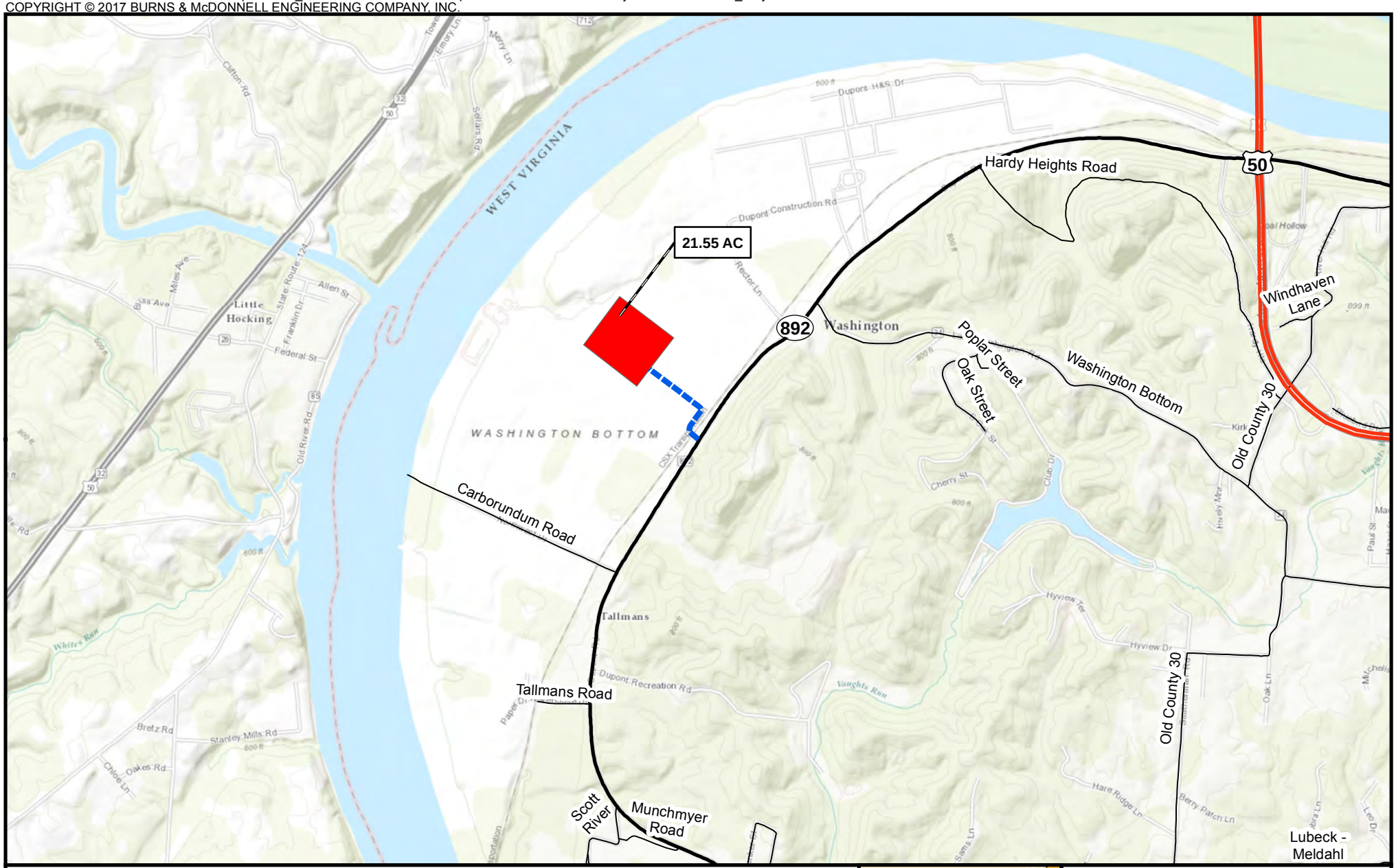


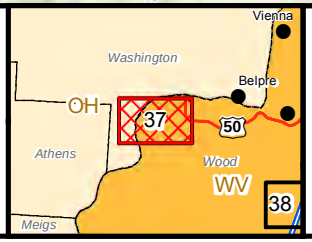
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
Page 37 of 63

Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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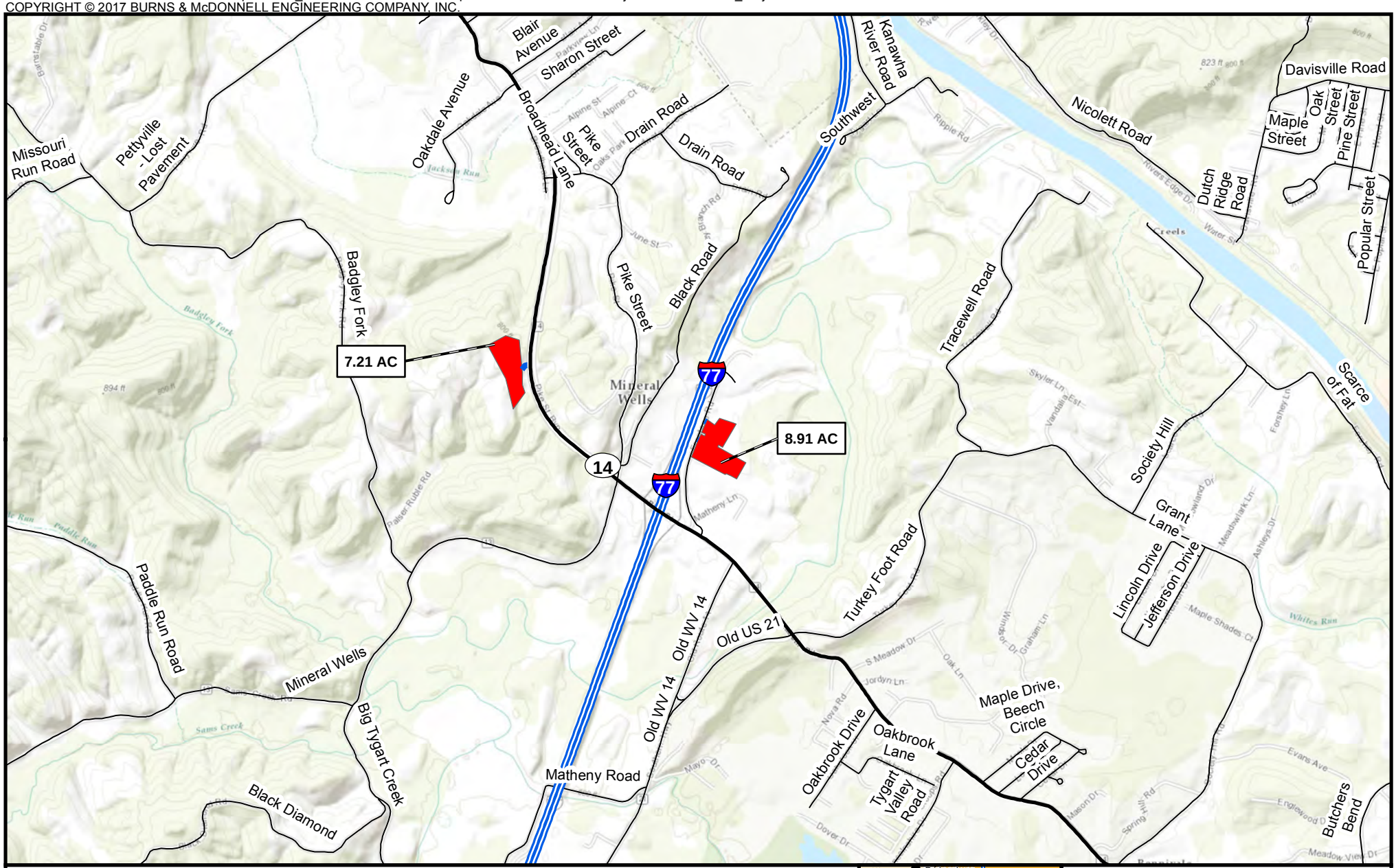


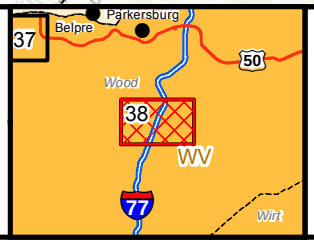
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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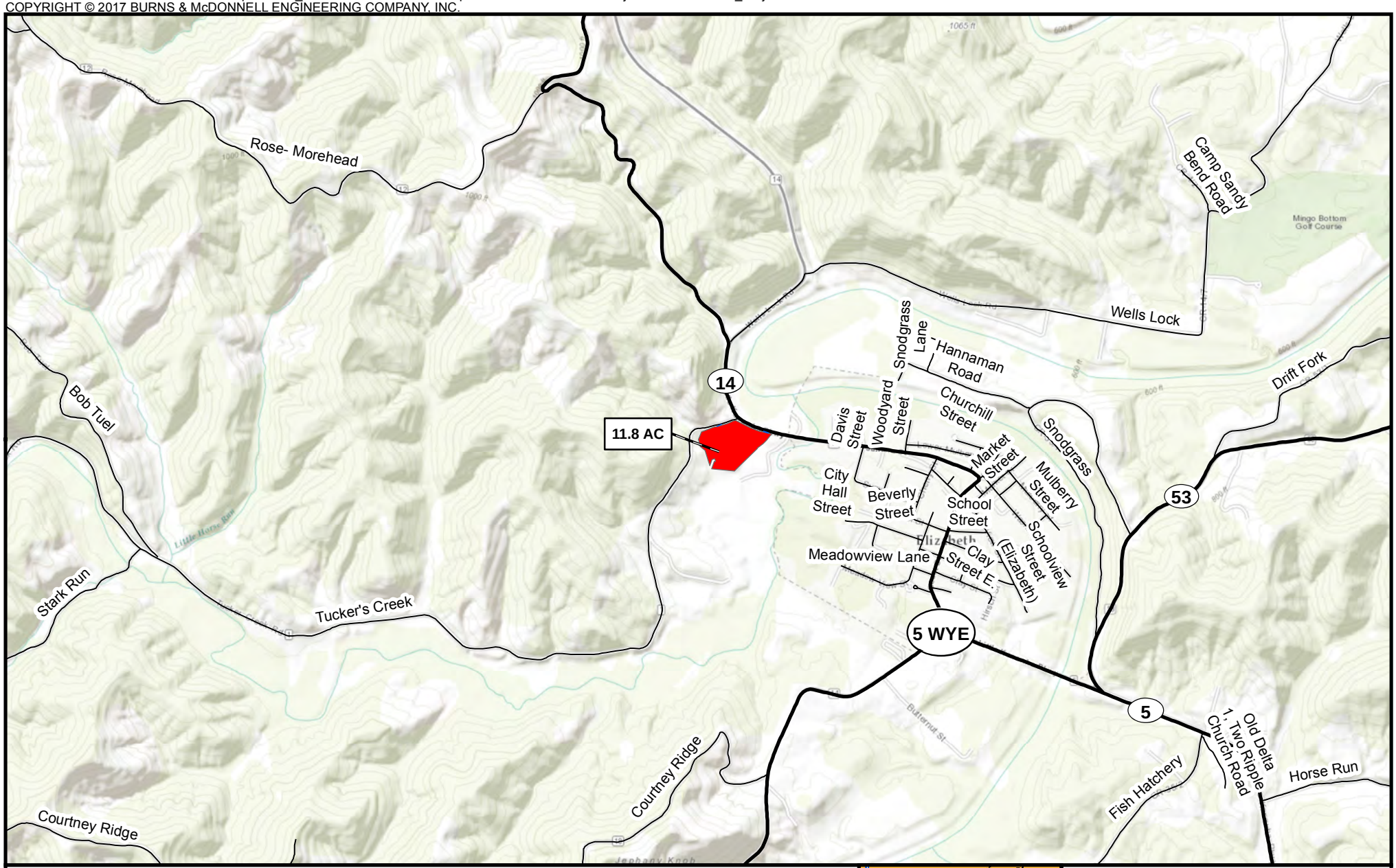


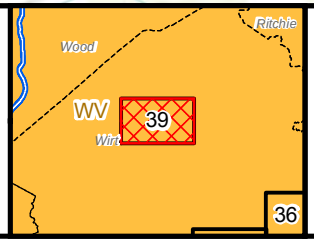
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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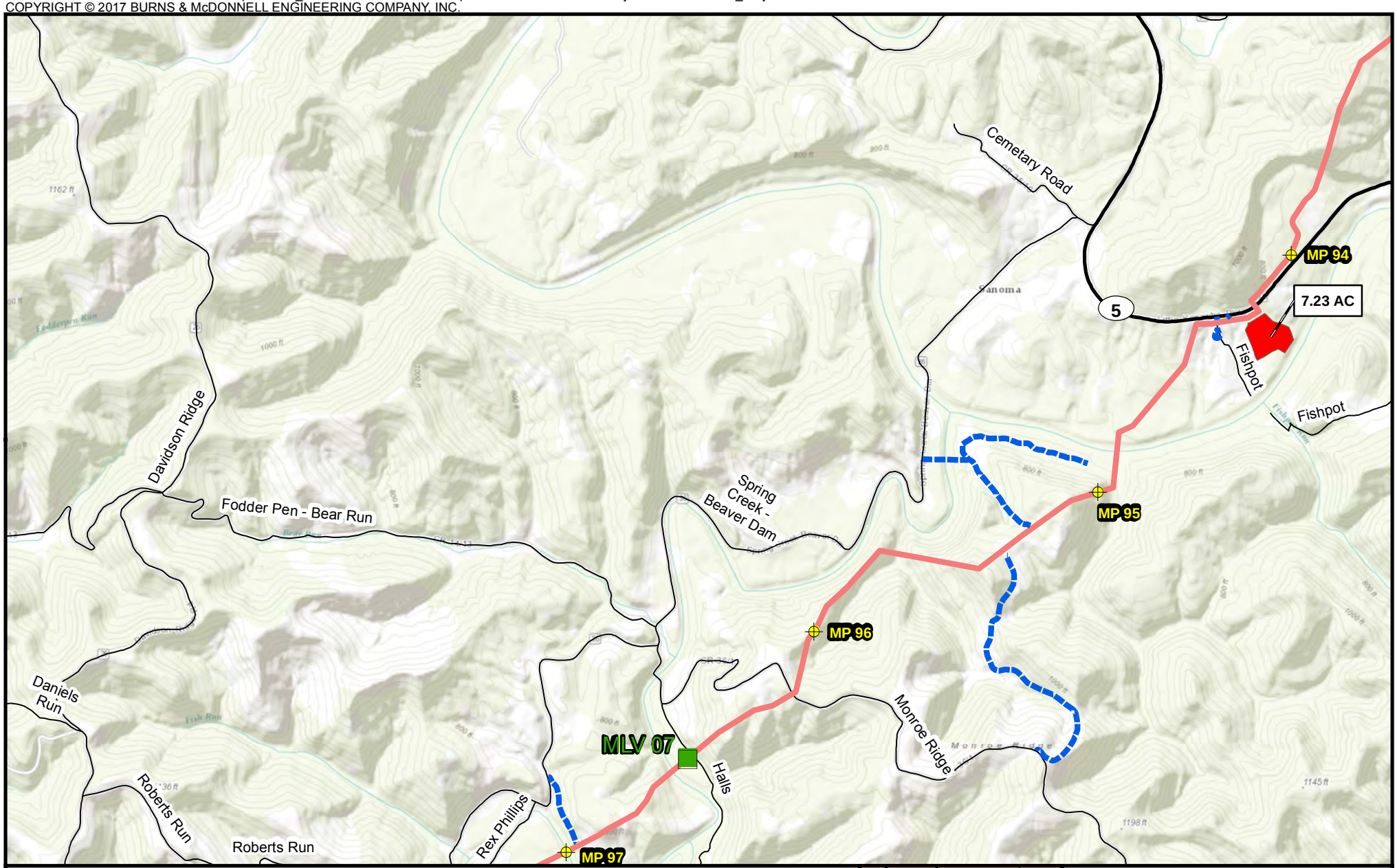
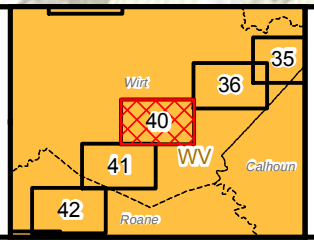


Milepost
Mainline Valve
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

Path: \\bmcd\Dfs\Clients\ESP\ColumbiaPipe\87879_CPGMXPEIS\Studies\Geospatial\DataFiles\ArcDocs\ProjectOverviews\MXP_ProjectOverview.mxd cronchetti 3/16/2017

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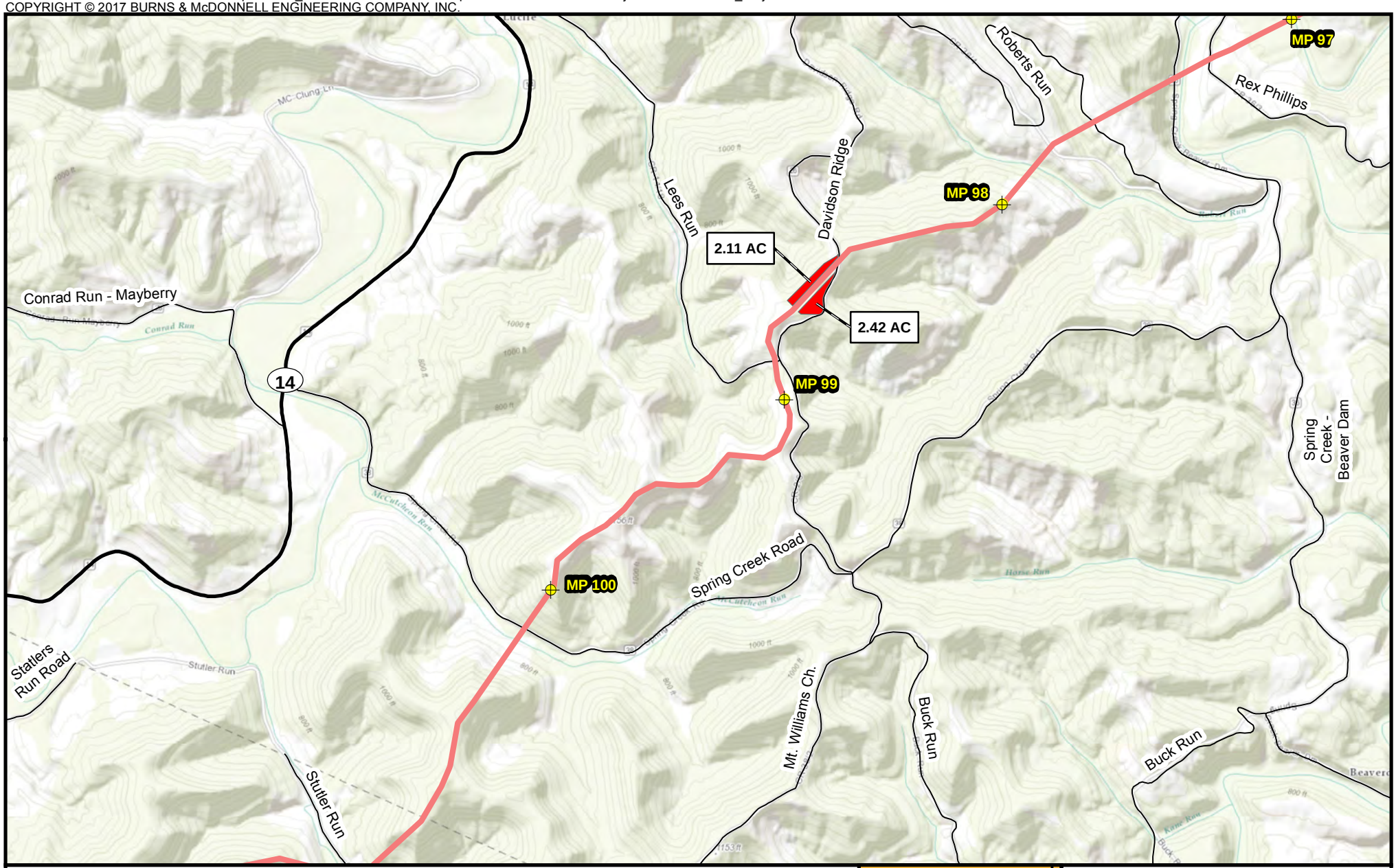


Milepost

Pipe\Contractor Yard, Staging Area

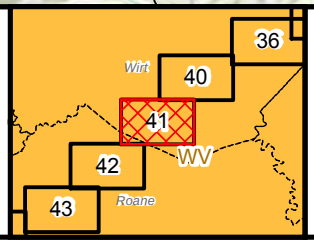
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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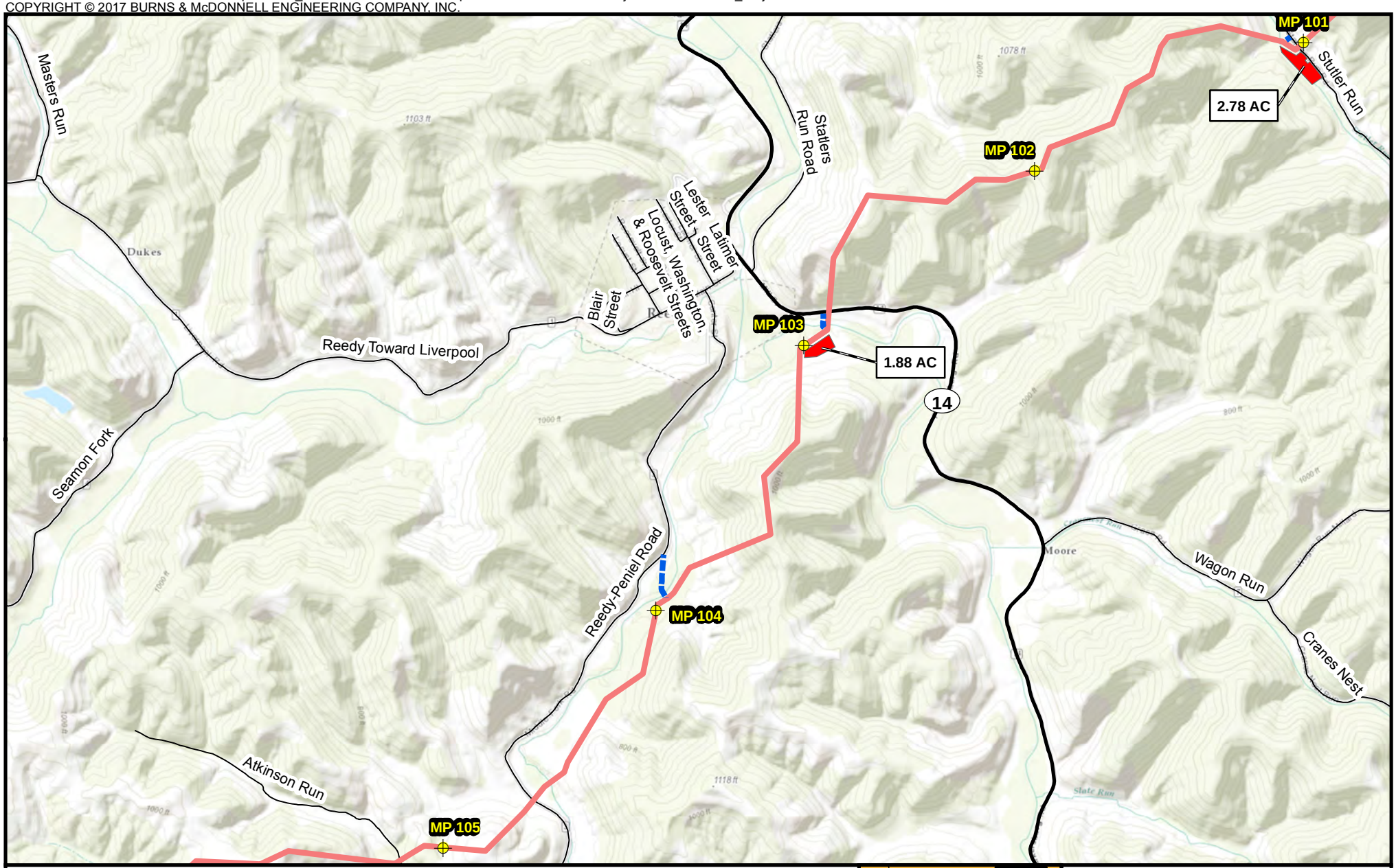
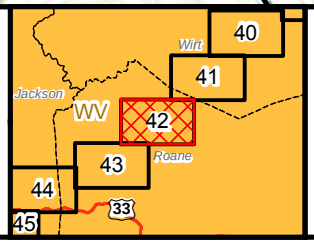


