

APPENDIX L

Karst Features

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APPENDIX L

Karst Features Identified within 0.25 mile of the Mountain Valley Project

Mile Post	Feature	Site Status	Field Confirmed?	Description <u>a/</u>	Potential Impacts and Recommendations for Avoidance/Mitigation	County
172.90	Contact – begin limestone	Negligible potential for impact	Yes	Northern extent of karst terrain (approximate).	n/a	Summers
173.28	Sinkhole	Negligible potential for impact	Yes	Sinkhole mapped approximately 240 feet to right (Southwest)	See Note <u>b/</u> at bottom of table	Summers
173.34	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 280 feet left (Northeast). Proposed MVP crosses surface drainage leading to sinkhole.	See Note <u>b/</u> at bottom of table	Summers
173.62	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 400 feet right (Southwest). Proposed MVP crosses surface drainage leading to sinkhole.	See Note <u>c/</u> at bottom of table	Summers
173.70	Spring	Minor potential for impact - Highlighted for construction inspection	Yes	Small spring approximately 260 feet right (west).	Proposed alignment is topographically above the spring. In general, uncontrolled storm water or other construction-related fluid from the Limit of Disturbance could impact the spring and stream.	Summers
173.78	Sinkhole	Negligible potential for impact	Yes	Compound sinkhole approximately 500 feet right (southwest) of the proposed alignment.	See Note <u>b/</u> at bottom of table	Summers
174.02	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole edge approximately 30 feet to left (east) of proposed MVP alignment.	See Note <u>c/</u> at bottom of table	Summers
174.22	Contact - end limestone	Negligible potential for impact	Yes	End of limestone area (approximate).	n/a	Summers
191.60	Contact - begin limestone	Negligible potential for impact	Yes	Short section of Union Limestone.	n/a	Monroe
191.86	Losing Stream, Insurgence	Negligible potential for impact	Yes	Below the pond there is an area where a minor stream sinks into the ground. Elevation of sink is about 30 feet above creek base level.	See Note <u>c/</u> at bottom of table	Monroe
192.04	Springs <u>c/</u>	Negligible potential for impact	Yes	440 feet left (southeast), and 105 feet southwest of Access Road MVP-MO-230, is a small wet weather seep. 705 feet left (southeast), and 370 feet southwest of Access Road MVP-MO-230, is a spring.	n/a	Monroe

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194.84	Contact - begin dolomite	Negligible potential for impact	No	Begin dolomite area (approximately). St. Clair thrust fault (ancient, inactive fault). This area historically known to have extensive and well documented cave and karst development. High karst potential with significant cave and karst feature development.	n/a	Monroe
195.18	Sinkhole	Minor potential for impact - Highlighted for construction inspection	No	Sinkhole mapped by desktop review approximately 100 feet to right (west) of the proposed alignment. An additional sinkhole is located approximately 150 feet to the right (west).	See Note <u>d/</u> and Note <u>c/</u> at bottom of table	Monroe
195.30	Sinkhole	Negligible potential for impact	No	Sinkholes mapped by desktop review more than approximately 800 feet right (west) of alignment	See Note <u>d/</u> and Note <u>b/</u> at bottom of table	Monroe
195.30	Contact - begin limestone	Negligible potential for impact	No	Begin limestone area (approximately). High karst feature potential.	n/a	Monroe
195.35	Sinkhole and Cave	Negligible potential for impact	No	Bobcat Cave, described as a small room located in a large sinkhole, location uncertain, approximately 1100 feet to right (west). Mapped by desktop review.	See Note <u>d/</u> and Note <u>b/</u> at bottom of table	Monroe
195.41	Sinkhole	Minor potential for impact - Highlighted for construction inspection	No	Open throat sinkhole located approximately 600 feet right (west) of the proposed alignment. Mapped by desktop review.	See Note <u>d/</u> and Note <u>b/</u> at bottom of table	Monroe