Milepost
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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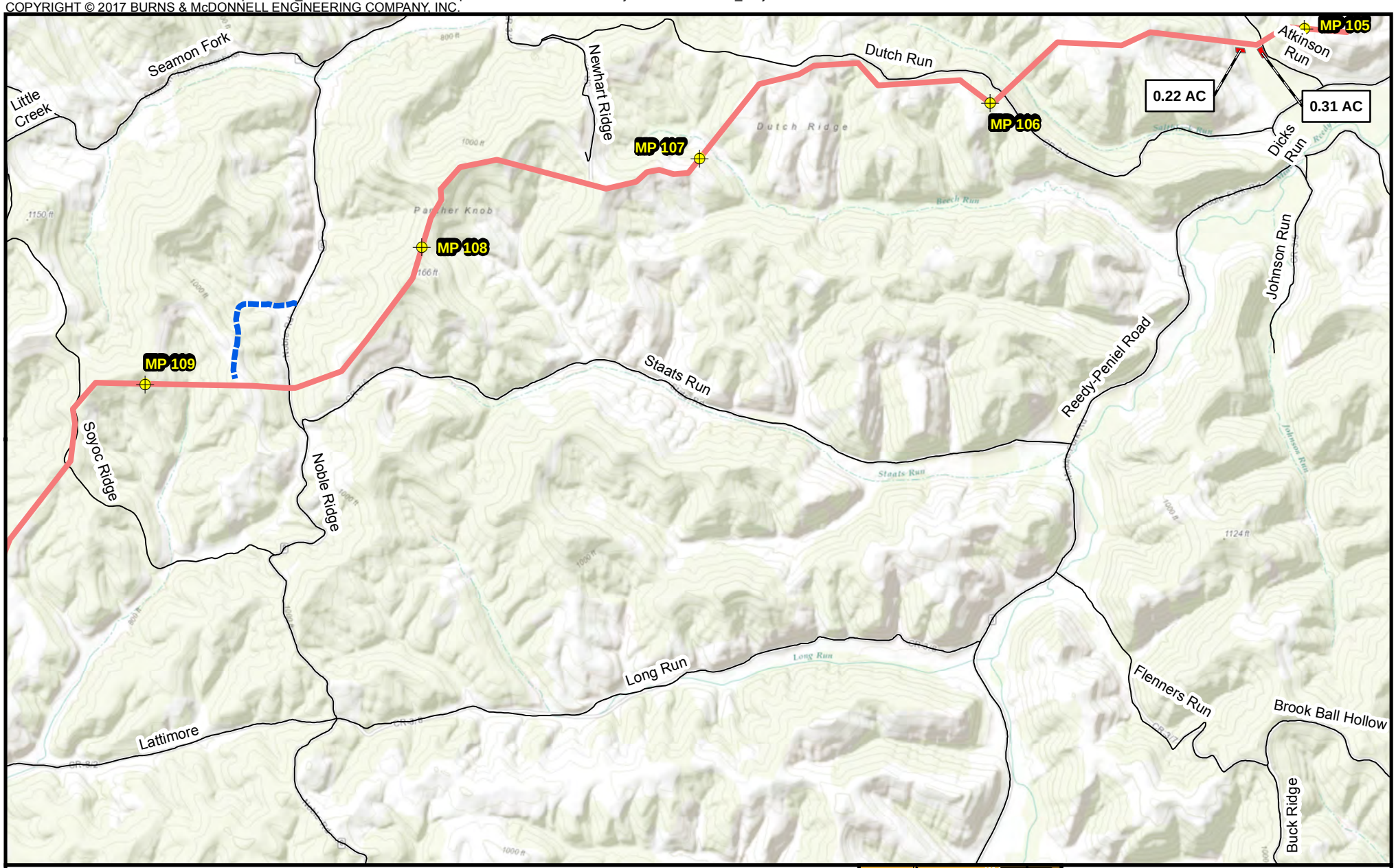


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

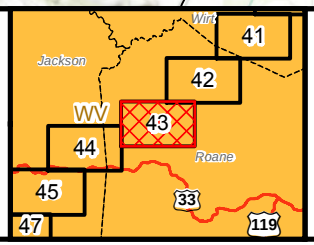
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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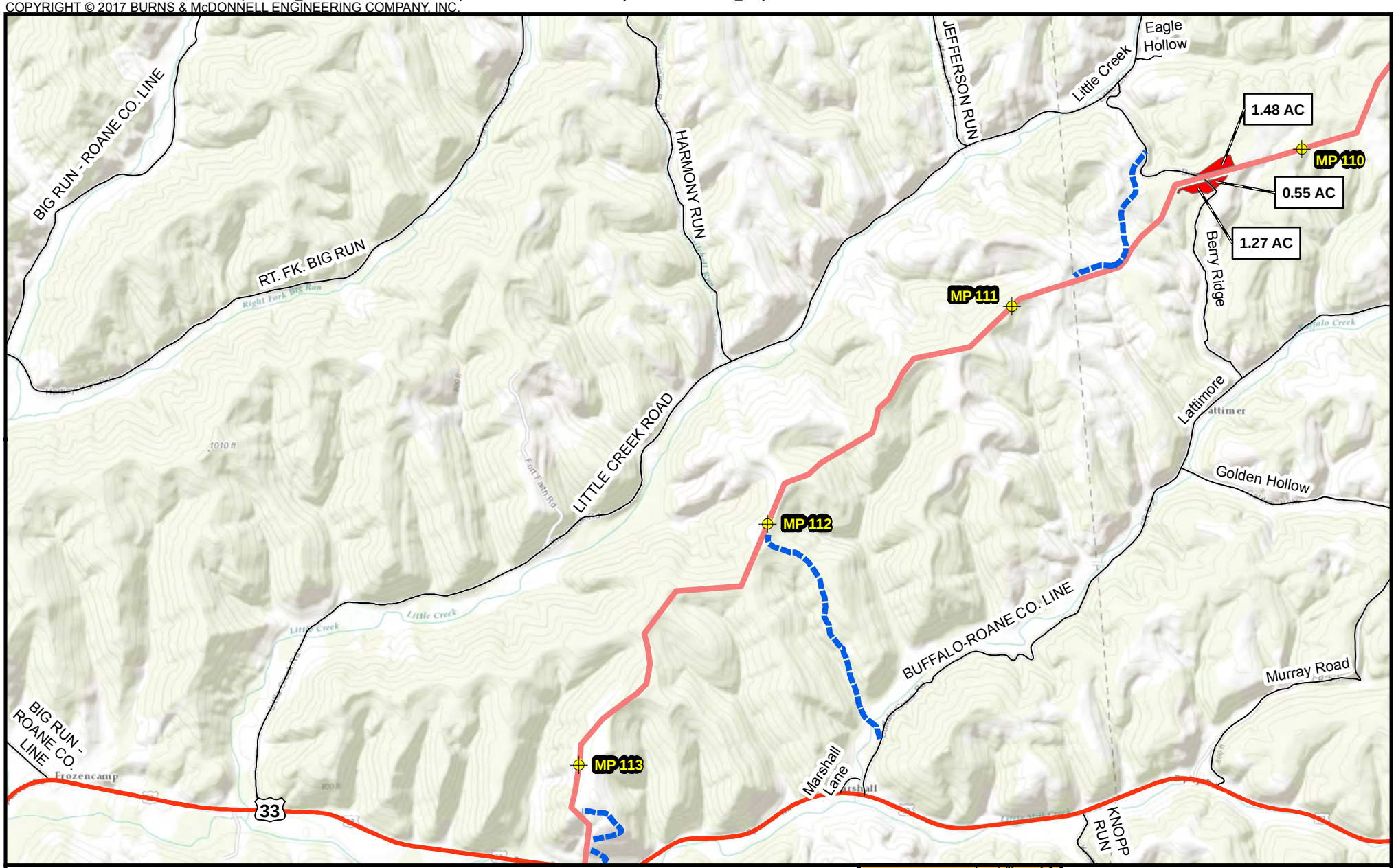


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

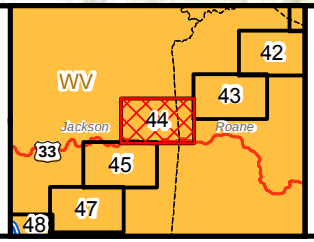
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

Issued: 3/16/2017

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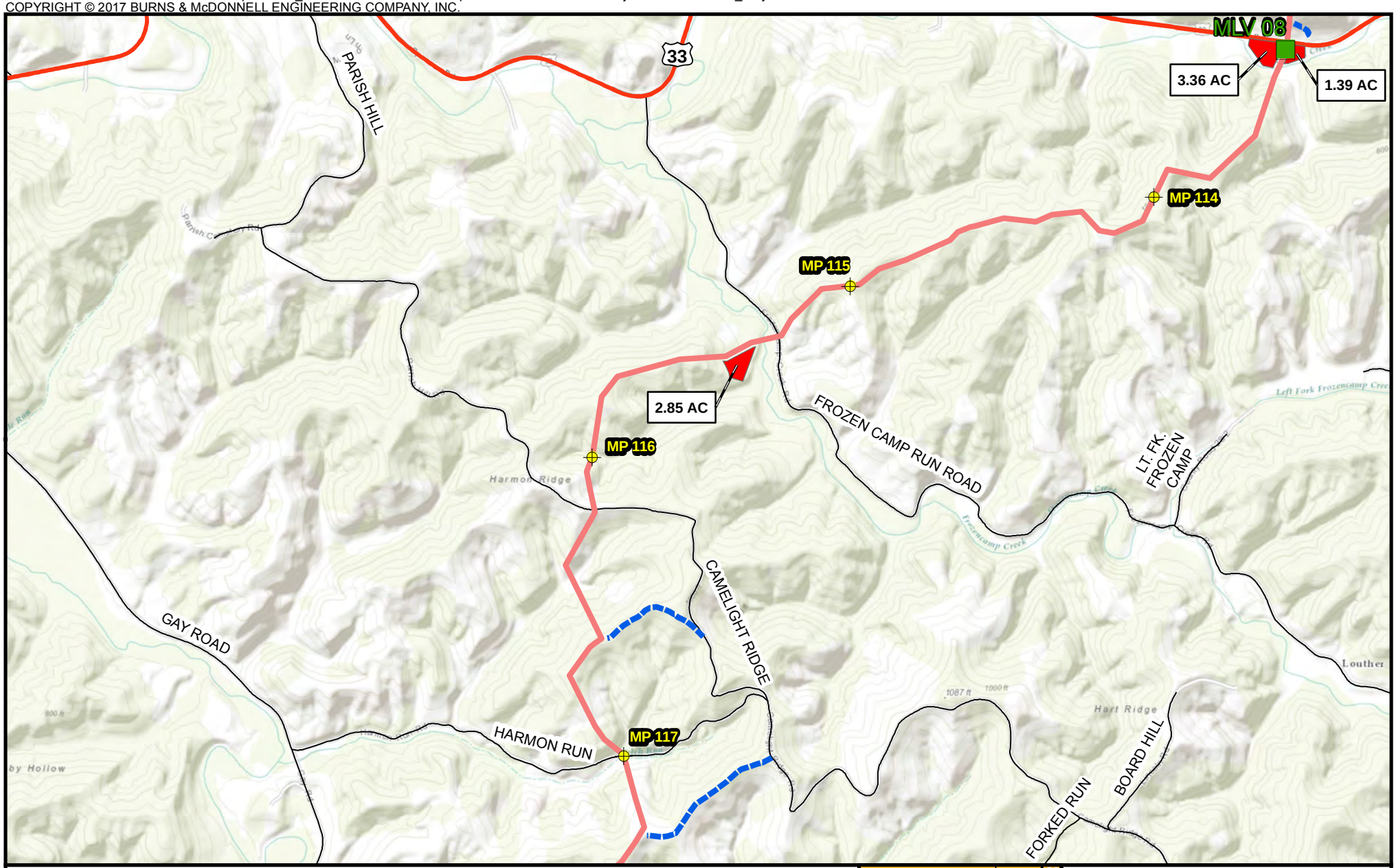


Milepost

Mainline Valve

Access Road

Pipe\Contractor Yard, Staging Area

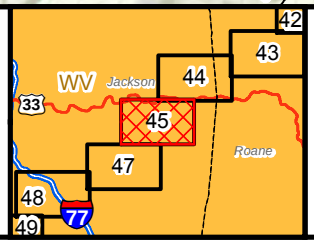
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

Issued: 3/16/2017

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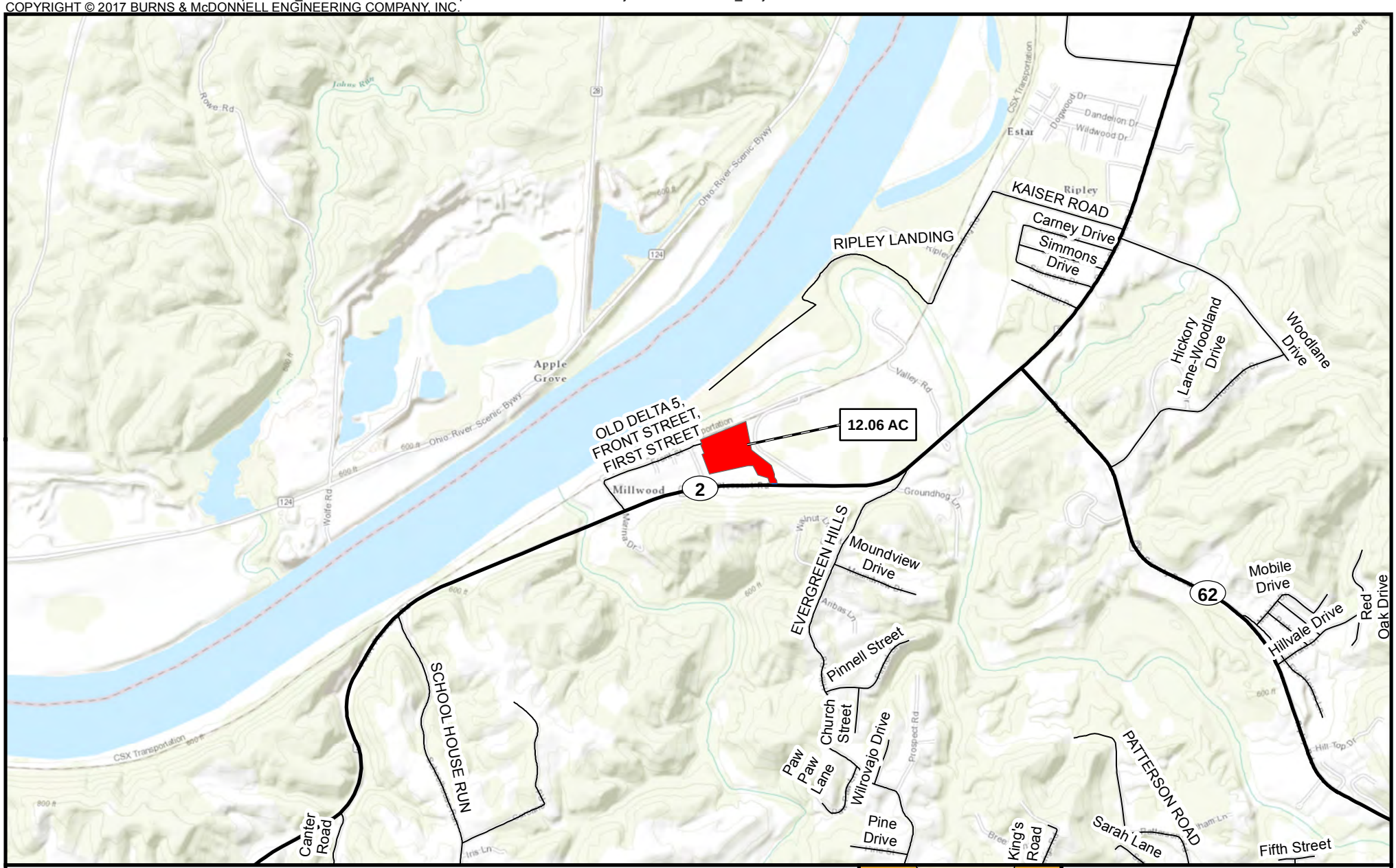

Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet

Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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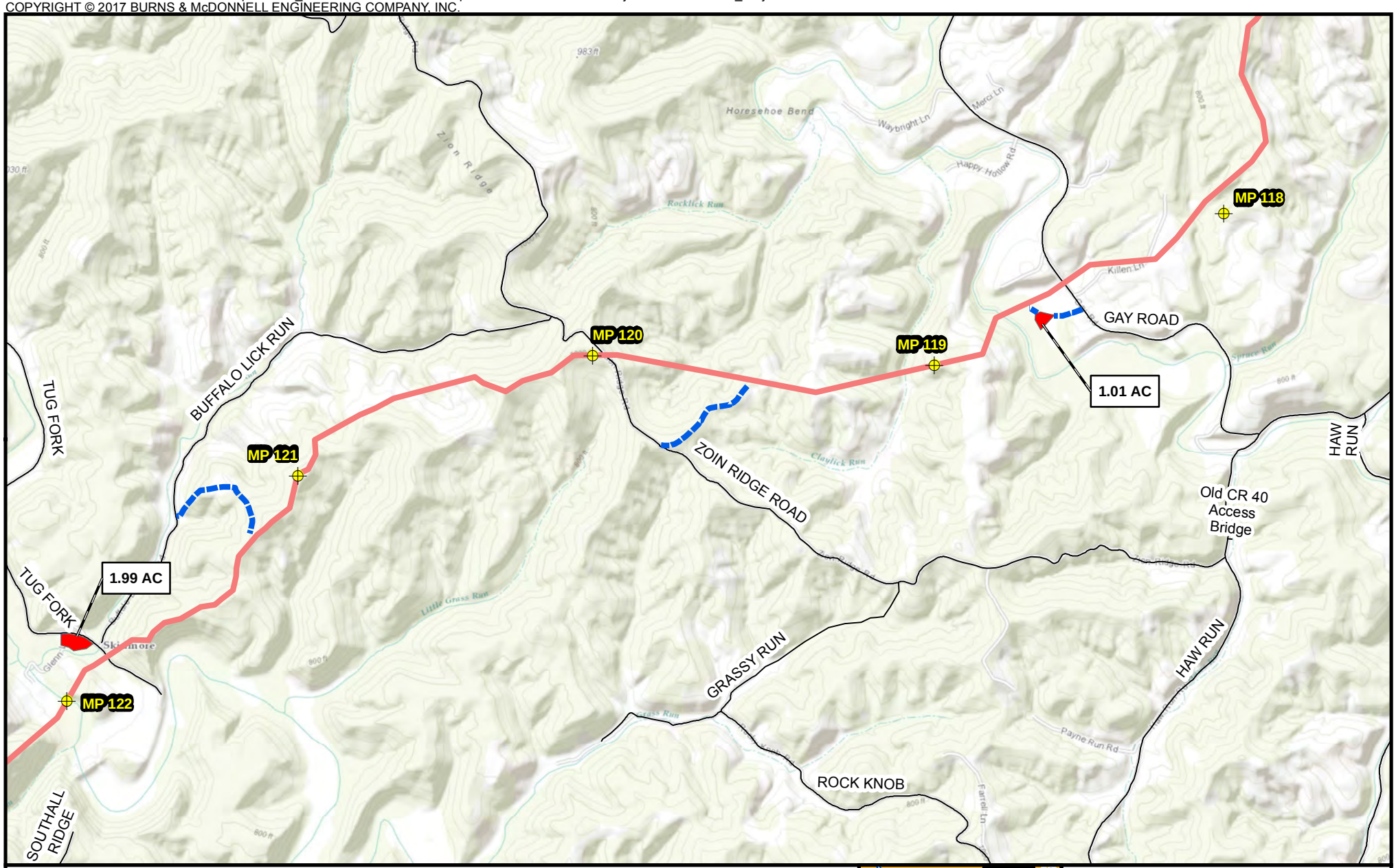


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

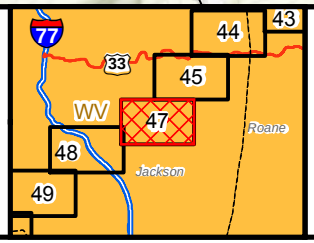
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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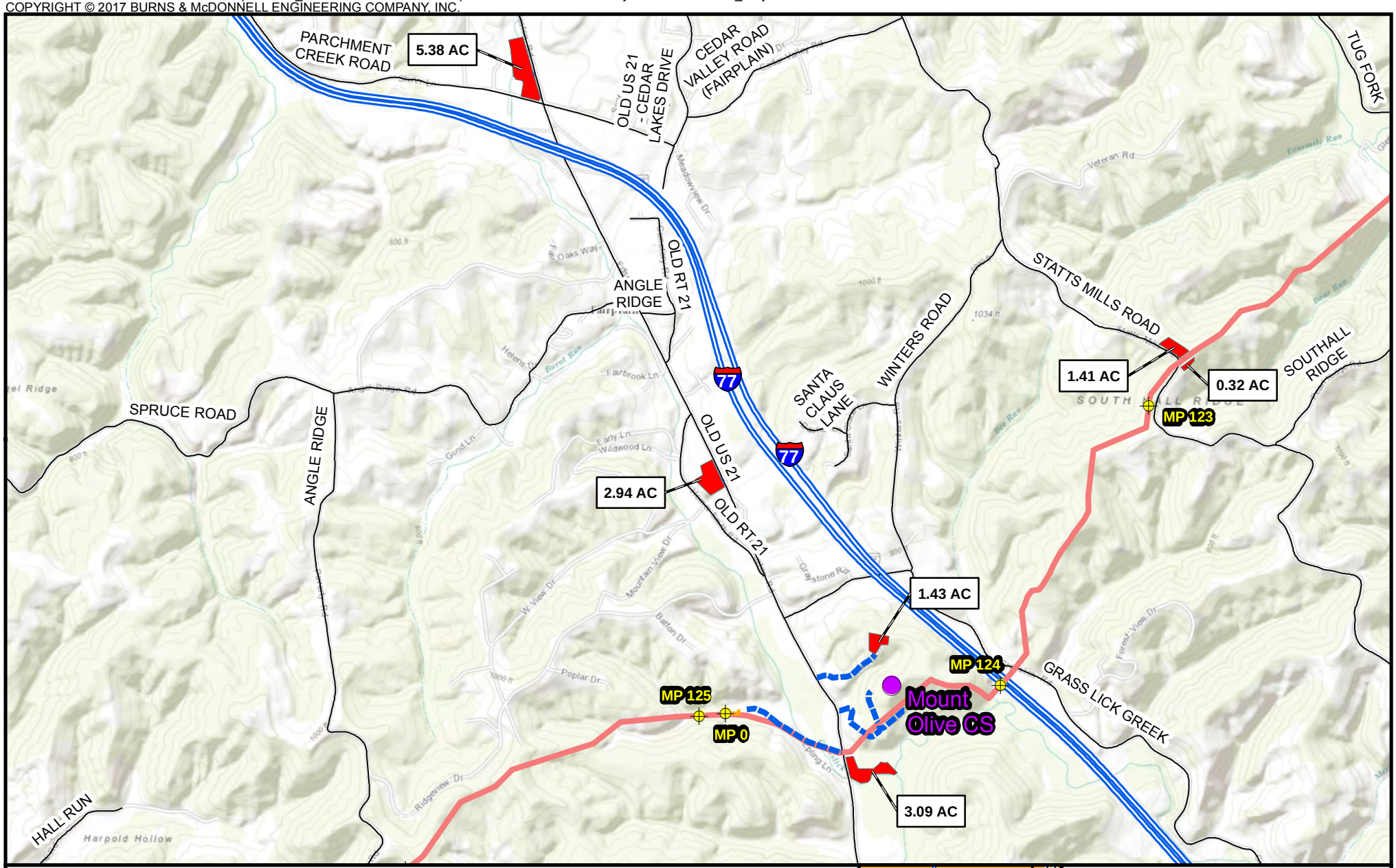
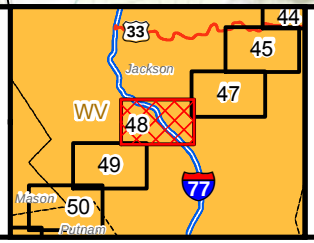


Milepost
Compressor Station
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100
X59M1 Line

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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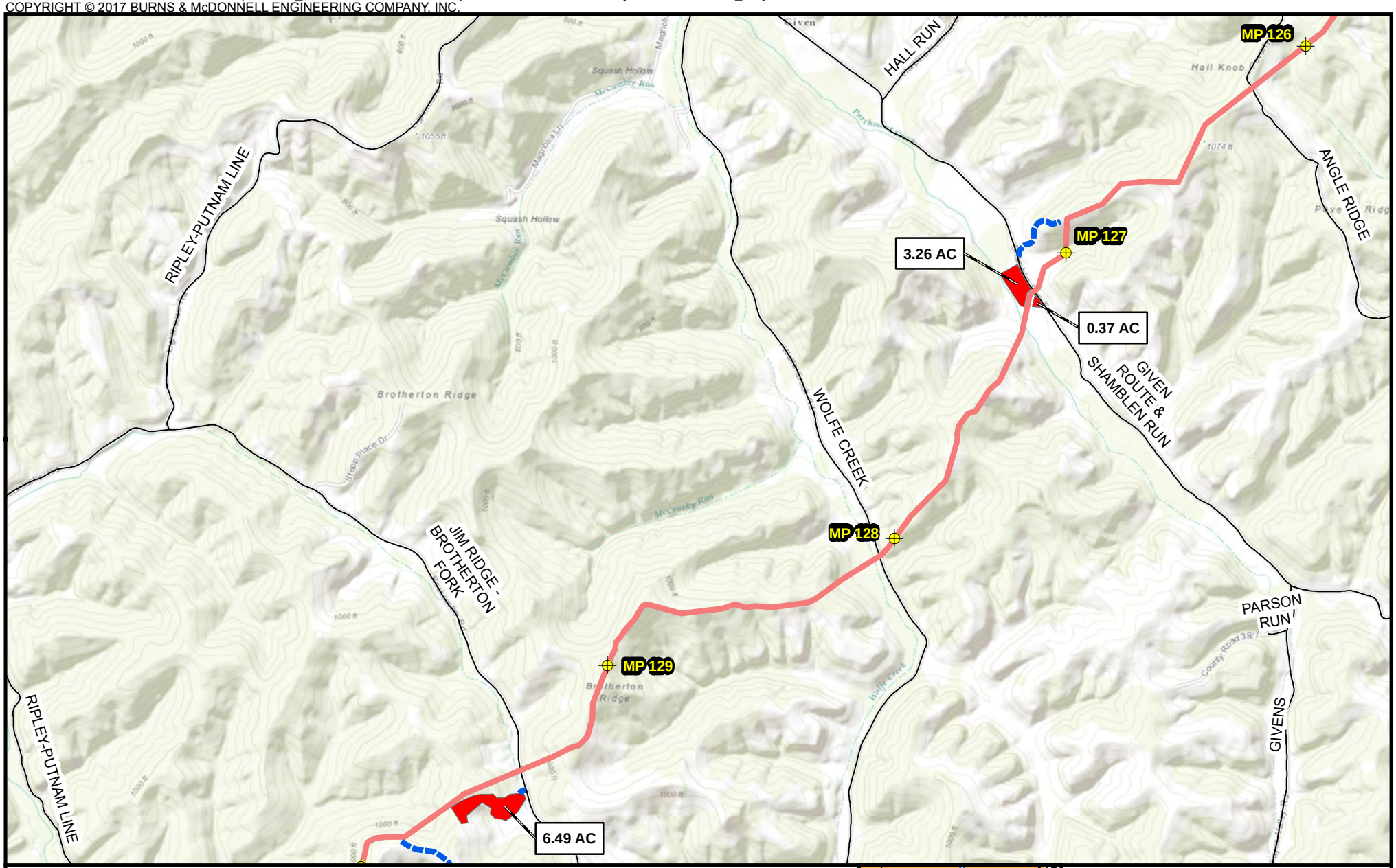


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

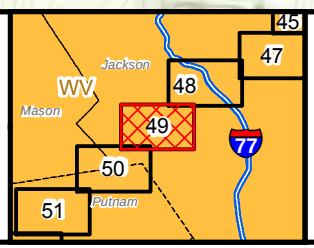
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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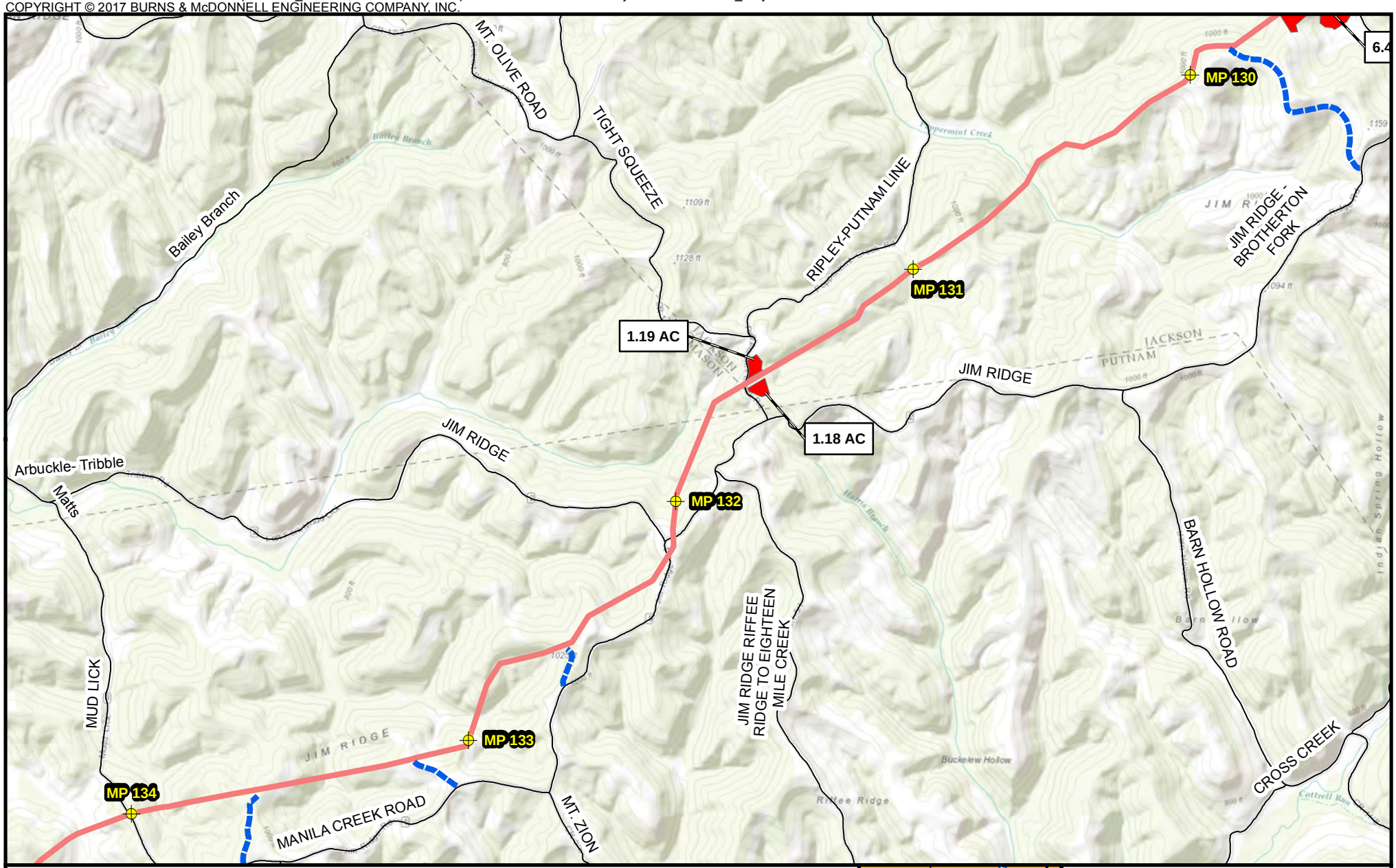


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

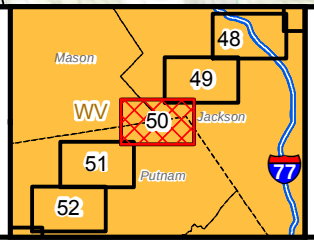
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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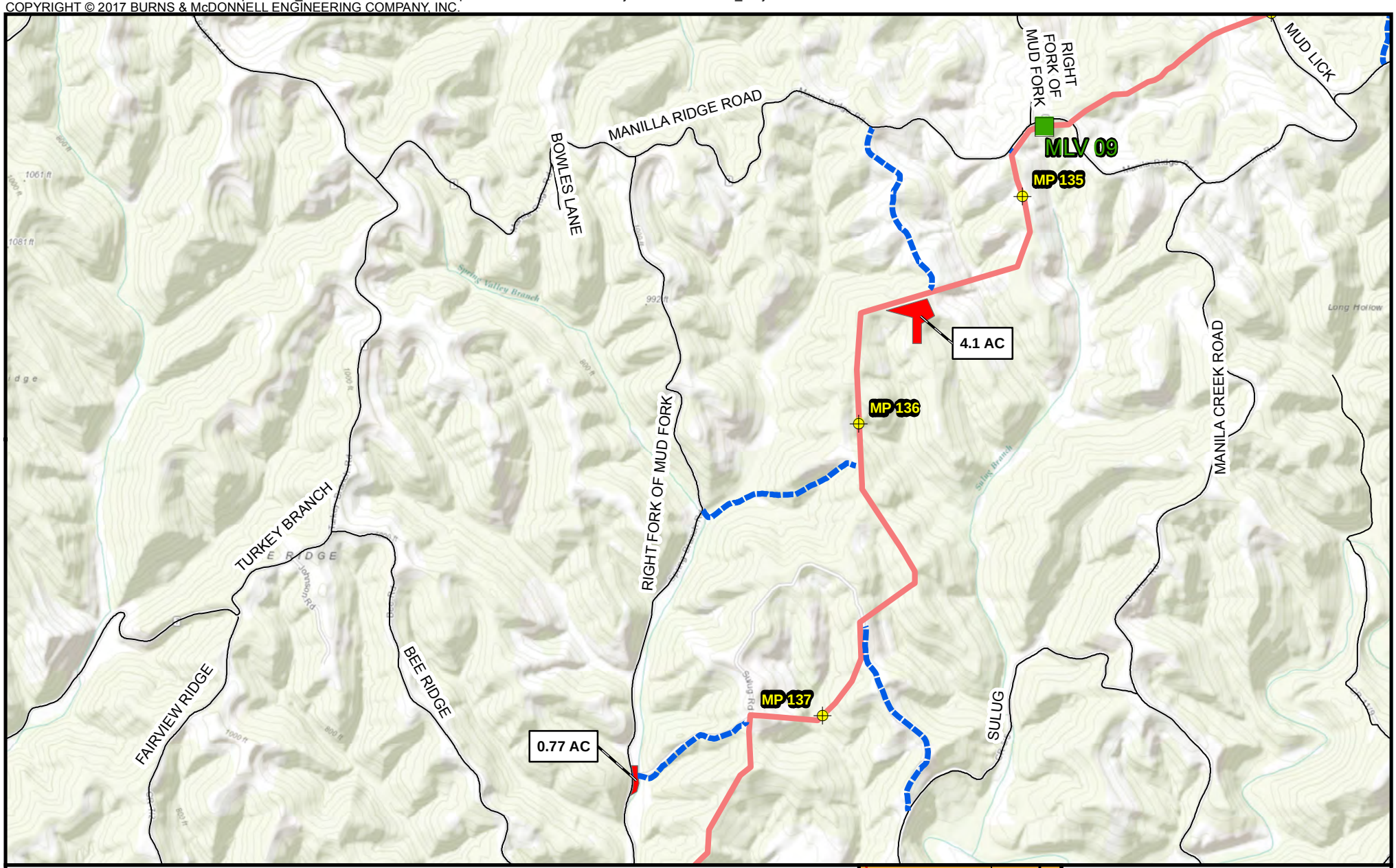
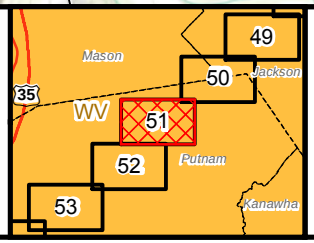


Milepost
Mainline Valve
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

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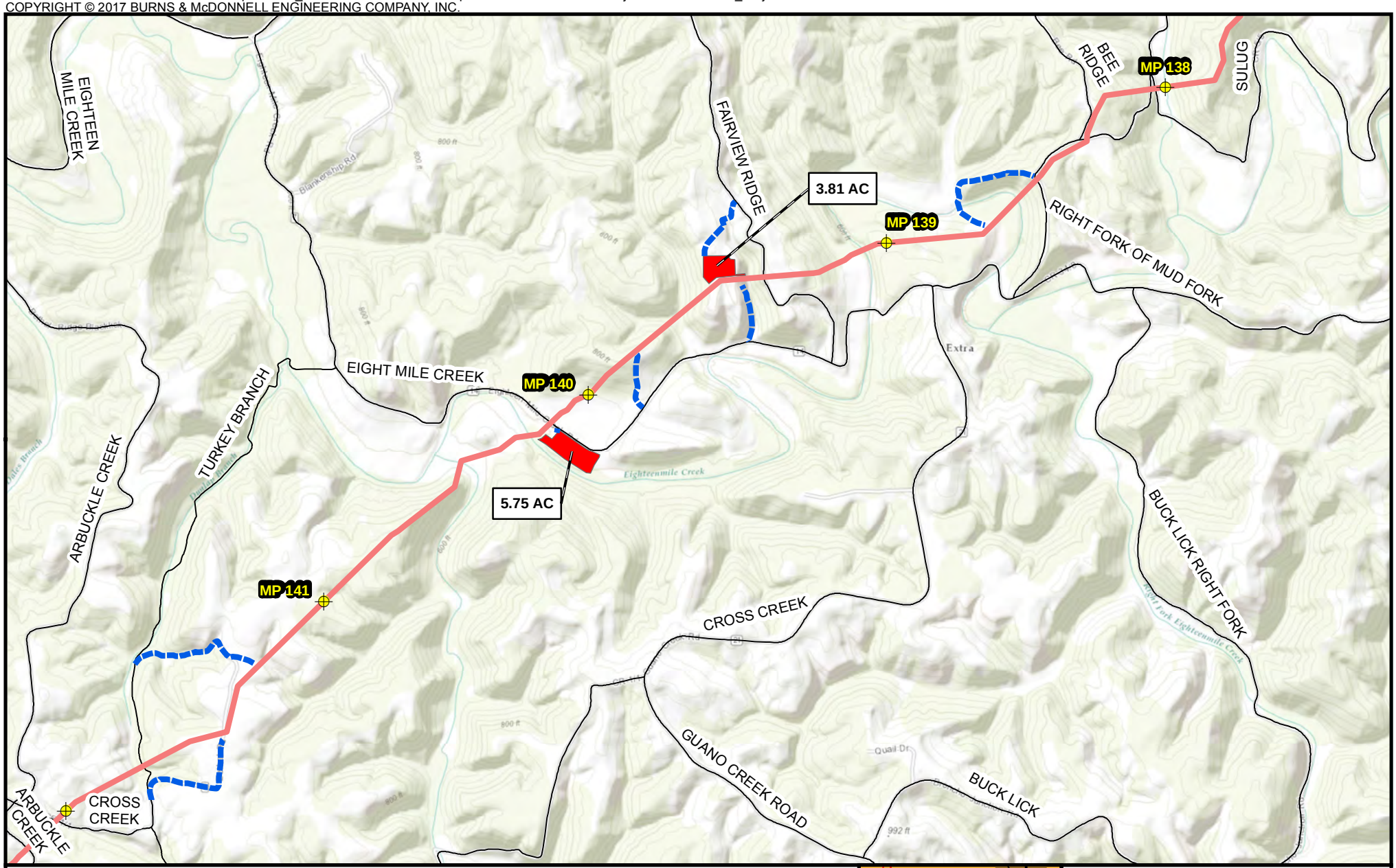


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

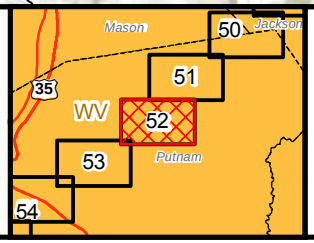
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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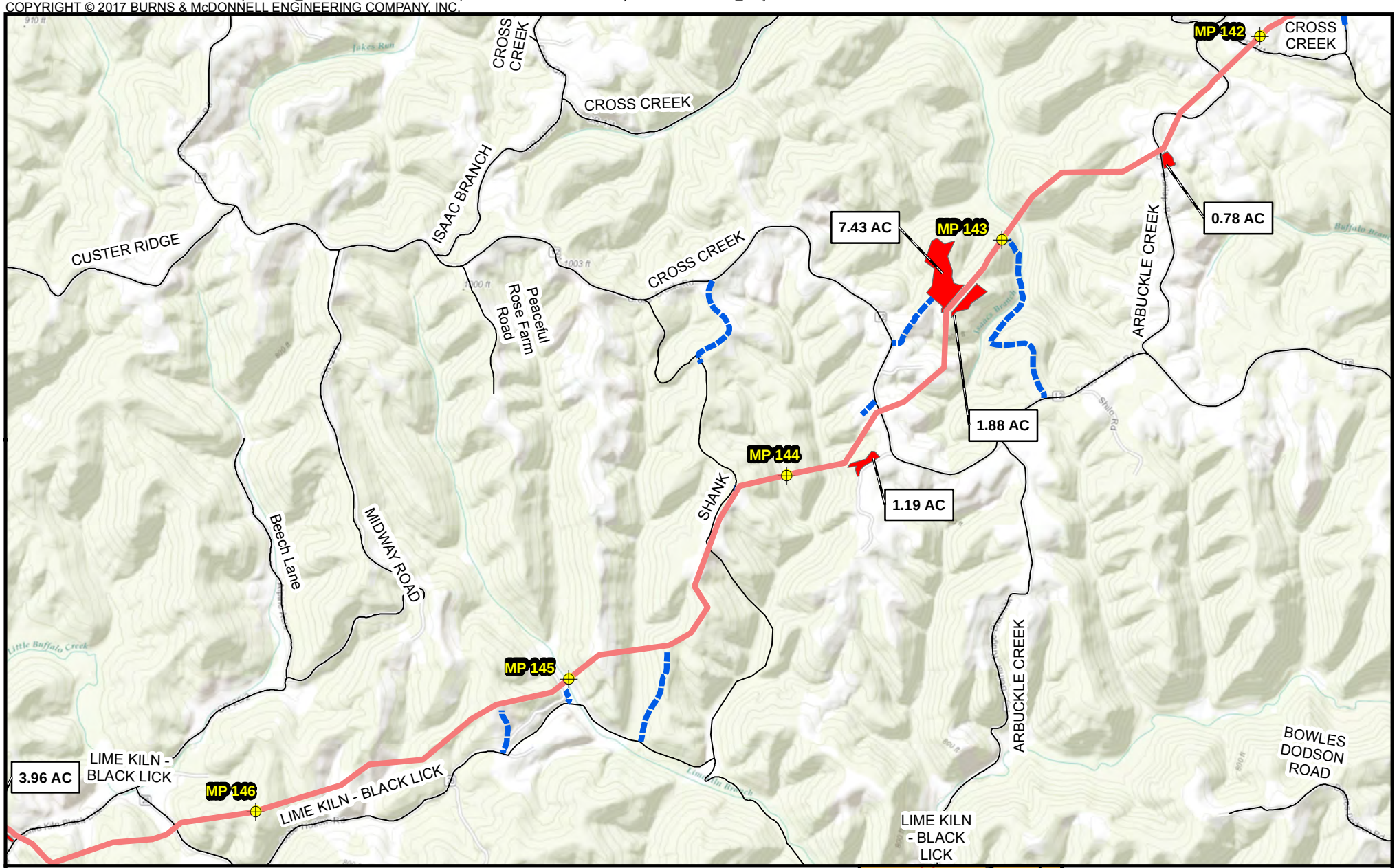


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

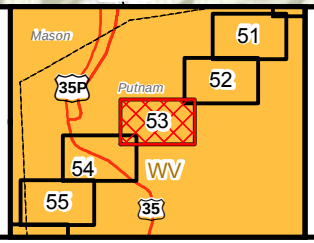
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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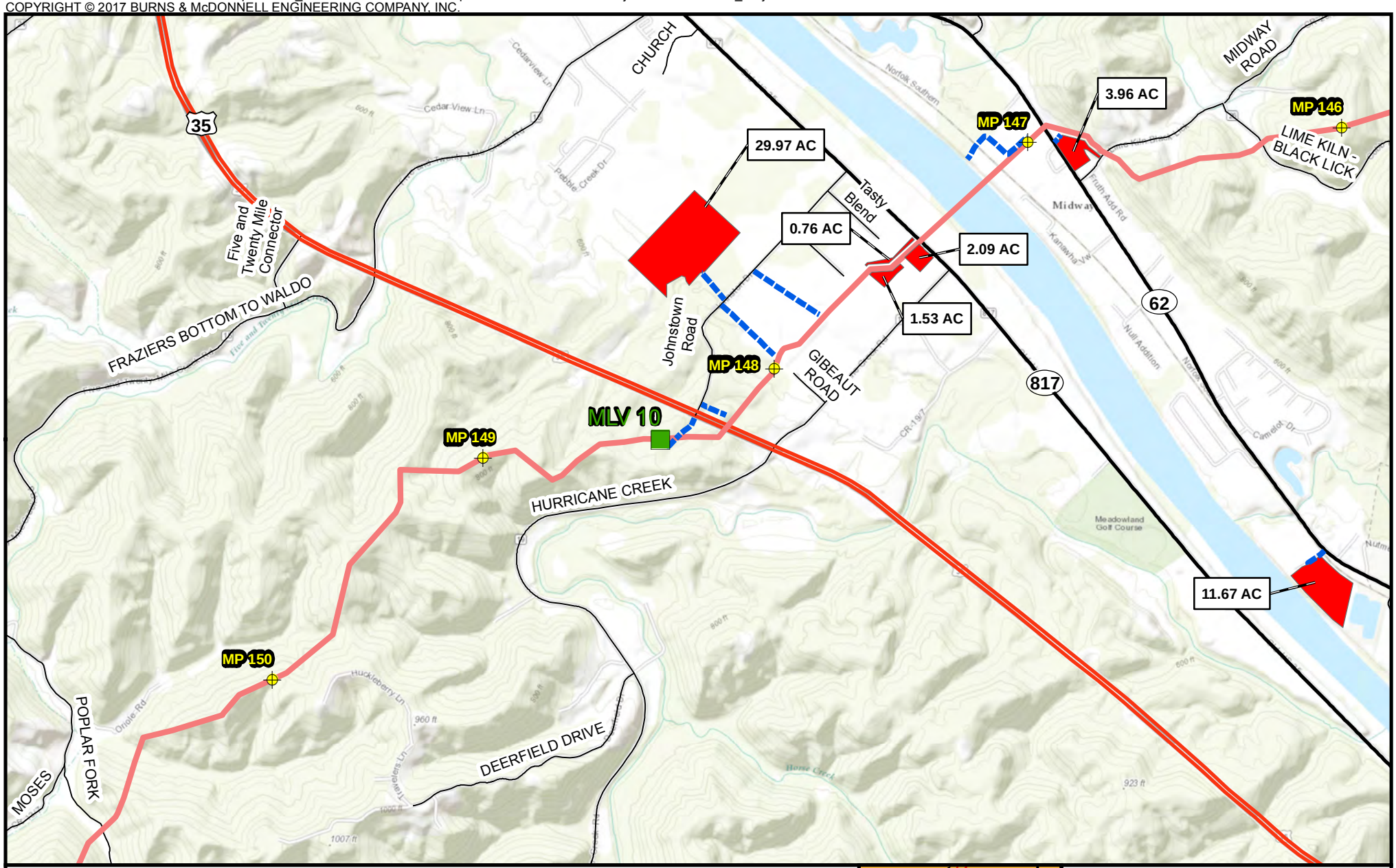
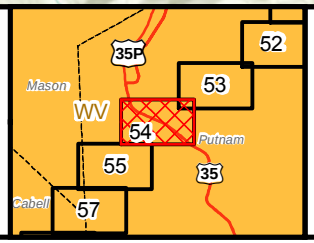