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195.42	Spring and Cave	Moderate potential for impact - Additional evaluation during construction may be required	No	Rich Creek Spring (headwaters of Rich Creek, water supply for Red Sulphur PSD and Town of Peterstown, WV), Rich Creek Cave, and Rich Creek Fish Hatchery were mapped approximately 1,500 feet right (west) of the proposed alignment. The proposed alignment is at a higher elevation than the spring which distances it from potential impact. However, the presence of sinking streams and open throat sinkholes could provide direct conduit to the subsurface flow.	MVP contacted the Red Sulphur Public Service District and is providing support to the PSD to develop a contingency plan to ensure no interruption of water service during construction. Also, see Note <u>c/</u> and Note <u>d/</u> at bottom of this table	Monroe
195.52	Sinkhole	Minor potential for impact - Highlighted for construction inspection	No	Sinkhole located approximately 80 feet left (east) of the proposed alignment	See Note <u>c/</u> and Note <u>d/</u> at bottom of table	Monroe
195.56	Sinkhole	Minor potential for impact - Highlighted for construction inspection	No	Several sinkholes mapped by desktop review approximately 250 feet to the right (west) of the proposed alignment.	See Note <u>b/</u> and Note <u>d/</u> at bottom of table	Monroe
195.72	Contact - limestone	Negligible potential for impact	No	End of limestone area (approximately)	n/a	Monroe
196.80	Contact - Tonoloway limestone		Yes	Several short sections of Tonoloway limestone.	n/a	Giles
198.48	Contact - limestone to dolomite	Negligible potential for impact	Yes	Begin dolomite area (Knox Group). Medium karstification potential. Complex structural disconformity due to ancient thrust faulting (Narrows Fault), preferential hydrology, possible voids.	n/a	Giles
200.20	Sinkhole	Negligible potential for impact	No	Sinkholes located greater than 1,000 feet left (Northeast) of alignment	See Note <u>b/</u> and Note <u>d/</u> at bottom of table	Giles
200.73	Contact - dolomite to limestone	Negligible potential for impact	Yes	End dolomite area (Knox Group). Begin limestone (undivided) area. High karst feature potential.	n/a	Giles

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200.85	Lhoist Cave	Negligible potential for impact	Yes	Lhoist Cave is located approximately 370 feet right (southwest) of the proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
201.00	Several sinkholes	Negligible potential for impact	Yes	Several sinkholes approximately 400 to 1,000 feet to left (northeast) of proposed alignment, distributed approximately linearly along a southwest trending surface drainage.	See Note <u>b/</u> at bottom of table	Giles
201.40	Sinkhole complex	Negligible potential for impact	Yes	Sinkhole complex approximately 1,000 feet right (southwest) and on the other side of a topographic high from the proposed alignment. Spring and swallet associated with sinkhole.	See Note <u>b/</u> at bottom of table	Giles
201.66	Sinkholes	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Sinkholes observed approximately 80 feet left and 60 feet right of proposed MVP alignment. Another cluster of sinkholes further to the right (southwest) prevents avoidance of sinkholes altogether.	See Note <u>c/</u> at bottom of table	Giles
202.05	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	A small natural opening is within 50 feet left (northeast) of alignment in an area of cutter and pinnacle karst. Possible cutter or even animal hole.	See Note <u>c/</u> at bottom of table	Giles
202.08	Cave	Negligible potential for impact	Yes	Crooks Crevice, 50-foot pit along roadside approximately 800 feet right (southwest) of proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
202.32	Contact - limestone	Negligible potential for impact	Yes	End of limestone (undivided) area	n/a	Giles
202.73	Spring	Negligible potential for impact	Yes	Small spring approximately 830 feet left (northeast) of alignment that serve as livestock watering sources.	See Note <u>b/</u> at bottom of table	Giles
204.06	Spring	Negligible potential for impact	No	Little Stoney Spring is located approximately 1,100 feet right (south) of proposed MVP alignment.	See Note <u>b/</u> and Note <u>d/</u> at bottom of table	Giles