Milepost
Mainline Valve
Access Road
Pipe\Contractor Yard, Staging Area

Proposed Pipeline
MXP-100

NORTH
2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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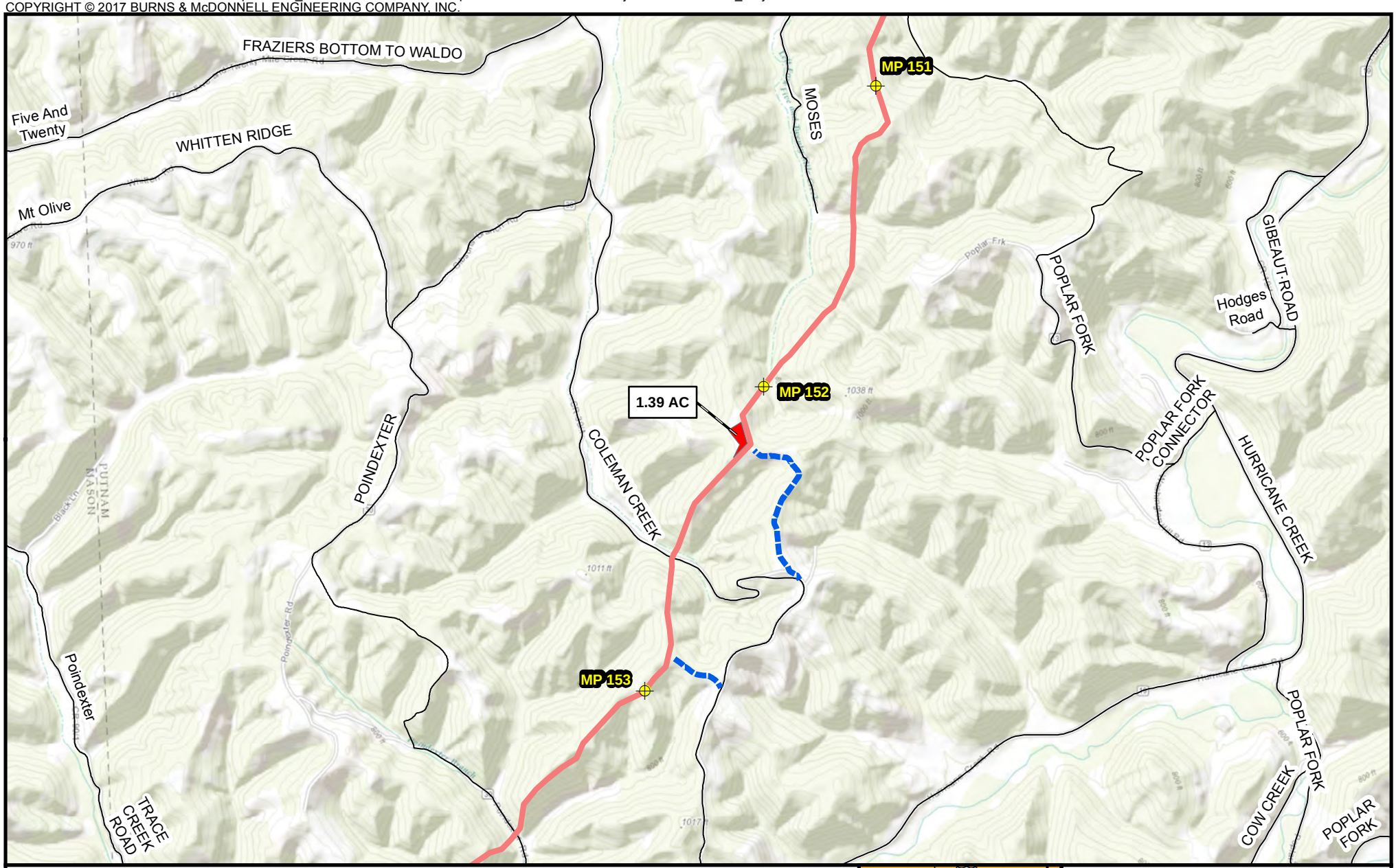


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

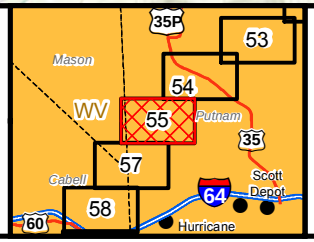
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
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Issued: 3/16/2017

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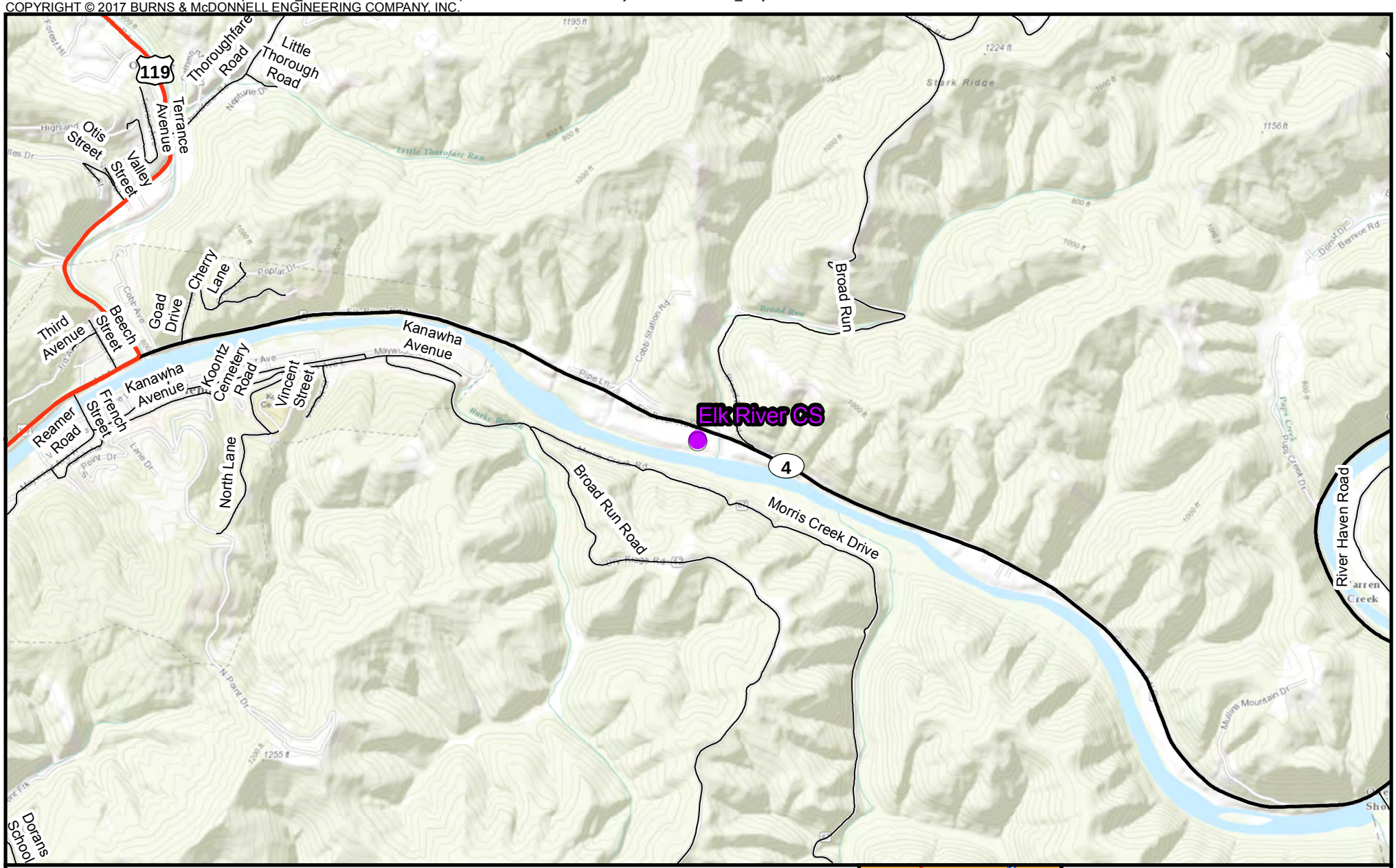
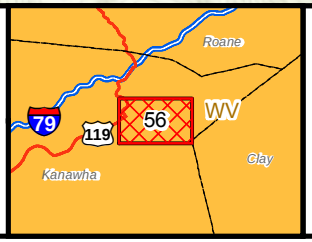


Compressor Station

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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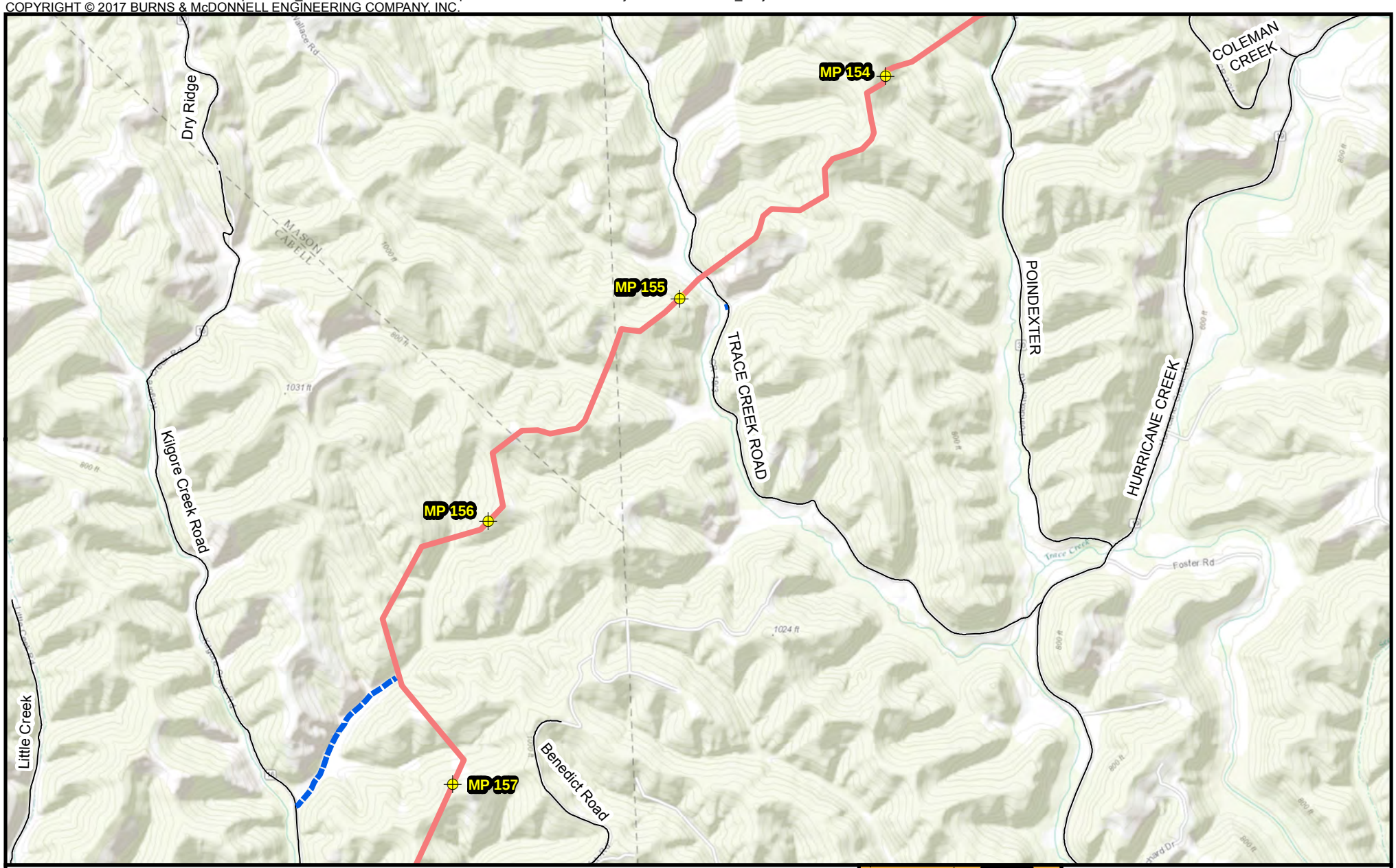
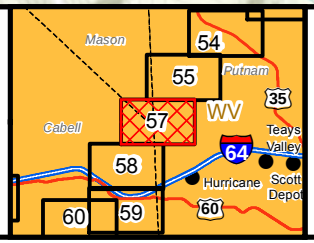


Milepost
Access Road

Proposed Pipeline
MXP-100

NORTH

2,000 1,000 0
Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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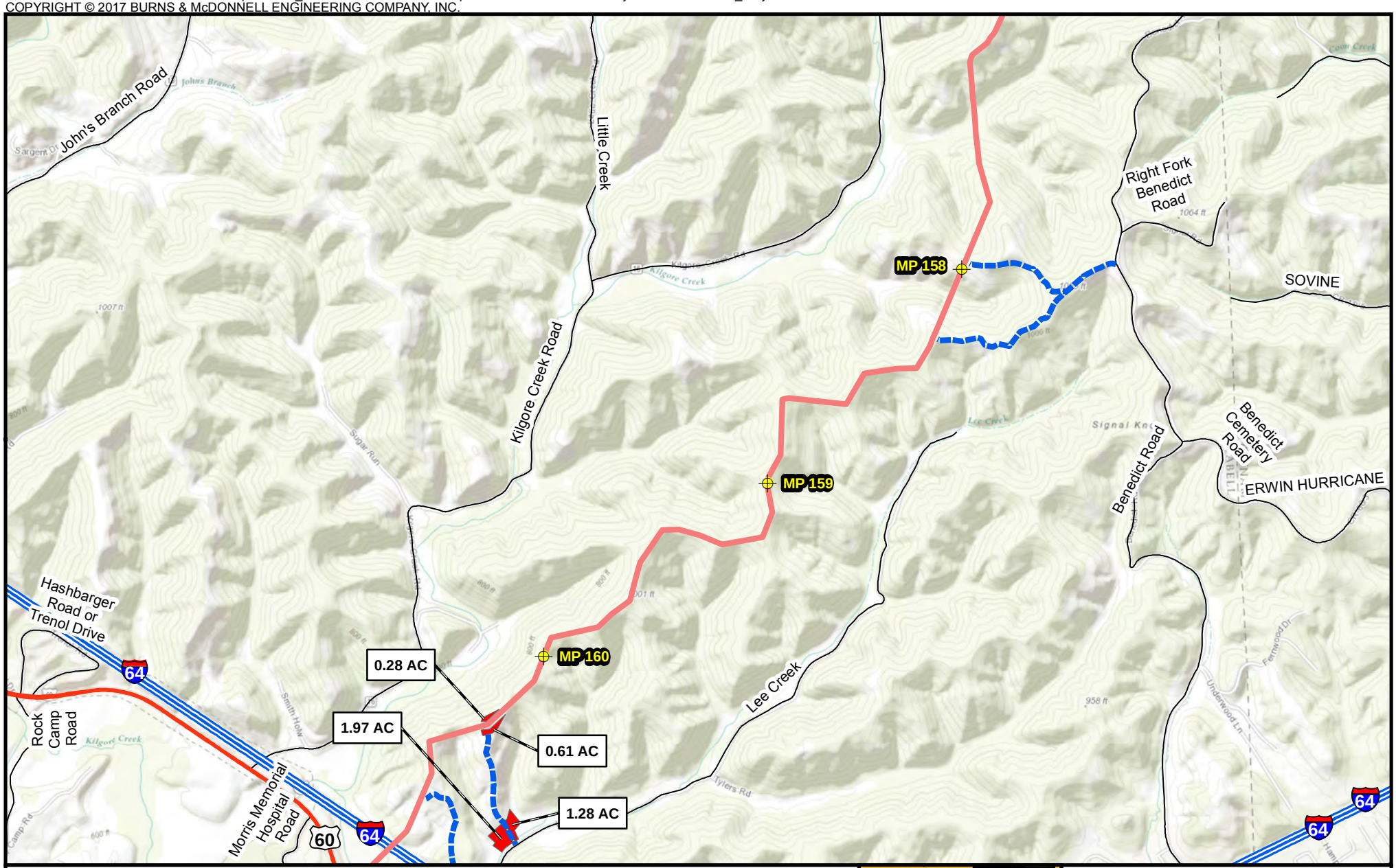


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

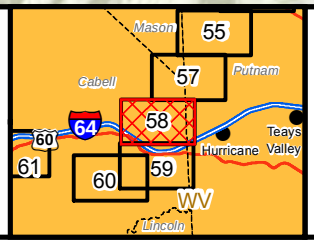
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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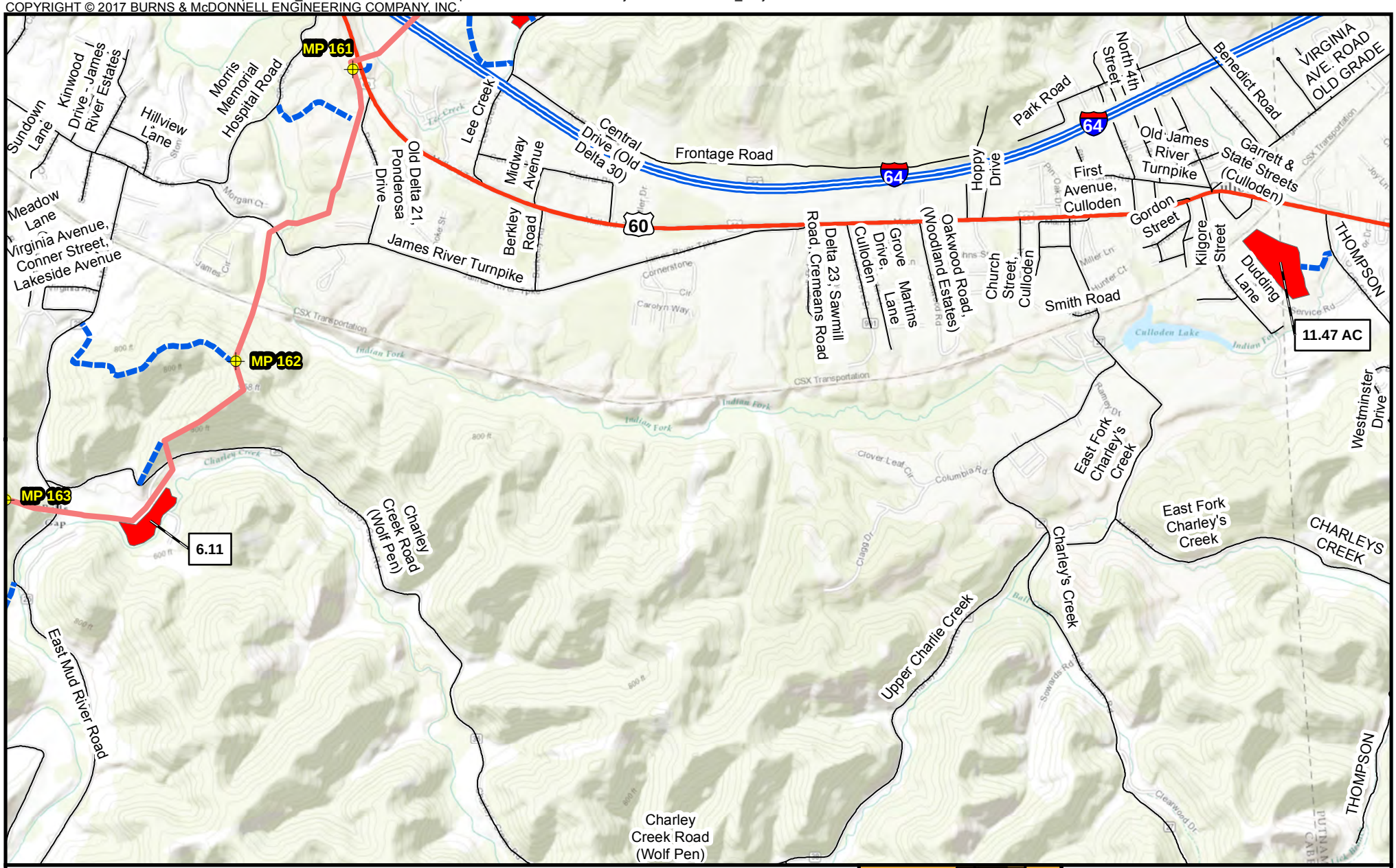


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

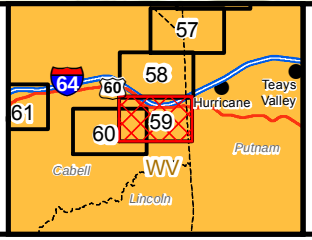
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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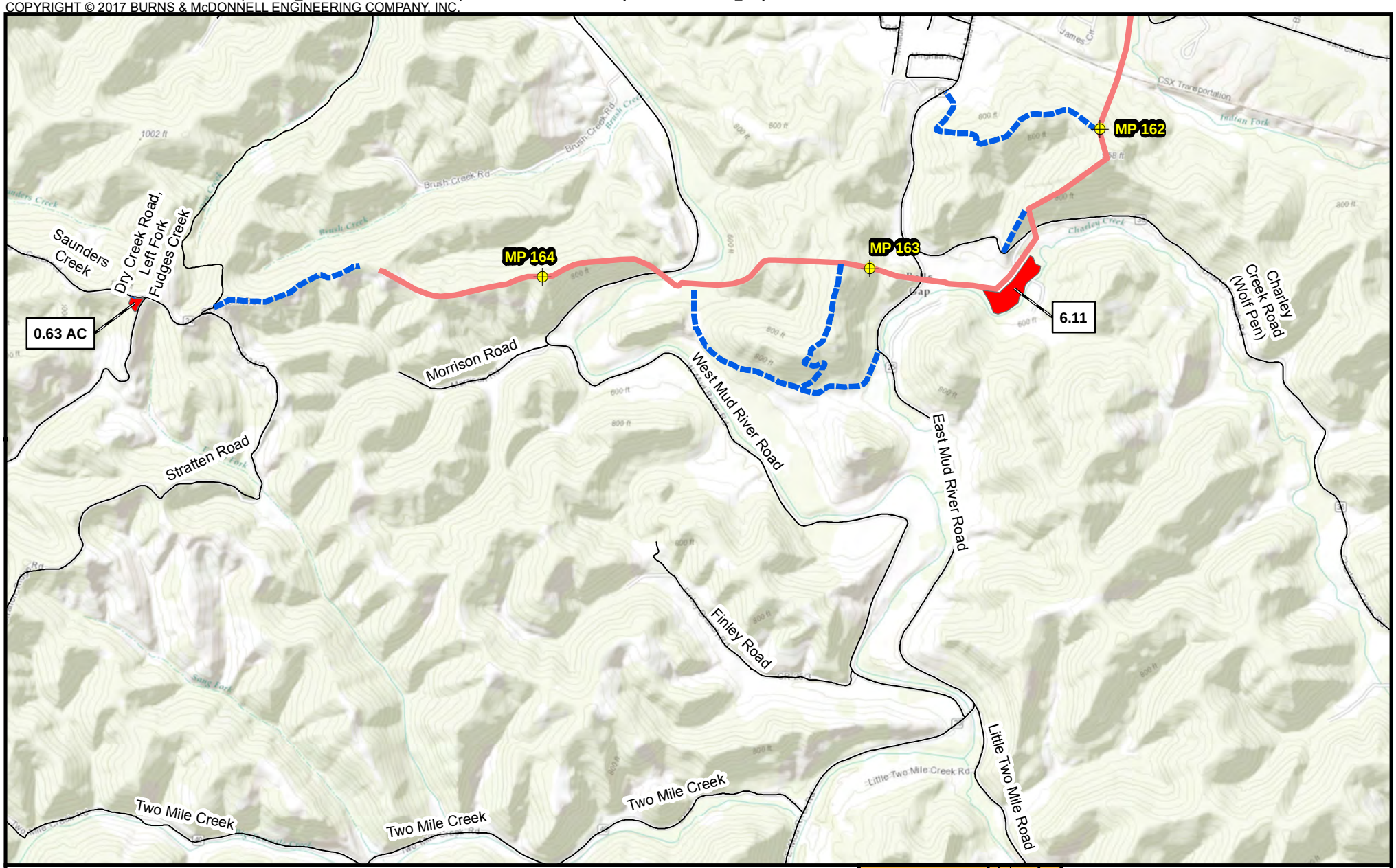


Milepost

Access Road

Pipe\Contractor Yard, Staging Area

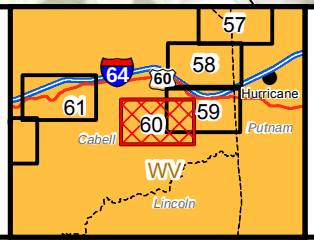
Proposed Pipeline

MXP-100

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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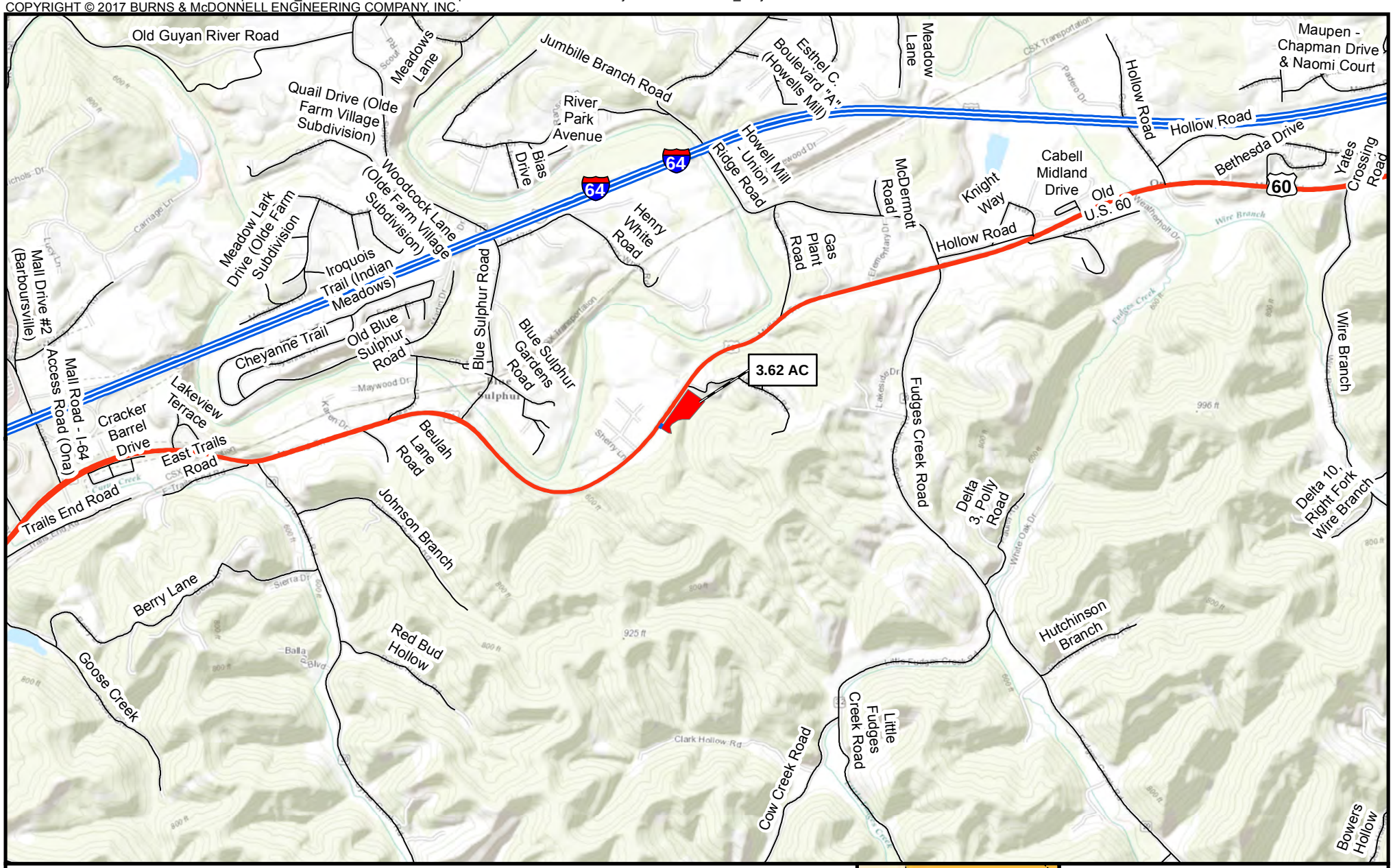


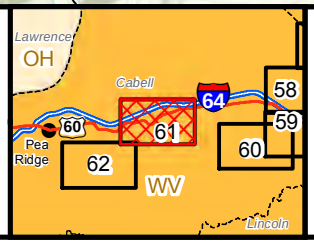
Access Road

Pipe\Contractor Yard, Staging Area

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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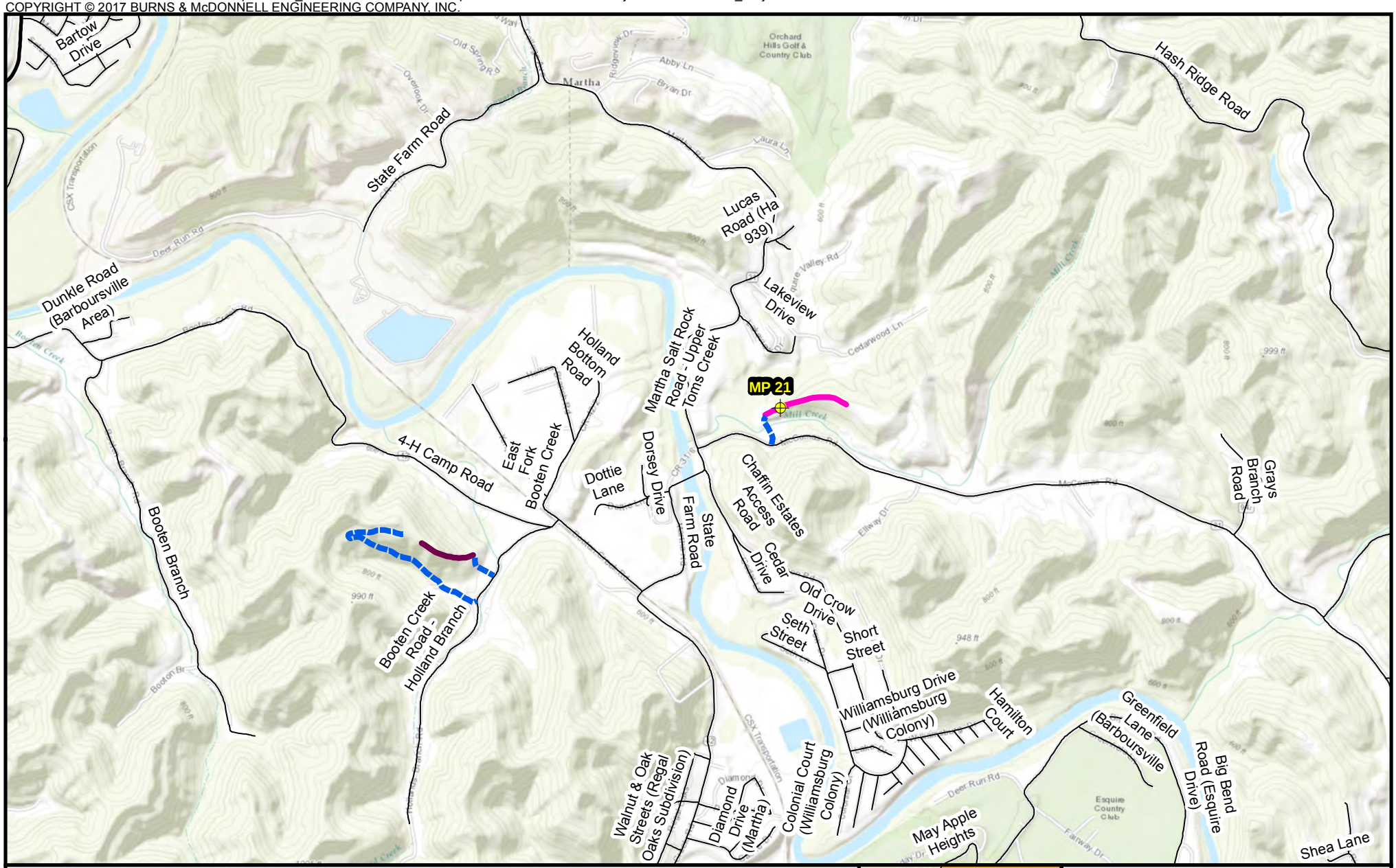

Milepost

Access Road

Proposed Pipeline

SM-80 Line Replacement

SM-80 Loop Line Replacement

NORTH

2,000 1,000 0

Scale in Feet

Appendix B-1
Mountaineer XPress Project
Project Overview Map
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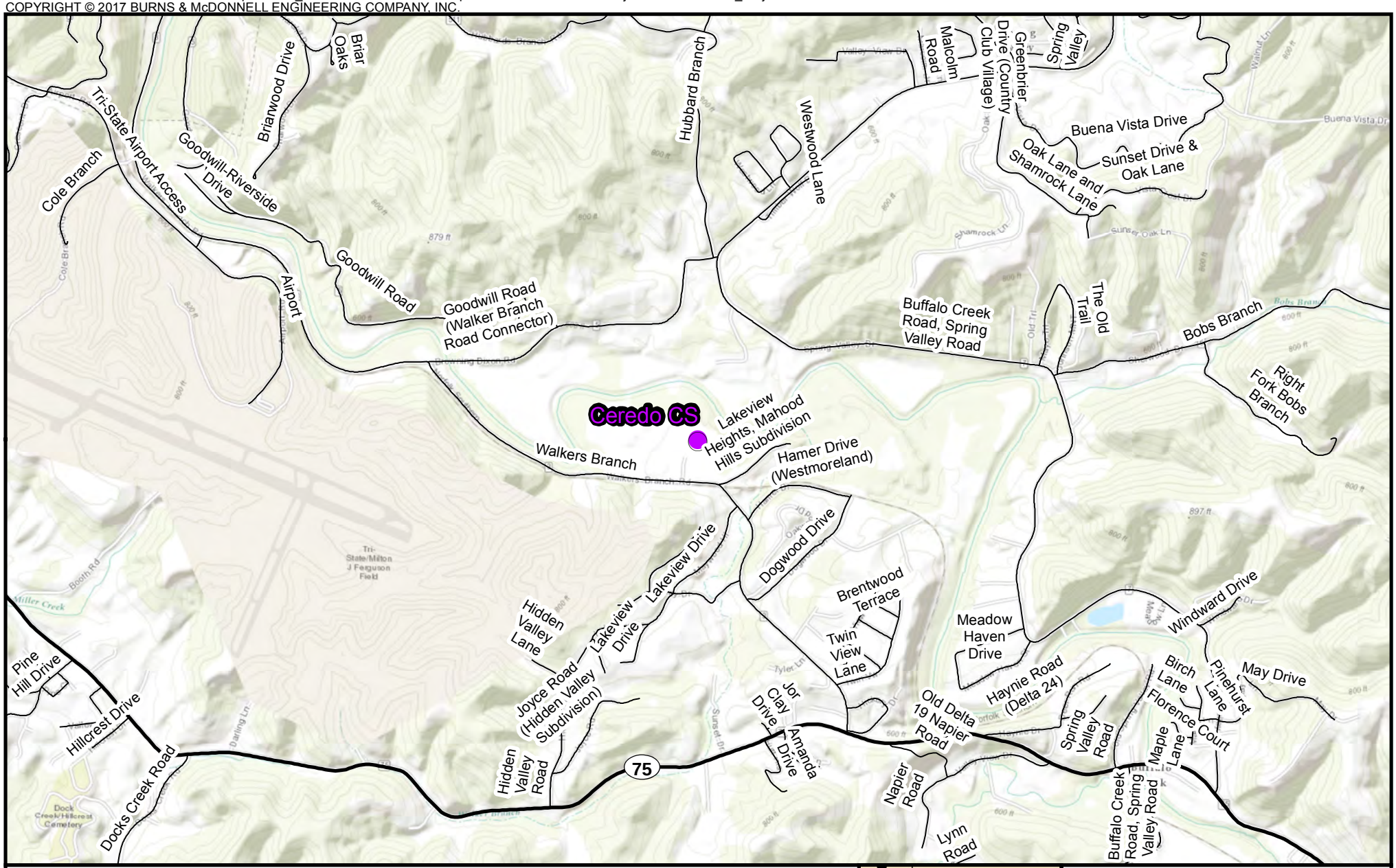
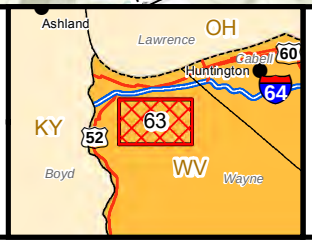


Compressor Station

NORTH

2,000 1,000 0

Scale in Feet



Appendix B-1
Mountaineer XPress Project
Project Overview Map
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Source: Columbia Pipeline Group and Burns & McDonnell Engineering Company, Inc.

Mountaineer XPress Project

Site-specific Stream and Highway Crossing Drawings

DRAWING NUMBER	ISSUE
D6987-ALG-COV	P3

Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

PROPOSED 36" PL-MXP-100 PIPELINE
ENGINEERING SERVICES DESIGN; JOB NUMBER 6987
SITE SPECIFIC STREAM & HIGHWAY CROSSINGS - COVER SHEET

D6987-SWD-006	PL-MXP-100 - RIVER CROSSING - KANAWHA RIVER MP 147.2 - PUTNAM COUNTY, WV	P6
D6987-SWD-007	PL-MXP-100 - RIVER CROSSING - BUCKEYE CREEK MP 48.5 - DODDRIDGE COUNTY, WV	P1
D6987-HXP-001	PL-MXP-100 - ROAD CROSSING - US HIGHWAY 50 MP 48.4 - DODDRIDGE COUNTY, WV	P7
D6987-SWD-008	PL-MXP-100 - RIVER CROSSING - MUD RIVER MP 163.6 - CABELL COUNTY, WV	P1

ISSUED FOR FERC SUPPL
02/17/2017

NON-SCALED

DESIGN PRESSURE ___ PSIG AT ___ °F (___ DESIGN FACTOR), MAXIMUM HOOP STRESS LEVEL AT ___ PSIG ___ % SMYS, BASED ON _____.
MAOP OF ___ PSIG AT ___ °F IS LIMITED BY _____.
MINIMUM TEST PRESSURE ___ PSIG, MAXIMUM TEST PRESSURE ___ PSIG.
TEST LIMITED BY _____, TEST PERIOD ___ HOURS.
TEST MEDIUM _____, SERVICE _____.
NONDESTRUCTIVE INSPECTION REQUIREMENTS _____.

CERTIFICATE
TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE COLUMBIA GUIDELINES AND SPECIFICATIONS.

DESIGN ENGINEER — DATE

NOTE: ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER.

NO.	REVISIONS	BY	DATE
1	–		
1	–		
1	–		
2	–	JHE	02/17/17
2	ISSUED FOR FERC SUPPL FILING	SJS	02/17/17
2	–	TLJ	02/17/17
2	–	JHE	10/09/16
2	ISSUED FOR FERC SUPPL FILING	SJS	10/09/16
2	–	TLJ	10/09/16
3	–	JHE	05/09/16
3	ISSUED FOR 50% REVIEW	SJS	05/09/16
3	–	TLJ	05/09/16
P	–	JHE	04/29/16
P	ISSUED FOR FERC FILING	GPM	04/29/16
P	–	TLJ	04/29/16

DWG. NO.	REFERENCE
–	–
–	–

PROJECT DELIVERY
PROJECT ENGINEERING
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

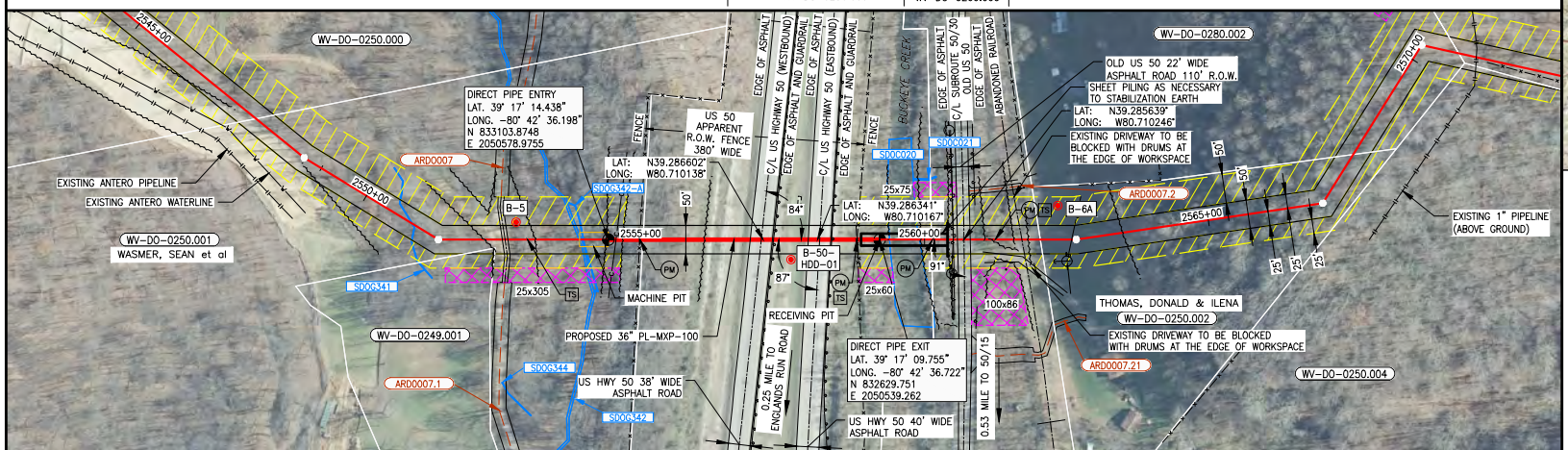
TITLE: PL-MXP-100 PIPELINE
SITE SPECIFIC STREAM & HIGHWAY CROSSING COVER

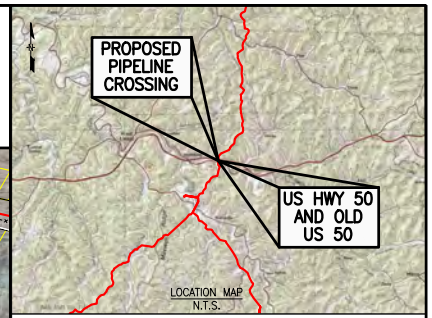
DRAWN BY: GMB | DATE: 03-13-2017 | PROJECT NUMBER: 6987 | W.O. NUMBER: 46130

DRAWING NUMBER: D6987-SWD-COV | ISSUE: P3

Appendix V
Page 2 of 2

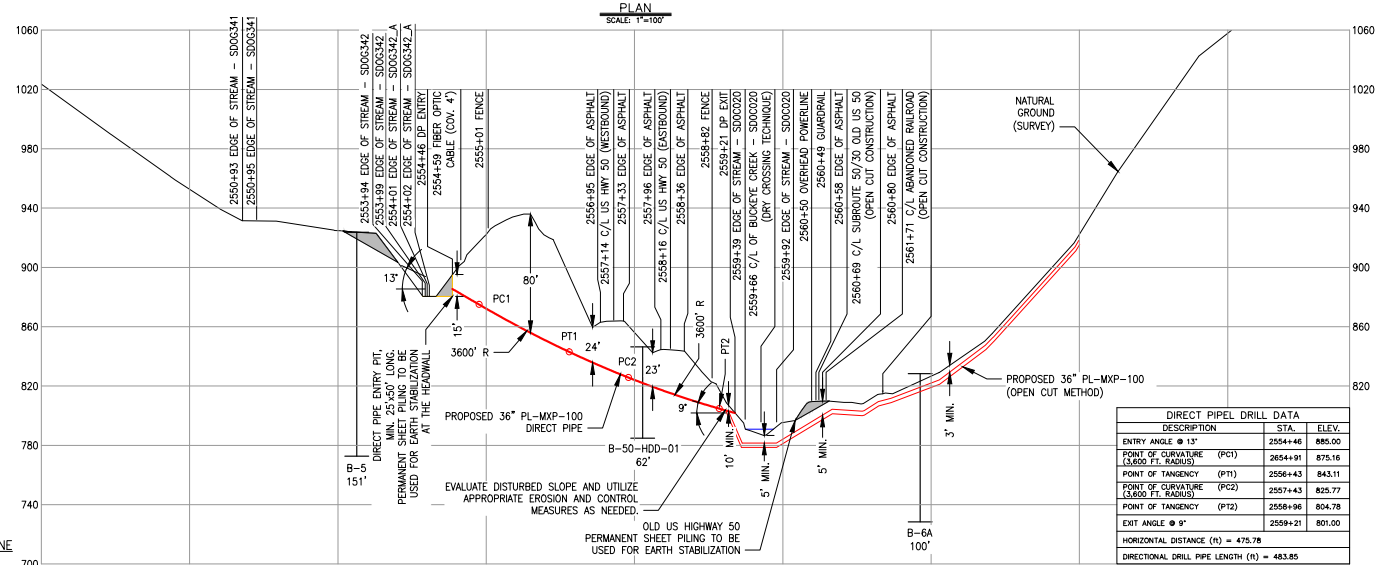
DODDRIDGE COUNTY, WEST VIRGINIA





PLAN

SCALE: 1"=100'



US HWY 50 DIRECT PIPE UNCASED CROSSING
PIPE SPECIFICATIONS
Size – 36" NOM. O.D.
Material – Steel
Wall Thickness – 0.750"
Material Grade – X70
MAOP – 1440 psig
Design Factor – 0.5
Pipe Coating – 14-16 MILS FBE and 30-60 MILS ARO

OLD US 50 UNCASED CROSSING
PIPE SPECIFICATIONS
Size – 36" NOM. O.D.
Material – Steel
Wall Thickness – 0.750"
Material Grade – X70
MAOP – 1440 psig
Design Factor – 0.5
Pipe Coating – 14-16 MILS FBE and 30-60 MILS ARO

24/7 CONTACT AND PIPELINE MARKER INFO
Columbia Pipeline Group
P.O. Box 1273
Charleston, WV 25325-1273
Emergency Phone: 1-800-835-7191

DIRECT PIPEL DRILL DATA

DESCRIPTION	STA.	ELEV.
ENTRY ANGLE @ 13°	2554+46	885.00
POINT OF CURVATURE (PC1) (3,600 FT. RADIUS)	2654+91	875.16
POINT OF TANGENCY (PT1)	2556+43	843.11
POINT OF CURVATURE (PC2) (3,600 FT. RADIUS)	2557+43	825.77
POINT OF TANGENCY (PT2)	2558+96	804.78
EXIT ANGLE @ 9°	2559+21	801.00
HORIZONTAL DISTANCE (ft) = 475.78		
DIRECTIONAL DRILL PIPE LENGTH (ft) = 483.85		

PROFILE

HORIZ. SCALE: 1"=100'
VERT. SCALE: 1"=40'

PIPELINE CROSSING @ US HWY 50 MP 12.09
LATITUDE: N39.286602°
LONGITUDE: W80.710138°

PIPELINE CROSSING @ OLD US 50 RD MP 13.97
LATITUDE: N39.285639°
LONGITUDE: W80.710246°

PROJECTION SYSTEM:
NAD83 STATE PLANE,
WEST VIRGINIA SOUTH (U.S. SURVEY FEET)