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205.02	Contact - begin limestone	Minor potential for impact - Highlighted for construction inspection	Yes	Begin limestone (undivided) area. Upper limestone contact in drainage swale with high potential for voids in bedrock. High karst potential with significant cave and karst feature development.	Karst Specialist Team to provide more intensive inspection during construction	Giles
205.02	Cave	Minor potential for impact - Highlighted for construction inspection	Yes	Eight Point Pit entrance is approximately 250 feet right (West).	See Note <u>b/</u> at bottom of table	Giles
205.04	Cave	Negligible potential for impact	Yes	Williams Contact Shaft entrance is approximately 500 feet right (west).	See Note <u>b/</u> at bottom of table	Giles
205.20	Cave	Minor potential for impact - Highlighted for construction inspection	Yes	High Voltage Cave is located approximately 140 feet left (east), in APCO high voltage electric transmission easement clearing. The area southwest of the electric line has large bedrock benches and pinnacles.	See Note <u>c/</u> at bottom of table	Giles
205.20	Note	Negligible potential for impact	Yes	Exposed bedrock, heavy benches, thin overburden mantle. This observation is characteristic of the relatively near vicinity of the proposed alignment and not limited to the specific mile post.	n/a	Giles
205.45	Sinkhole	Negligible potential for impact	Yes	Shallow sinkhole approximately 250 feet left (northeast) of proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
205.48	Sinkhole and cave	Negligible potential for impact	Yes	Sinkhole is approximately 150 feet left (northeast) of MVP alignment. Conklin Sink Cave entrance is approximately 440 feet left (east) of alignment. Proposed MVP alignment crosses watershed surface drainage to Conklin Sink Cave.	See Note <u>c/</u> at bottom of table	Giles
205.69	Contact - limestone to dolomite	Negligible potential for impact	Yes	End of undivided limestone area. Begin dolomite area (Knox Group). Moderate karst feature potential.	n/a	Giles

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205.89	Sinkhole	Negligible potential for impact	Yes	Sinkhole observed approximately 50 feet left (northeast).	See Note <u>c/</u> at bottom of table	Giles
206.90	Contact - dolomite to limestone	Negligible potential for impact	Yes	End of dolomite area. Begin limestone (undivided) area. Exposed bedrock, benches, pavement, pinnacles, thin overburden mantle.	n/a	Giles
207.55	Contact - end limestone	Negligible potential for impact	Yes	End of limestone (undivided) area. Exposed bedrock, benches, pavement, pinnacles, thin overburden mantle.	n/a	Giles
207.72	Swallet	Minor potential for impact - Highlighted for construction inspection	No	Sinking stream dye traced to Doe Creek Spring on New River by VaDCR. Approximately 430 feet to right (south) of proposed alignment. No sink point was identified during field review (wet weather).	See Note <u>b/</u> and Note <u>d/</u> at bottom of table	Giles
208.67	Contact - begin limestone	Minor potential for impact - Highlighted for construction inspection	Yes	Begin limestone (undivided) area. High karst feature potential.	n/a	Giles
208.85	Sinkhole	Negligible potential for impact	Yes	Sinkhole on east side of access road, approximately 1,000 feet right (southwest) of alignment.	See Note <u>b/</u> at bottom of table	Giles
209.00	Swallet, Losing stream	Minor potential for impact - Highlighted for construction inspection	Yes	Crossing a losing stream. Multiple stream sink points approximately 760 feet left (northeast) of proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
209.10	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Proposed MVP alignment is on edge of sinkhole, to left (northeast).	See Note <u>c/</u> at bottom of table	Giles
209.30	Cave	Negligible potential for impact	Yes	Pighole cave system located more than 1/4-mile left (northeast) of proposed alignment.	n/a	Giles
209.33	Cave	Negligible potential for impact	Yes	Echols Cave approximately 970 feet right (southwest) of alignment, and 150 feet above proposed access road.	n/a	Giles