TRC PIPELINE SERVICES, LLC
2087 EAST 71ST STREET
TULSA, OK. 74136
(918) 496-0400
FIRM COA NO. C02358

DIRECT BORE CONSTRUCTION NOTES:

1. ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY OR FROM APPROVED ACCESS ROADS. NO VEHICULAR OR PEDESTRIAN TRAFFIC SHALL ENTER OR EXIT THE WORKSPACE FROM US 50.
2. WORK SPACE: MAXIMUM WORK SPACE LIMITS ARE DEPICTED, RESTRICT CLEARING TO THE WORK SPACE INDICATED AT THE ENTRY AND EXIT POINTS AND PRODUCT PIPE STRINGING AND FABRICATION AREA ALONG THE CONSTRUCTION RIGHT-OF-WAY.
3. WATER SOURCE: DRILL WATER AND HYDROSTATIC TEST WATER SHALL BE OBTAINED FROM AN APPROVED SOURCE.
4. HYDROSTATIC TEST: PRE-INSTALLATION HYDROSTATIC TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH THE HYDROSTATIC TEST PLAN. TEST WATER SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH PERMIT REQUIREMENTS. THE TEST WATER SHALL BE USED IN THE DRILLING PROCESS OR DISCHARGED IN AN UPLAND AREA INTO AN EROSION CONTROL STRUCTURE AND/OR SILT FENCES, GEOTEXTILE FILTER BAG, OR COLLECTED IN A TRUCK AND HAULED TO AN APPROVED DISPOSAL SITE, UPON COMPLETION OF DEWATERING AND DRYING, A CALIPER PIG SURVEY SHALL BE COMPLETED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
5. SPILL-PREVENTION: REFUELING OF ALL EQUIPMENT SHALL BE COMPLETED IN ACCORDANCE WITH THE SPCC PLAN.
6. EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
7. INSTALLATION: THE DIRECT PIPE SHALL BE COMPLETED USING A HERRENKNECHT 36" DIRECT PIPE MICROTUNNELING MACHINE. CONTRACTOR WILL CONTINUOUSLY MONITOR THRUST PRESSURE AND PIPE DEFLECTION TO AVOID OVERSTRESS OF THE PIPE. CONTRACTOR SHALL REPORT DAILY FEET OF PROGRESS, THRUST PRESSURES, VERTICAL AND HORIZONTAL DEFLECTION, AND VARIANCE FROM THE DESIGN CURVE.
8. DRILLING FLUID DISPOSAL: CONTRACTOR SHALL DISPOSE OF EXCESS DRILLING FLUID AS DIRECTED BY COLUMBIA'S REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS. UNDER NO CIRCUMSTANCES SHALL DRILLING FLUID BE DISPOSED OF IN WATER BODIES OR WETLANDS. ANY DRILLING FLUID WHICH INADVERTENTLY SURFACES AT POINTS OTHER THAN THE ENTRY OR EXIT POINTS SHALL BE CONTAINED AND COLLECTED TO THE EXTENT PRACTICABLE AND DISPOSED OF AS DIRECTED BY COLUMBIA'S REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS.
9. CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGINAL CONTOURS. DISTURBED AREAS SHALL BE SEEDED AS SPECIFIED IN THE CLEAN-UP AND RESTORATION REQUIREMENTS. IF THE TERRAIN ALLOWS AND ACCESS IS PERMITTED, CONTRACTOR SHALL UTILIZE LOW GROUND PRESSURE EQUIPMENT OR OTHER EQUIPMENT APPROVED BY COLUMBIA TO FACILITATE CONTAINMENT AND CLEAN-UP OF ANY INADVERTENT RETURNS THAT OCCUR DURING THE DIRECT PIPE INSTALLATION PROCESS.
10. CONTRACTOR IS RESPONSIBLE FOR CALLING WEST VIRGINIA ONE-CALL AND LOCATING ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION. IF ANY UTILITY IS LOCATED WITHIN 15 FEET OF THE DESIGNED DIRECT PIPE PROFILE AND ALIGNMENT, CONTRACTOR SHALL OBTAIN APPROVAL FROM COLUMBIA PRIOR TO INITIATING DIRECT PIPE OPERATIONS.
11. IT IS THE CONTRACTORS RESPONSIBILITY TO IDENTIFY AND PROTECT ANY FOREIGN UTILITY THAT MAY BE AFFECTED BY THE DIRECT PIPE OPERATIONS.
12. CONTRACTOR SHALL ADHERE TO THE SPECIFICATIONS AND REQUIREMENTS PER COLUMBIA'S SPECIFICATIONS, CONTRACT DOCUMENT AND SPECIAL PERMIT CONDITIONS, EXCEPT AS NOTED ON THIS DRAWING.
14. ACCESS TO THE RESIDENTS WILL BE CONSTRUCTED PRIOR TO CLOSURE OF OLD HWY 50. THIS ACCESS IS NOTED ON THE DRAWING AS ARD0007.2 AND ARD0007.21.
15. OLD HWY 50 WILL BE REPAIRED AND RECONSTRUCTED PER SHEET 2.
16. REFER TO PSI GEOTECHNICAL REPORTS DATED APRIL 15, 2016 FOR B-5 AND B-6A. AND SUPPLEMENTAL REPORT DATED NOVEMBER 14, 2016 FOR B-50-HDD-01.

WEST VIRGINIA DOH APP. NO.

Know what's below. Call before you dig.
CALL1-800-245-4848

LEGEND
HDD ENTRY/EXIT
BORE HOLE
FISH EXCLUSION NET
EQUIPMENT CROSSING BRIDGE
TRENCH PLUG
MATS
PROPOSED PIPE MARKER
TEST STATION
SILT FENCE
ABSORBENT BOOM
SAFETY BARRIER
TURBIDITY CURTAIN
WATERBAR

ISSUED FOR FERC SUPPL
02/17/2017

LEGEND
MILEPOST
ROUTE
EXISTING COLUMBIA PIPELINE
FOREIGN PIPELINE
PERMANENT ROW
FENCE
TEMPORARY WORKSPACE
ADDITIONAL TEMPORARY WORKSPACE
ACCESS ROAD
CONTRACTOR / PIPE YARD
ST-CO-001.0000 PROPERTY TRACT NUMBER
WPAD.0002 WETLAND ID
SPAD.0002 WATERBODY ID
ACCESS ROAD NUMBER
UNDERGROUND CABLE
OVERHEAD POWERLINE
WATERLINE
COUNTY BORDER
WETLAND
WATERBODY
SANITARY SEWER

SCALE: 1" = 100'
100' 50' 0' 100' 200'

No.	REVISIONS	APPROVED BY	DATE
2	ISSUED FOR FERC FILING	SJO	4/29/16
3	ISSUED FOR 50% REVIEW	SJO	5/9/16
4	ISSUED FOR FERC DATA REQUEST	SJO	9/8/16
5	ISSUED FOR FERC SUPPL FILING	SJO	10/2/16
6	ISSUED FOR PERMIT	JTJ	02/07/17
7	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17

DWG. NO.	REFERENCE
D6987-ALG-050	ALIGNMENT SHEET
A6987-TYP-8616	TYPICAL WORKSPACE LAYOUT FOR DIRECTIONAL DRILL
A6987-TYP-8648	TYPICAL HDD ENTRY WORKSPACE
D6987-SHD-007	MXP-100 RIVER CROSSING/BUCKEYE CREEK
A6987-TYP-25	TEMPORARY ROAD ENTRANCE ROCK PADS
A6987-REP-004	STATE RAIL AUTHORITY

PROJECT DELIVERY
PROJECT ENGINEERING
Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

TITLE: MXP-100 ROAD CROSSING
US HIGHWAY 50 MP 48.4 – DODDRIDGE CO, WV

DRAWN BY	PROJECT NUMBER	WORK ORDER NUMBER	DRAWING NUMBER	SHEET	ISSUE
SJO	20432	46130	D6987-HXP-001	1 OF 4	P7

GENERAL NOTES:

1. THIS DRAWING IS FOR PERMITTING PURPOSES ONLY.
2. ALL WORK AND MATERIALS WITHIN RIGHT-OF-WAY MUST CONFORM TO WVDOH REGULATIONS AND STANDARDS.
3. NO IMPACTS TO THE PAVEMENT STRUCTURE ARE ANTICIPATED WITH BORE OR DIRECTIONAL DRILL CONSTRUCTION.
4. ON ROADS WHERE OPEN-CUT CONSTRUCTION METHODS ARE USED, THE EXISTING ROAD SURFACE SHOULD BE RESTORED TO ORIGINAL CONDITIONS AFTER COMPLETION OF THE WORK.
5. AFTER THIS LINE IS IN SERVICE, REPAIRS AND/OR REPLACEMENT OF THE INSTALLED PIPE WILL BE OUTSIDE OF THE ROADWAY RIGHT-OF-WAY WHEN POSSIBLE. WHEN THE REPAIRS ARE REQUIRED INSIDE OF THE ROADWAY RIGHT-OF-WAY, THE PIPELINE WILL BE ABANDONED BY REMOVING THE LINE FROM SERVICE, FILLING THE PIPE WITH AN APPROPRIATE GROUT, AND CAPPING BOTH ENDS. A NEW CROSSING WILL BE INSTALLED A SAFE DISTANCE A WAY AND TIED INTO THE EXISTING PIPELINE.
6. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION, SIZES AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION.
7. LINE MARKERS WILL BE LOCATED AT THE ROAD RIGHT-OF-WAY LINES INDICATING THE ADDRESS AND TELEPHONE NUMBER OF OPERATOR AND THAT THE UTILITY IS A NATURAL GAS PIPELINE.
8. WORK ZONE TRAFFIC CONTROL CASES C1 & C4 SHALL BE APPLIED AS SHOWN IN WVDOHS MANUAL ON TEMPORARY TRAFFIC CONTROL FOR STREETS AND HIGHWAY, 2006 EDITION.
9. CONTRACTOR SHALL MAINTAIN 5 FEET COVER OVER PIPELINE WITHIN THE LIMITS OF THE ROAD RIGHT-OF-WAY ON NON-LIMITED ROADS AND 10' MINIMUM COVER OVER PIPELINE WITHIN THE ROADWAY RIGHT-OF-WAY FOR LIMITED ACCESS HIGHWAYS.
10. THE CONTRACTOR SHALL EXERCISE CARE TO AVOID DAMAGES TO ALL EXISTING UTILITIES.
11. THIS GAS AND/OR PETROLEUM PIPELINE INSTALLATION AND MAINTENANCE TO BE DESIGNED TO MEET ALL RULES, REGULATIONS AND PIPELINE CRITERIA CONTAINED IN 49 CFR 192 AND/OR CFR FEDERAL SAFETY STANDARDS.
12. CONTRACTOR TO INSTALL SHORING AS NECESSARY TO MAINTAIN STABLE PIPE TRENCHES.
13. PIPE PROFILE REPRESENTS MINIMUM DEPTH OF COVER REQUIREMENTS. ACTUAL CONSTRUCTION DEPTH TO BE DETERMINED BASED ON SITE-SPECIFIC CONDITIONS.

PIPELINE NOTES:

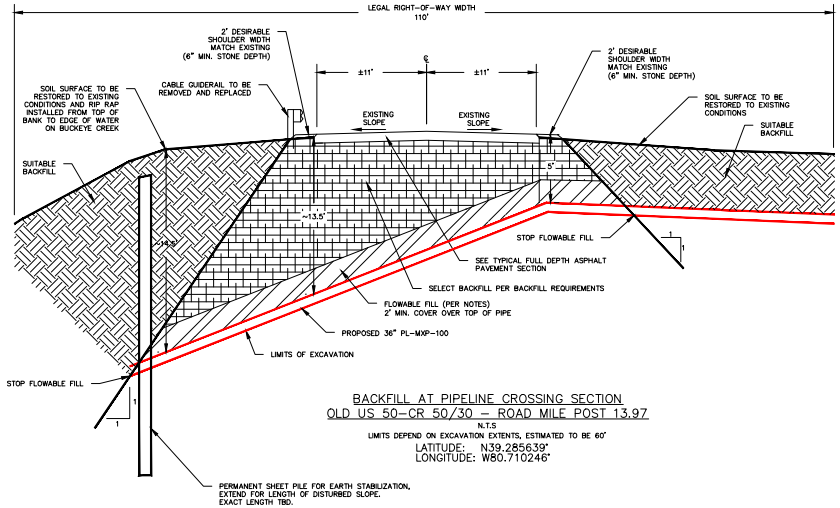
1. THE CATHODIC PROTECTION FOR THE PIPELINE WILL BE PROVIDED BY IMPRESSED CURRENT.
2. NO EXCAVATION ANTICIPATED WITHIN THE WVDOH RIGHT-OF-WAY.
3. ANY SURFACE DISTURBANCE DUE TO TEST PIT/POTHOLE OF EXISTING UTILITIES SHALL BE REPAIRED IN ACCORDANCE WITH LOCAL STATE/COUNTY/TOWNSHIP AUTHORITIES.
4. HORIZONTAL DATUM BASED ON NAD83, WEST VIRGINIA STATE PLANE SOUTH, US FOOT, VERTICAL DATUM BASED ON NAVD88.
5. PROPERTY LINES SHOWN ON THESE SHEETS ARE APPROXIMATE AND NOT BASED ON A BOUNDARY SURVEY.
6. THIS SURVEY WAS CONDUCTED BY TRC, 2016.

UTILITY NOTES:

1. THE UNDERGROUND UTILITIES SHOWN HEREON WERE COMPILED FROM INFORMATION OBTAINED FROM EXISTING PLANS, SURFACE FACILITIES, AND FIELD WORK. UTILITIES ARE SHOWN AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. NO GUARANTEE OF ACTUAL LOCATION IS GIVEN UNTIL SAID LINES ARE UNCOVERED IN FIELD FOR VERIFICATION.
2. PIPELINE SHALL BE REGISTERED WITH WEST VIRGINIA 8-1-1 UTILITIES PROTECTION SERVICE: 1-800-245-4548

WEST VIRGINIA DOH NOTES:

1. APPLICATIONS FOR PIPELINE ACCESSES SHALL BEAR THE SIGNATURE OF THE PROPERTY OWNER OR PROPERTY OWNER'S AUTHORIZED AGENT (IF APPLICABLE) AND THE SIGNATURE OF THE OIL AND GAS COMPANY REPRESENTATIVE.
2. YOU MUST CONTACT THE WVDOH TRANSPORTATION MANAGER 48 HOURS PRIOR TO STARTING ANY WORK AND UPON COMPLETION.
3. A COPY OF THE PERMIT AND APPROVED PLANS MUST BE ON SITE AT ALL TIMES WHILE WORK IS BEING PERFORMED WITHIN THE STATE RIGHT-OF-WAY.

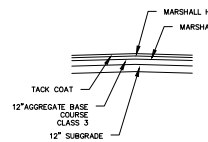


BACKFILL AT PIPELINE CROSSING SECTION
OLD US 50-CR 50/30 – ROAD MILE POST 13.97

N.T.S

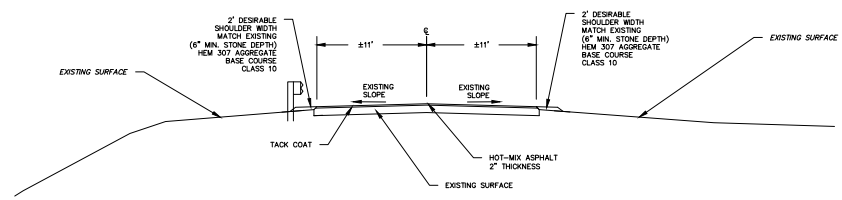
LIMITS DEPEND ON EXCAVATION EXTENTS, ESTIMATED TO BE 60'

LATITUDE: N39.285639°
LONGITUDE: W80.710246°



TYPICAL FULL DEPTH ASPHALT PAVEMENT SECTION

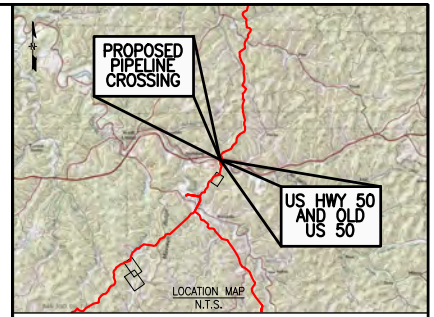
N.T.S



TYPICAL PAVEMENT OVERLAY SECTION

N.T.S

LIMITS TO BE APPROXIMATELY 10' ON EACH SIDE OF THE FULL DEPTH EXCAVATION



LOCATION MAP
N.T.S.

SELECT BACKFILL REQUIREMENTS

1. THE FOLLOWING BACKFILLING SPECIFICATION IS TO BE USED IN CONNECTION WITH ANY UTILITY WORK PERFORMED WITHIN HIGHWAY RIGHT OF WAY.
2. AFTER THE CASING CONDUIT OR OTHER UNDERGROUND FACILITY IS INSTALLED, THE TRENCH IS TO BE BACKFILLED. ALL BACKFILL MATERIAL SHALL: BE FREE FROM PARTICLES LARGER THAN 3 INCHES (75MM); NOT BE FROZEN; CONTAIN NO CINDERS, ASHES, REFUSE, ORGANIC, VEGETABLE OR OTHER LIKE MATTER; NOT ANY OTHER MATERIAL DEEMED UNSUITABLE BY THE DISTRICT ENGINEER OR HIS AUTHORIZED REPRESENTATIVE. CARE SHALL BE TAKEN TO COMPACT THE MATERIAL UNDER THE HAUNCHES OF THE CASING, CONDUIT PIPE OR OTHER FACILITY AND TO PLACE THE BACKFILL EVENLY ON EACH SIDE. THE BACKFILL MATERIAL SHALL BE DEPOSITED IN THE TRENCH FOR ITS FULL WIDTH IN LAYERS NOT EXCEEDING 4 INCHES (100MM) AFTER COMPACTION. THIS METHOD SHALL BE FOLLOWED UNTIL THE TRENCH IS FULLY BACKFILLED. THE TARGET PERCENTAGE OF DRY DENSITY FOR THE BACKFILL MATERIAL WILL BE 95% OR THE DENSITY OF THE EXISTING MATERIAL, AS EVIDENCED BY TESTING, IF THE EXISTING DENSITY IS LOWER THAN 95% IN AREAS OUTSIDE THE LIMITS OF THE TRAVELED WAY AND SHOULDERS, COMPACTION TO THE DENSITY OF THE ORIGINAL GROUND IS SUFFICIENT.
3. ALL BACKFILL MATERIAL AND COMPACTION REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS IN THIS MANUAL AND SUBJECT TO DIVISION OF HIGHWAYS APPROVAL. EVIDENCE OF PROPER COMPACTION BY TESTING WILL BE THE RESPONSIBILITY OF THE APPLICANT. THE TESTING SHALL BE 1 (ONE) PER DAY OF EVERY 500 LINEAL FEET (150M) OR AS DETERMINED BY THE DISTRICT ENGINEER OF THIS AUTHORIZED REPRESENTATIVE.
4. APPROPRIATE AGGREGATE BASE COURSE AND/OR AGGREGATE SHOULDER STONE IS TO BE PLACED ON THE SHOULDER AT A THICKNESS EQUAL TO 6 INCHES (150MM) OR ITS ORIGINAL THICKNESS WHICHEVER IS GREATER. PAVED SHOULDER SHALL BE REPAVED.

FLOWABLE FILL

1. PIPELINE WILL BE BACKFILLED WITH FLOWABLE FILL TO A MINIMUM OF 2' OF COVER WITHIN THE ANGLE OF INFLUENCE.
2. FLOWABLE FILL TO BE PER MIXTURE SPECIFIED ON TYPICAL.

GENERAL NOTES FOR TYPICAL SECTIONS

1. SOIL SURFACE WILL BE SCARIFIED AND SEEDED IN ACCORDANCE WITH WVDOH STANDARDS.
2. ROADWAY MARKINGS, SIGNAGE, AND LINE STRIPING SHALL BE RESTORED TO EXISTING CONDITIONS IN ACCORDANCE WITH WVDOH STANDARDS.
3. NEW ROADWAY SURFACE SHALL BE TIED INTO EXISTING ROADWAY SURFACE IN ACCORDANCE WITH WVDOH STANDARD DETAILS.
4. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH WVDOH STANDARD SPECIFICATIONS, ROADS, AND BRIDGES 2010 AND MOST CURRENT SUPPLEMENTAL SPECIFICATIONS.

OLD US 50
UNCASED CROSSING

PIPE SPECIFICATIONS
Size – 36" NOM. O.D.
Material – Steel
Wall Thickness – 0.750"
Material Grade – X70
MAOP – 1440 psig
Design Factor – 0.5
Pipe Coating – 14-16 MILS FBE and 30-60 MILS ARO

WEST VIRGINIA DOH APP. NO.

Know what's below. Call before you dig.
CALL 1-800-245-4848

24/7 CONTACT AND PIPELINE MARKER INFO
Columbia Pipeline Group
P.O. Box 1273
Charleston, WV 25325-1273
Emergency Phone: 1-800-835-7191

LEGEND

FISH EXCLUSION NET
EQUIPMENT CROSSING BRIDGE
TRENCH PLUG
MATS
SILT FENCE
ABSORBENT BOOM
SAFETY BARRIER
TURBIDITY CURTAIN
WATERBAR

ISSUED FOR FERC SUPPL
02/17/2017

TRC PIPELINE SERVICES, LLC
2087 EAST 71ST STREET
TULSA, OK. 74136
(918) 496-0400
FIRM COA NO. C02358

LEGEND: MILEPOST; ROUTE; EXISTING COLUMBIA PIPELINE; FOREIGN PIPELINE; PERMANENT ROW; FENCE; TEMPORARY WORKSPACE; ADDITIONAL TEMPORARY WORKSPACE; ACCESS ROAD; CONTRACTOR / PIPE YARD; ACCESS ROAD NUMBER; PROPERTY TRACT NUMBER; WETLAND ID; WATERBODY ID; UNDERGROUND CABLE; OVERHEAD POWERLINE; WATERLINE; COUNTY BORDER; WETLAND; WATERBODY; SANITARY SEWER

SCALE: NONE

No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE
1	ISSUED FOR PERMIT	JTJ	02/07/17								
2	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17								

DWG. NO.	REFERENCE
D6987-ALG-050	ALIGNMENT SHEET
A6987-TYP-54	TYPICAL ROAD REPAIR DETAIL (TYPE C)/FLOWABLE FILL MIX SPECIFICATION
A6987-TYP-25	TEMPORARY ROAD ENTRANCE ROCK PADS

PROJECT DELIVERY
PROJECT ENGINEERING
NAUGLER CITY/CHARLESTON, WV 25302-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission

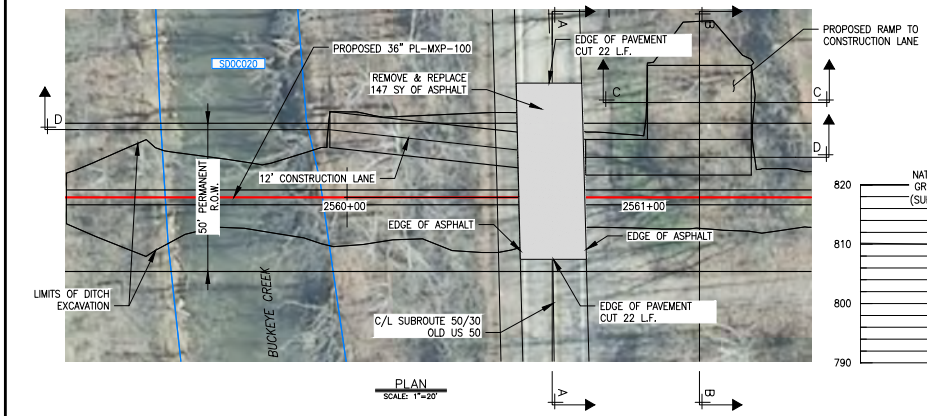
MOUNTAINEER XPRESS PROJECT

TITLE: 36" MXP-100 ROAD CROSSING
SUBROUTE 30/80 OLD US 50 MP 48.5 – DODDRIDGE CO, WV

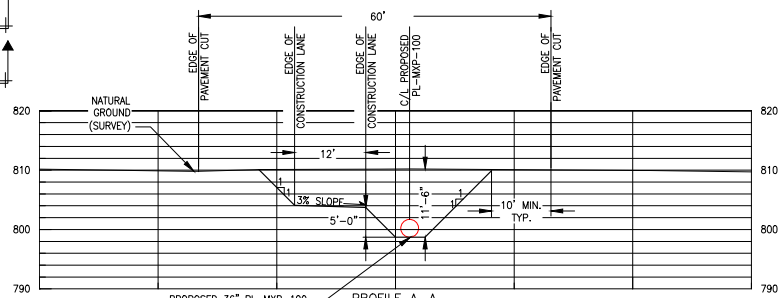
DRAWN BY	DRAWING NUMBER	SHEET	ISSUE
SJO	D6987-HXP-001	2 OF 4	P2

PROJECT NUMBER: 20432
WORK ORDER NUMBER: 46130

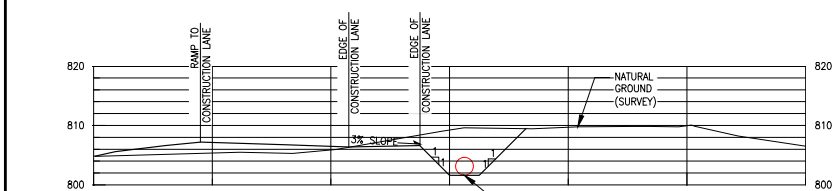
DODDRIDGE COUNTY, WEST VIRGINIA



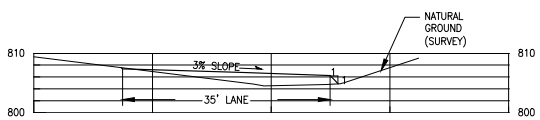
PLAN
SCALE: 1"=20'



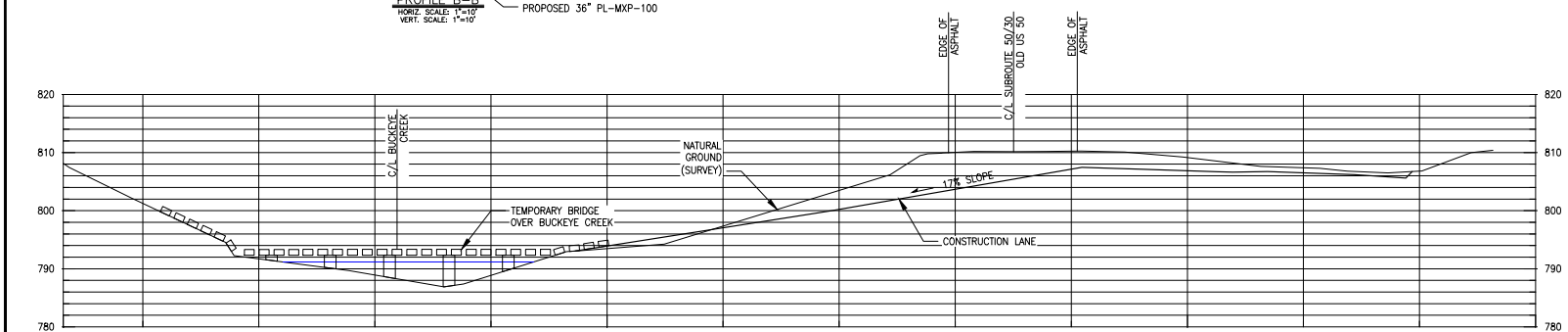
PROFILE A-A
HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'



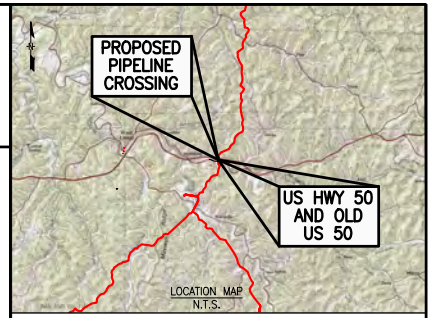
PROFILE B-B
HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'



PROFILE C-C
HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'



PROFILE D-D
HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=10'



WEST VIRGINIA DOH APP. NO.

Know what's below. Call before you dig.
CALL: 1-800-245-4848

TRC PIPELINE SERVICES, LLC
2087 EAST 71ST STREET
TULSA, OK. 74136
(918) 496-0400
FIRM COA NO. 002358

ISSUED FOR FERC SUPPL
02/17/2017

24/7 CONTACT AND PIPELINE MARKER INFO
Columbia Pipeline Group
P.O. Box 1273
Charleston, WV 25325-1273
Emergency Phone: 1-800-835-7191

PROJECTION SYSTEM:
NAD83 STATE PLANE,
WEST VIRGINIA SOUTH (U.S. SURVEY FEET)

LEGEND: MILEPOST; ROUTE; EXISTING COLUMBIA PIPELINE; FOREIGN PIPELINE; PERMANENT ROW; FENCE; TEMPORARY WORKSPACE; ADDITIONAL TEMPORARY WORKSPACE; ACCESS ROAD; CONTRACTOR / PIPE YARD; ASPHALT REMOVAL / REPLACEMENT; ACCESS ROAD NUMBER; PROPERTY TRACT NUMBER; WETLAND ID; WATERBODY ID; UNDERGROUND CABLE; OVERHEAD POWERLINE; WATERLINE; COUNTY BORDER; WETLAND; WATERBODY; SANITARY SEWER

SCALE: 1" = 20'

1	ISSUED FOR PERMIT	JTJ	2/07/17		–	–	–		–	–	–	D6987-ALG-056	PROPOSED 36" PL-MXP-100 PIPELINE
2	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17		–	–	–		–	–	–	D6987-SMD-007	MXP-100 RIVER CROSSING BUCKEYE CREEK
												A6987-TYP-25	TEMPORARY ROAD ENTRANCE ROCK PADS
No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE	DWG. NO.	REFERENCE

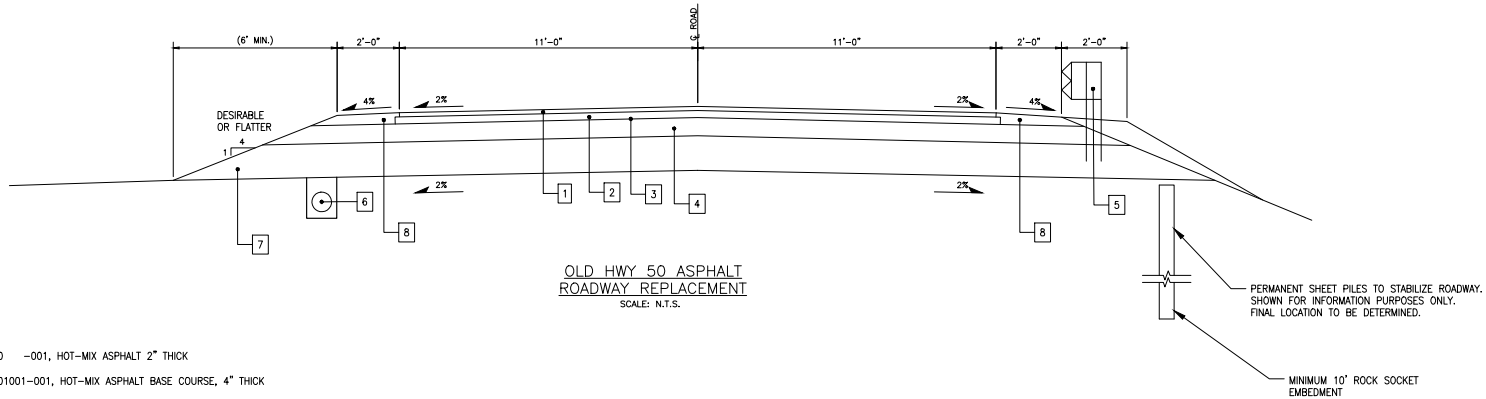
PROJECT DELIVERY
PROJECT ENGINEERING
MAJOR CITY/HIGHLEVEL WV 25526-0270
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

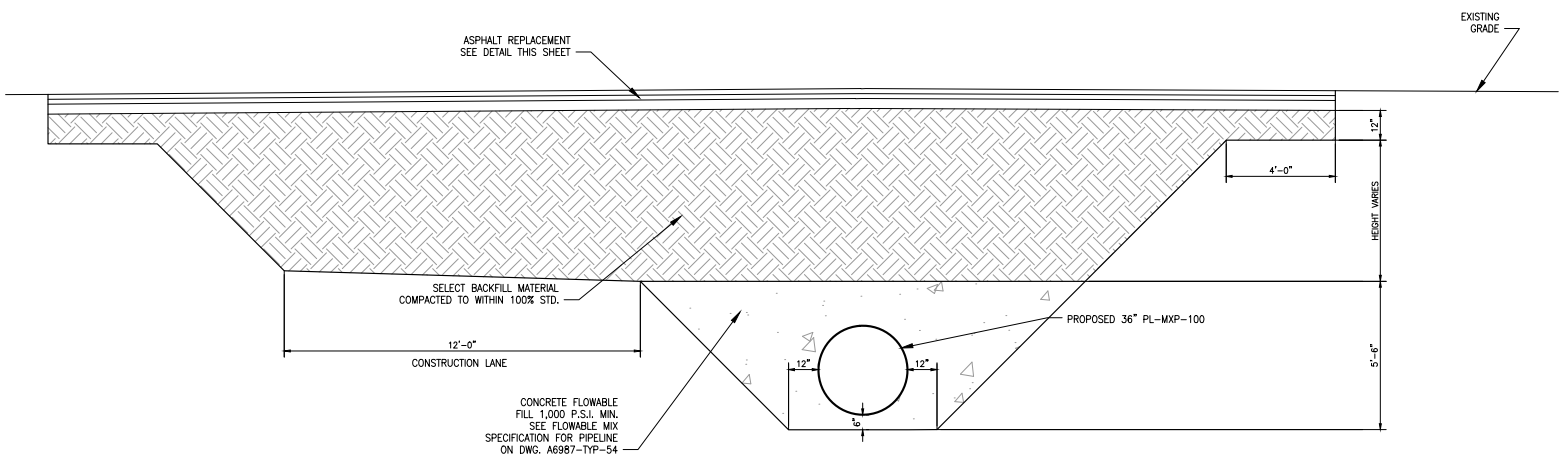
TITLE: PIPELINE XPRESS 100 ROAD CROSSING
OLD US 50 MP 48.8 – DODDRIDGE CO, WV

DRAWN BY	JB	02/07/17	DRAWING NUMBER	SHEET	ISSUE
PROJECT NUMBER	20432		D6987-HXP-001	3 OF 4	P2
WORK ORDER NUMBER	46130				



OLD HWY 50 ASPHALT
ROADWAY REPLACEMENT
SCALE: N.T.S.

1. ITEM 40 -001, HOT-MIX ASPHALT 2" THICK
2. ITEM 401001-001, HOT-MIX ASPHALT BASE COURSE, 4" THICK
3. TACK COAT 0.04-0.05 GAL. PER S.Y. UNDILUTED OR 0.08-0.10 GAL. PER S.Y. DILUTED 1:1.
4. ITEM 307001-00, AGGREGATE BASE COURSE, CLASS 3-12" MINIMUM.
5. ITEM 607001-001, TYPE I GUARDRAIL, CLASS (MATCH EXISTING)
6. ITEM 606025-, UNDERDRAIN PIPE OR MATCH EXISTING (IF ANY)
   ITEM 606020-001, FABRIC UNDERDRAIN. (MATCH EXISTING)
7. ITEM 207002-000, SUBGRADE MINIMUM 12" OF CLASS 3 AGGREGATE BASE, COMPACTED AND IN ACCORDANCE WITH SECTION 200 OF THE WEST VIRGINIA DEPARTMENT OF HIGHWAYS STANDARD SPECIFICATIONS.
8. ITEM 308001-001, 6" OF CLASS 10 AGGREGATE BASE.



PIPE TRENCH DETAIL
UNDER OLD HWY 50
SCALE: N.T.S.

ASPHALT PAVEMENT NOTES:

1. ROADS SHALL NOT BE SURFACED WITH HMA PAVEMENT UNTIL CONSTRUCTION IS COMPLETED. PRIOR TO APPLICATION OF PRIME COAT, THE BASE MATERIAL SHALL BE SCARIFIED, RE-GRADED, AND COMPACTED TO THE REQUIREMENTS DESCRIBED ON THIS DRAWING.
2. EXPOSED SUBGRADE SHALL BE THOROUGHLY PROOF-ROLLED PRIOR TO PLACING ROAD BASE OR FILL, IN ORDER TO IDENTIFY SOFT SPOTS AND/OR UNSUITABLE SOILS. PROOF-ROLLING SHOULD BE PERFORMED WITH A LOADED, TANDEM-AXEL DUMP TRUCK. WITH A MINIMUM GROSS WEIGHT OF 20,000 LBS. OR SIMILAR RUBBER-TIRED CONSTRUCTION EQUIPMENT. PROOF-ROLLING OPERATIONS SHOULD BE OBSERVED BY A GEOTECHNICAL REPRESENTATIVE. WHEN SOFT SPOTS ARE IDENTIFIED BY EXCESSIVE DEFLECTION OR RUTTING, THE AREA SHALL BE OVER EXCAVATED AND REPLACED WITH A STRUCTURAL FILL OR AGGREGATE ROAD BASE MATERIAL.
3. AGGREGATE BASE COURSE SHALL BE COMPACTED TO WITHIN 100% STD. PROCTOR, ASTM D698.
4. SELECT FILL, WHEN REQUIRED TO ACHIEVE GRADE PROFILE, SHALL BE COMPACTED TO WITHIN 100% OF STD. PROCTOR, PER ASTM D698.
5. PRIME COATS SHALL CONSIST OF CUTBACK ASPHALT, AND APPLIED PER WVDOH SPECIFICATIONS, BUT AT A RATE NO LESS THAN .3 GAL./yd^2.
6. CONTRACTOR TO COORDINATE ROAD CLOSURE WITH ALL APPLICABLE AGENCIES AND SHALL IMPLEMENT DETOUR ROUTE IN ACCORDANCE WITH LATEST MUTCD GUIDELINES.
7. ALL CONSTRUCTION ACTIVITIES SHALL BE IN COMPLIANCE WITH LATEST OSHA GUIDELINES.

TRC PIPELINE SERVICES, LLC
2087 EAST 71ST STREET
TULSA, OK. 74136
(918) 496-0400
FIRM COA NO. C02358

ISSUED FOR
FERC SUPPL
02/17/2017

LEGEND: MILEPOST; ROUTE; EXISTING COLUMBIA PIPELINE; FOREIGN PIPELINE; PERMANENT ROW; FENCE; TEMPORARY WORKSPACE; ADDITIONAL TEMPORARY WORKSPACE; ACCESS ROAD; CONTRACTOR / PIPE YARD; AR#001 ACCESS ROAD NUMBER; ST-CO-001.000 PROPERTY TRACT NUMBER; WP#D/C002 WETLAND ID; SP#D/C002 WATERBODY ID; C UNDERGROUND CABLE; P OVERHEAD POWERLINE; W WATERLINE; COUNTY BORDER; WETLAND; WATERBODY; SS SANITARY SEWER

SCALE: NONE

No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE
P1	ISSUED FOR PERMIT	JTJ	2/07/17								
P2	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17								

DWG. NO.	REFERENCE
D6987-ALG-056	PROPOSED 36" PL-MXP-100 PIPELINE
D6987-SHD-007	MXP-100 RIVER CROSSING BUCKEYE CREEK
A6987-TYP-25	TEMPORARY ROAD ENTRANCE ROCK PADS
A6987-TYP-54 2 OF 2	TYPICAL ROAD REPAIR DETAIL

PROJECT DELIVERY
PROJECT ENGINEERING
MAJOR CITY/CHARLESTON WV DISTRICT
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

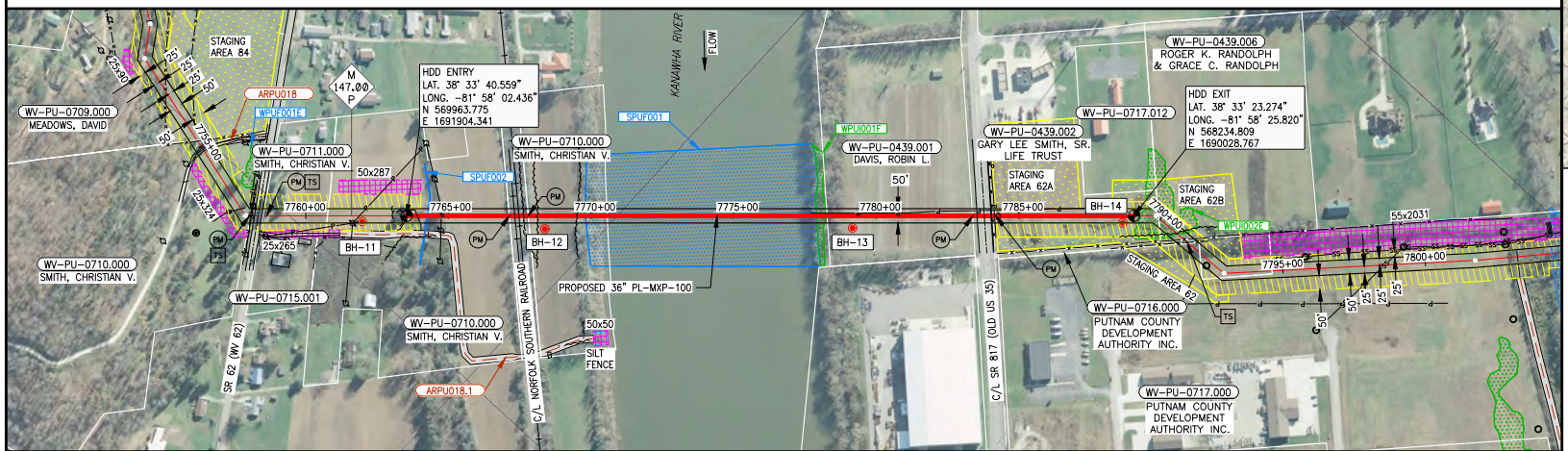
Columbia Gas Transmission

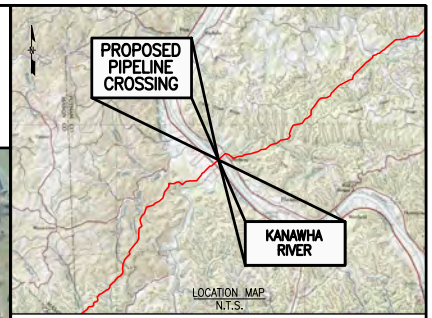
MOUNTAINEER XPRESS PROJECT

TITLE: MXP-100 ROAD CROSSING
OLD US 50 MP 48.8 – DODDRIDGE CO, WV

DRAWN BY	JRB 02/07/17	DRAWING NUMBER	SHEET	ISSUE
PROJECT NUMBER	20432	D6987-HXP-001	4 OF 4	P2
WORK ORDER NUMBER	46130			

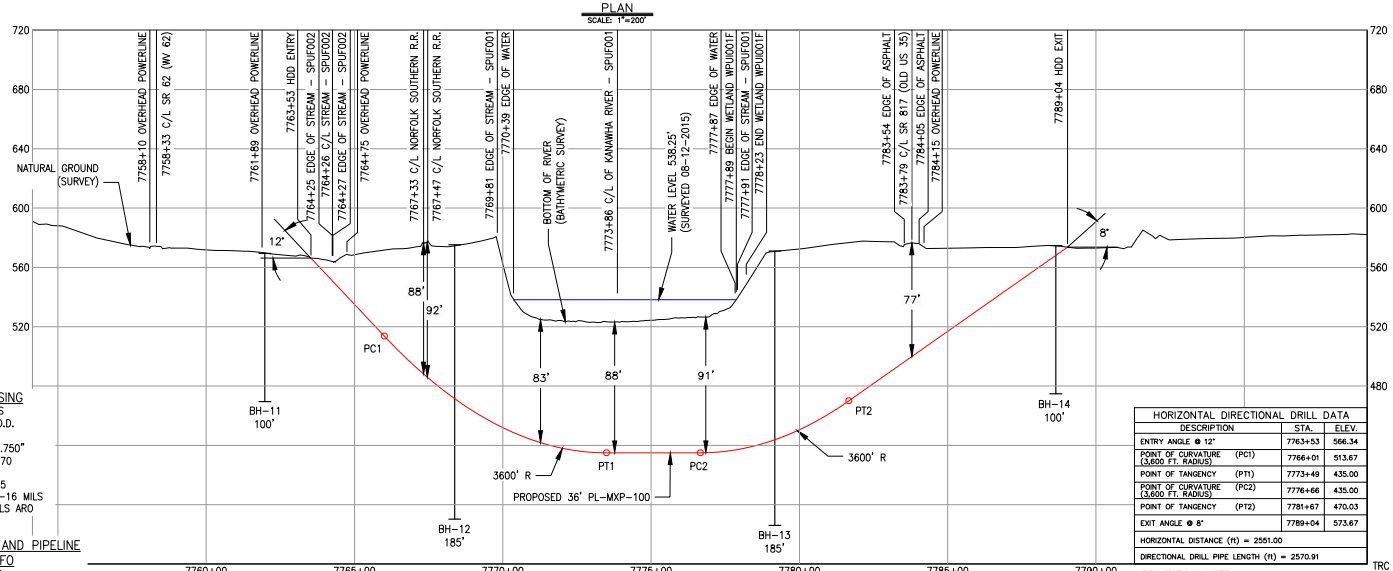
PUTNAM COUNTY, WEST VIRGINIA





PLAN

SCALE: 1" = 200'



PROFILE

HORIZ. SCALE: 1" = 200'
VERT. SCALE: 1" = 40'

UNCASED CROSSING

PIPE SPECIFICATIONS
Size – 36" NOM. O.D.
Material – Steel
Wall Thickness – 0.750"
Material Grade – X70
MAOP – 1440 psig
Design Factor – 0.5
Pipe Coating – 14–16 MILS FBE and 30–60 MILS ARO

24/7 CONTACT AND PIPELINE MARKER INFO

Columbia Pipeline Group
P.O. Box 1273
Charleston, WV 25325-1273
Emergency Phone: 1-800-835-7191

HORIZONTAL DIRECTIONAL DRILL DATA

DESCRIPTION	STA.	ELEV.
ENTRY ANGLE @ 12°	7763+53	566.34
POINT OF CURVATURE (PC1) (3,600 FT. RADIUS)	7766+01	513.67
POINT OF TANGENCY (PT1)	7773+49	435.00
POINT OF CURVATURE (PC2) (3,600 FT. RADIUS)	7776+66	435.00
POINT OF TANGENCY (PT2)	7781+67	470.03
EXIT ANGLE @ 8°	7789+04	573.67
HORIZONTAL DISTANCE (ft) = 2551.00		
DIRECTIONAL DRILL PIPE LENGTH (ft) = 2570.91		

PROJECTION SYSTEM:

NAD83 STATE PLANE,
WEST VIRGINIA SOUTH (U.S. SURVEY FEET)

TRC PIPELINE SERVICES, LLC
2087 EAST 71ST STREET
TULSA, OK. 74136
(918) 496-0400
FIRM COA NO. C02358

DIRECTIONAL DRILL CONSTRUCTION NOTES:

1. ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY OR FROM APPROVED ACCESS ROADS.
2. WORK SPACE: MAXIMUM WORK SPACE LIMITS ARE DEPICTED, RESTRICT CLEARING TO THE WORK SPACE INDICATED AT THE ENTRY AND EXIT POINTS AND PRODUCT PIPE STRINGING AND FABRICATION AREA ALONG THE CONSTRUCTION RIGHT-OF-WAY. CLEARING BETWEEN THE ENTRY AND EXIT POINTS REQUIRES PRIOR APPROVAL FROM THE ENVIRONMENTAL INSPECTOR AND IS LIMITED TO THE AMOUNT NECESSARY TO STRING SURVEY WIRES AND INSTALL PUMPS AND PIPING TO OBTAIN WATER (WHERE APPROVED).
3. WATER SOURCE: DRILL WATER AND HYDROSTATIC TEST WATER SHALL BE OBTAINED FROM AN APPROVED SOURCE.
4. HYDROSTATIC TEST: PRE-INSTALLATION AND POST-INSTALLATION HYDROSTATIC TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH THE HYDROSTATIC TEST PLAN. TEST WATER SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH PERMIT REQUIREMENTS. THE TEST WATER SHALL BE DISCHARGED IN AN UPLAND AREA INTO AN EROSION CONTROL STRUCTURE AND/OR SILT FENCES, GEOTEXTILE FILTER BAG, OR COLLECTED IN A TRUCK AND HAULED TO AN APPROVED DISPOSAL SITE, UPON COMPLETION OF DEWATERING AND DRYING, A CALIPER PIG SURVEY SHALL BE COMPLETED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
5. SPILL-PREVENTION: REFUELING OF ALL EQUIPMENT SHALL BE COMPLETED IN ACCORDANCE WITH THE SPCC PLAN.
6. EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
7. INSTALLATION: THE PIPE SECTION FOR THE DRILLED CROSSING SHALL BE MADE UP WITHIN THE APPROVED CONSTRUCTION RIGHT-OF-WAY AT THE DRILL EXIT POINT AS SHOWN AFTER THE PILOT HOLE IS COMPLETE. CONTRACTOR'S ACTUAL DRILL PROFILE SHALL BE SUBMITTED TO COLUMBIA FOR APPROVAL. CONTRACTOR SHALL ASSESS THE NEED FOR AND SUPPLY APPROPRIATE BALLAST DURING PULLBACK.
8. DRILLING FLUID DISPOSAL: CONTRACTOR SHALL DISPOSE OF EXCESS DRILLING FLUID AS DIRECTED BY COLUMBIA'S REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS. UNDER NO CIRCUMSTANCES SHALL DRILLING FLUID BE DISPOSED OF IN WATER BODIES OR WETLANDS. ANY DRILLING FLUID WHICH INADVERTENTLY SURFACES AT POINTS OTHER THAN THE ENTRY OR EXIT POINTS SHALL BE CONTAINED AND COLLECTED TO THE EXTENT PRACTICABLE AND DISPOSED OF AS DIRECTED BY COLUMBIA'S REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS.
9. CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGINAL CONTOURS. DISTURBED AREAS SHALL BE SEEDED AS SPECIFIED IN THE CLEAN-UP AND RESTORATION REQUIREMENTS. IF THE TERRAIN ALLOWS AND ACCESS IS PERMITTED. CONTRACTOR SHALL UTILIZE LOW GROUND PRESSURE EQUIPMENT OR OTHER EQUIPMENT APPROVED BY COLUMBIA TO FACILITATE CONTAINMENT AND CLEAN-UP OF ANY INADVERTENT RETURNS THAT OCCUR DURING THE HDD INSTALLATION PROCESS.
10. CONTRACTOR IS RESPONSIBLE FOR CALLING WEST VIRGINIA ONE-CALL AND LOCATING ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION. IF ANY UTILITY IS LOCATED WITHIN 15 FEET OF THE DESIGNED HDD PROFILE AND ALIGNMENT, CONTRACTOR SHALL OBTAIN APPROVAL FROM COLUMBIA PRIOR TO INITIATING HDD OPERATIONS.
11. IT IS THE CONTRACTORS RESPONSIBILITY TO IDENTIFY AND PROTECT ANY FOREIGN UTILITY THAT MAY BE AFFECTED BY THE HDD OPERATIONS.
12. CONTRACTOR SHALL ADHERE TO THE SPECIFICATIONS AND REQUIREMENTS PER COLUMBIA'S SPECIFICATIONS, CONTRACT DOCUMENT AND SPECIAL PERMIT CONDITIONS, EXCEPT AS NOTED ON THIS DRAWING.
13. WETLAND AREAS AT HDD EXIT WILL NEED TO BE MATTED.
14. REFER TO PSI GEOTECHNICAL REPORTS DATED APRIL 15, 2016 FOR B-11 AND B-14. AND SUPPLEMENTAL REPORT DATED NOVEMBER 14, 2016 FOR B-12 AND B-13.

WEST VIRGINIA DOH APP. NO.

Know what's below. Call before you dig.
CALL1-800-245-4848

LEGEND
HDD ENTRY/EXIT
BORE HOLE
FISH EXCLUSION NET
EQUIPMENT CROSSING BRIDGE
TRENCH PLUG
MATS
PROPOSED PIPE MARKER
TEST STATION
SILT FENCE
ABSORBENT BOOM
SAFETY BARRIER
TURBIDITY CURTAIN
WATERBAR

ISSUED FOR FERC SUPPL
02/17/2017

LEGEND
MILEPOST
ROUTE
EXISTING COLUMBIA PIPELINE
FOREIGN PIPELINE
PERMANENT ROW
FENCE
TEMPORARY WORKSPACE
ADDITIONAL TEMPORARY WORKSPACE
ACCESS ROAD
CONTRACTOR / PIPE YARD
ST-CO-001.000 PROPERTY TRACT NUMBER
WPADJ002 WETLAND ID
SPADJ002 WATERBODY ID
AR-001 ACCESS ROAD NUMBER
C UNDERGROUND CABLE
P OVERHEAD POWERLINE
W WATERLINE
COUNTY BORDER
SS SANITARY SEWER
WETLAND
WATERBODY

SCALE: 1" = 200'
200' 100' 0' 200' 400'

No.	REVISIONS	APPROVED BY	DATE
1	ISSUED FOR FERC REVIEW	SJO	3/31/16
2	ISSUED FOR FERC FILING	SJO	4/29/16
3	ISSUED FOR 50% REVIEW	SJO	5/9/16
4	ISSUED FOR FERC SUPPL FILING	SJO	10/2/16
5	ISSUED FOR PERMIT	JTJ	01/17/17
6	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17

DWG. NO.	REFERENCE
D6987-ALG-163	ALIGNMENT SHEET
A6987-TYP-8616	TYPICAL WORKSPACE LAYOUT FOR DIRECTIONAL DRILL
A6987-TYP-8648	TYPICAL HDD ENTRY WORKSPACE
A6987-RRP-003	NORFOLK SOUTHERN RAILROAD

PROJECT DELIVERY
PROJECT ENGINEERING
COLUMBIA GAS TRANSMISSION, LLC
1700 MACCORKLE AVENUE, SE, CHARLESTON, WV 25314
1700 MACCORKLE AVENUE, SE, CHARLESTON, WV 25314

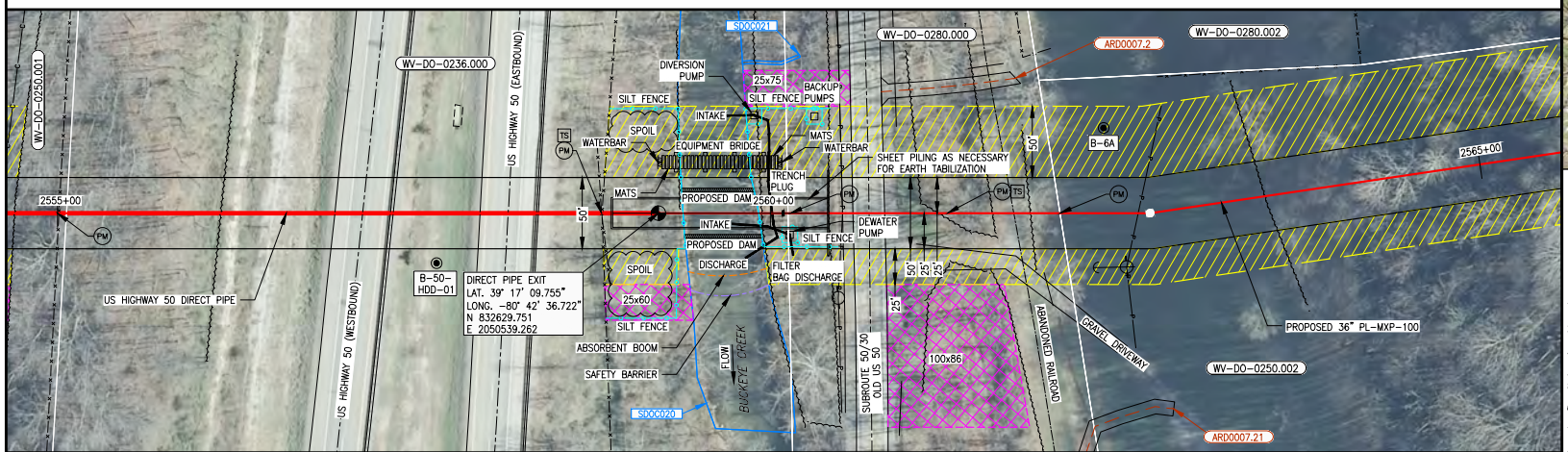
Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

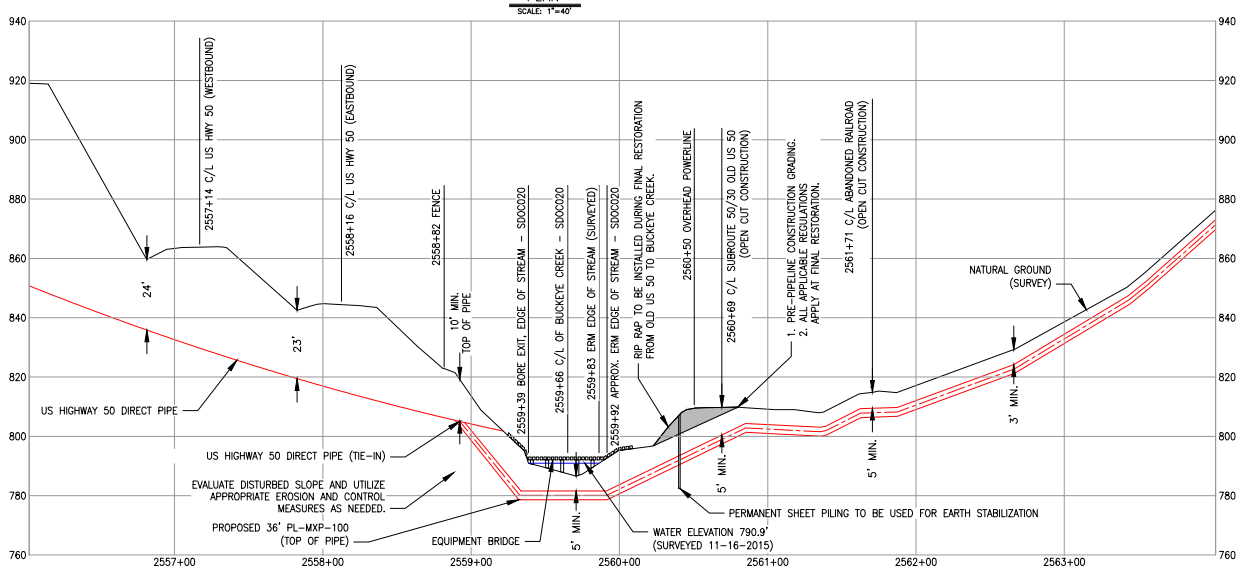
TITLE
HDD PLAN AND PROFILE – KANAWHA RIVER CROSSING
KANAWHA RIVER – MP 147.2 – PUTNAM CO, WV

DRAWN BY	SJO	03/07/2016	DRAWING NUMBER	SHEET	ISSUE
PROJECT NUMBER	20432		D6987-SWD-006	1 OF 1	P6
WORK GROUP NUMBER	46130				

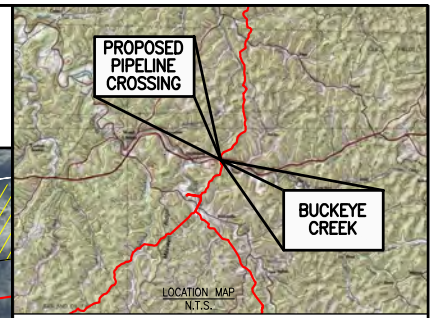
DODDRIDGE COUNTY, WEST VIRGINIA



PLAN
SCALE: 1"=40'



PROFILE
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=20'



CONSTRUCTION NOTES:

1. THE BUCKEYE CREEK CONSTRUCTION CONSISTS OF THE INSTALLATION OF A NEW 36" LINE IN A NEW TRENCH.
2. TRENCH SHALL BE BACKFILLED TO CONFORM TO RIVER BOTTOM ELEVATIONS EXISTING PRIOR TO CONSTRUCTION.
3. BUOYANCY CONTROL TO BE USED 10 FEET OUTSIDE OF ENVIRONMENTAL FEATURE BOUNDARIES.

ENVIRONMENTAL CONTROLS AND DETAILS:

1. EROSION/SEDIMENT CONTROL STRUCTURES (SILT FENCES) TO BE INSTALLED PRIOR TO EARTH DISTURBANCE AND MAINTAINED DAILY TO MINIMIZE IMPACTS.
2. DISTURBED AREAS TO BE STABILIZED/RESTORED PRIOR TO REMOVAL OF EROSION/SEDIMENT CONTROL STRUCTURES.
3. TRENCH DEWATERING TO BE DIRECTED TO FILTER BAGS LOCATED IN AN UPLAND AREA IN A MANNER SO AS NOT TO CAUSE SEDIMENT TRANSPORT TO RIVER.
4. EROSION CONTROL DEVICES WILL BE INSTALLED AROUND FILTER BAG.
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6. THE USE OF PUMPS WITHIN 100' OF A WATERBODY OR WETLAND WILL COMPLY WITH COLUMBIA'S ECS.
7. DEPLOY ABSORBENT BOOMS "AT THE READY", ONSHORE DOWNSTREAM OF THE WORK AREA.
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10. BACKUP PUMPS (AS SAME NUMBER AND CAPACITY AS ACTIVE PUMPS) WILL BE READILY AVAILABLE IN WORKING CONDITION ON SITE AT CROSSING.
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12. PROPOSED DAM UTILIZED WILL BE SANDBAGS, AQUA DAM AND/OR COFFER DAM OR EQUIVALENT AND SHALL BE OF ADEQUATE HEIGHT TO IMPOUND WATER.
13. INSTALL REMOVABLE EROSION CONTROL DEVICE ACROSS TRAVEL LANE. REPLACE AT THE END OF EACH DAY.
14. ALL PUMPS MUST BE PLACED IN APPROPRIATE SECONDARY CONTAINMENT.
15. CONSTRUCT AND MAINTAIN EQUIPMENT BRIDGES TO ALLOW UNRESTRICTED FLOW AND TO PREVENT SOIL FROM ENTERING THE WATERBODY. BRIDGE SHOULD BE DESIGNED AND MAINTAINED TO WITHSTAND AND PASS THE HIGHEST FLOW EXPECTED TO OCCUR WHILE THE BRIDGE IS IN PLACE.
16. PIPELINE SACK WEIGHTS WILL BE 17 FEET FROM CENTER TO CENTER OF BAGS, OR USE 6.25" THICK CONCRETE COATED PIPE.

PROJECTION SYSTEM:

NAD83 STATE PLANE,
WEST VIRGINIA SOUTH (U.S. SURVEY FEET)

UNCASED CROSSING
PIPE SPECIFICATIONS
Size - 36" NOM. O.D.
Material - Steel
Wall Thickness - 0.750"
Material Grade - X70
MAOP - 1440 psig
Design Factor - 0.5
Pipe Coating - 14-16 MILS FBE and 30-60 MILS ARO

24/7 CONTACT AND PIPELINE MARKER INFO
Columbia Pipeline Group
P.O. Box 1273
Charleston, WV 25325-1273
Emergency Phone: 1-800-835-7191

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LEGEND
HDD ENTRY/EXIT
BORE HOLE
FISH EXCLUSION NET
EQUIPMENT CROSSING BRIDGE
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MATS
PROPOSED PIPE MARKER
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ISSUED FOR FERC SUPPL
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P OVERHEAD POWERLINE
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COUNTY BORDER
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SCALE: 1" = 40'
40' 20' 0' 40' 80'

DWG. NO.	REFERENCE
D6987-ALG-050	ALIGNMENT SHEET
A6987-TYP-30	TYPICAL STREAM CROSSING DAM AND PUMP
D6987-MXP-001	MXP-100 ROAD CROSSING/US HIGHWAY 50
A6987-RRP-004	STATE RAIL AUTHORITY

No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE	No.	REVISIONS	APPROVED BY	DATE
2	ISSUED FOR FERC SUPPL FILING	SJO	10/2/16								
2A	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17								

PROJECT DELIVERY
PROJECT ENGINEERING
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314-1518
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

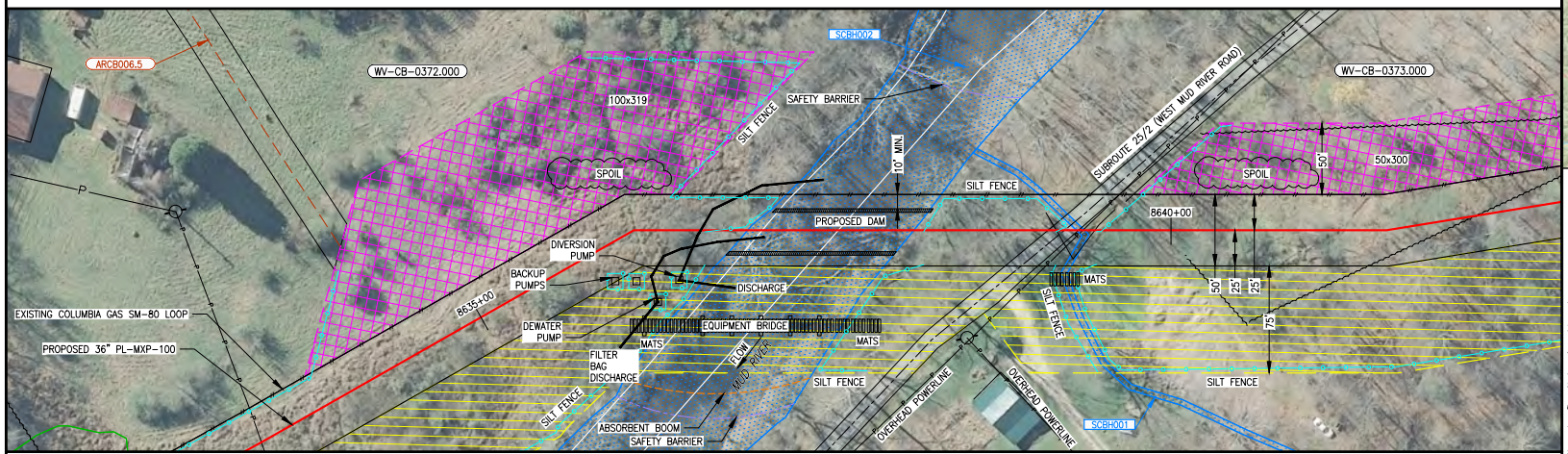
Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

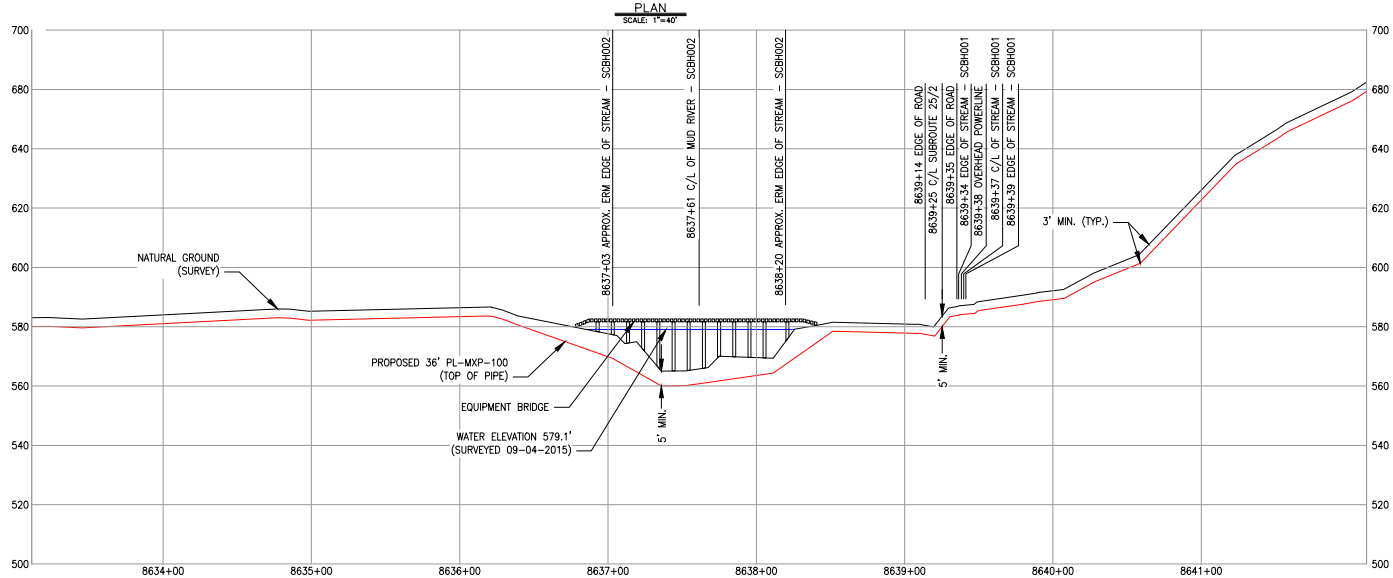
TITLE
PIPELINE RIVER CROSSING
BUCKEYE CREEK MP 48.5 - DODDRIDGE CO, WV

DRAWN BY	SJ	DRAWING NUMBER	SHEET	ISSUE
PROJECT NUMBER	20432	D6987-SWD-007	1 OF 1	P1
WORK ORDER NUMBER	46130			

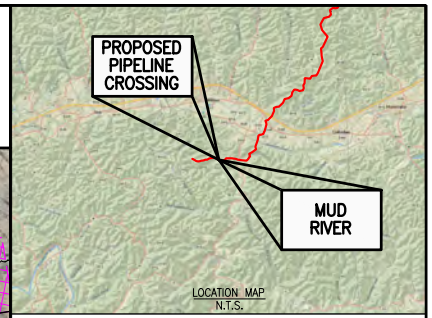
CABELL COUNTY, WEST VIRGINIA



PLAN
SCALE: 1"=40'



PROFILE
HORIZ. SCALE: 1"=40'
VERT. SCALE: 1"=20'



LOCATION MAP
N.T.S.

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PROJECTION SYSTEM:

NAD83 STATE PLANE,
WEST VIRGINIA SOUTH (U.S. SURVEY FEET)

UNCASED CROSSING
PIPE SPECIFICATIONS
Size – 36" NOM. O.D.
Material – Steel
Wall Thickness – 0.750"
Material Grade – X70
MAOP – 1440 psig
Design Factor – 0.5
Pipe Coating – 14-16 MILS FBE and 30-60 MILS ARO

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P.O. Box 1273
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OVERHEAD POWERLINE
WATERLINE
COUNTY BORDER
WETLAND
WATERBODY
SANITARY SEWER

SCALE: 1" = 40'
40' 20' 0' 40' 80'

DWG. NO.	REFERENCE
D6987-ALG-181	ALIGNMENT SHEET
A6987-TYP-30	TYPICAL STREAM CROSSING DAM AND PUMP

No.	REVISIONS	APPROVED BY	DATE
P1	ISSUED FOR FERC SUPPL FILING	SJO	02/17/17

PROJECT DELIVERY
PROJECT ENGINEERING
MAJOR CITY/HUNTINGTON, WV 25704-2121
1700 MACCORKLE AVENUE, SE, SUITE 200
CHARLESTON, WV 25314

Columbia Gas Transmission

MOUNTAINEER XPRESS PROJECT

TITLE
MUD RIVER CROSSING
MUD RIVER MP 163.6 – CABELL CO, WV

DRAWN BY	SJO	02/24/17
PROJECT NUMBER	20432	
WORK ORDER NUMBER	46130	

DRAWING NUMBER: D6987-SWD-008
SHEET: 1 OF 1
ISSUE: P1