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209.62	Contact - end limestone	Negligible potential for impact	Yes	End of undivided limestone area. Begin dolomite area (Knox Group). Moderate karst potential.	n/a	Giles
209.75	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Compound sinkhole approximately 150 feet right (south). Additional sinkholes in vicinity farther away.	See Note <u>c/</u> at bottom of table	Giles
209.95	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 660 feet to right (southeast).	See Note <u>b/</u> at bottom of table	Giles
210.54	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 80 feet to left (north).	See Note <u>c/</u> at bottom of table	Giles
210.62	Sinkhole	Negligible potential for impact	Yes	Several sinkholes to left (south) approximately 170 feet or more.	See Note <u>b/</u> at bottom of table	Giles
210.65	Contact - dolomite to limestone	Minor potential for impact - Highlighted for construction inspection	Yes	Begin limestone (undivided) area. This area has been historically known to contain caves and karst features. High karst feature potential.	n/a	Giles
211.05	Cave, Spring	Negligible potential for impact	Yes	Tawneys Cave and Spring at base of hill and road embankment. Two cave entrances approximately 800 feet to left (northeast) of alignment. Extent of Tawney's cave does not extend beneath the alignment.	n/a	Giles
211.39	Sinkholes	Negligible potential for impact	Yes	Two sinkholes approximately 200 feet and 350 feet left (northeast) of the alignment.	See Note <u>b/</u> at bottom of table	Giles
211.45	Contact - end limestone	Negligible potential for impact	Yes	Undivided limestone ends, Martinsburg siliciclastics begin.	n/a	Giles
211.66	Cave	Negligible potential for impact	Yes	Hog Hole No. 2. A small cave approximately 140 feet to right (southwest).	See Note <u>c/</u> at bottom of table	Giles
211.67	Contact	Negligible potential for impact	Yes	Narrow band of limestone. Hog Hole Cave associated with this formation.	n/a	Giles
212.43	Contact - begin dolomite	Negligible potential for impact	Yes	Saltville thrust fault (ancient, inactive fault) disconformity. Preferential hydrology, possible voids	n/a	Giles

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212.85	Contact	Negligible potential for impact	Yes	Narrow band of undivided limestone and Honaker / Nolichucky dolomite.	n/a	Giles
213.08	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 350 feet left (northeast) of alignment.	See Note <u>b/</u> at bottom of table	Giles
214.03	Sinkholes	Negligible potential for impact	Yes	Several sinkholes between 50 and 150 feet left (northwest) of the proposed alignment	See Note <u>c/</u> at bottom of table	Giles
214.26	Spring	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Proposed alignment cuts immediately above and approximately 100 feet left of a large spring at the convergence of two topographic drainage features.	Primary concern is the potential to disrupt the spring hydrology and compromising the spring water flow. See Note <u>c/</u> at bottom of this table	Giles
214.39	Sinkholes	Negligible potential for impact	Yes	Several sinkholes in vicinity of a proposed access road.	n/a	Giles
214.67	Sinkholes	Negligible potential for impact	Yes	Two <u>c/</u> sinkholes in vicinity of proposed access road.	n/a	Giles
214.86	Spring	Minor potential for impact - Highlighted for construction inspection	Yes	Large spring located approximately 360 feet right (east) and upstream of the proposed alignment. Alignment crosses the spring's stream. The source is most likely from the flank of the mountain to the northeast.	See Note <u>c/</u> at bottom of table	Giles
214.98	Cave	Negligible potential for impact	Yes	Canoe Cave is located approximately 1,000 feet right (southeast) of the alignment.	See Note <u>b/</u> at bottom of table	Giles
215.01	Sinkhole	Negligible potential for impact	Yes	Sinkhole containing debris approximately 240 feet right (southeast) of proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
215.24	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 50 feet right (southeast) of proposed alignment.	See Note <u>c/</u> at bottom of table	Giles
215.35	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 440 feet right (southeast) of the proposed alignment.	See Note <u>b/</u> at bottom of table	Giles

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215.59	Contact - begin limestone	Minor potential for impact - Highlighted for construction inspection	Yes	End of dolomite area (Knox). Begin limestone (undivided) area. High karst feature potential.	n/a	Giles
215.60	Sinkholes	Negligible potential for impact	Yes	Two sinkholes approximately 410 feet right (southeast) of proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
215.91	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 280 feet left (northwest) of proposed alignment.	See Note <u>b/</u> at bottom of table	Giles
216.22	Cave, Stream insurgence	Minor potential for impact - Highlighted for construction inspection	Yes	A possible cave with stream insurgence approximately 240 feet right (southeast) of the proposed alignment. The alignment is in the vicinity of the insurgence drainage and karst related features may be relatively near the surface.	See Note <u>c/</u> at bottom of table	Giles
216.52	Cave, spring, stream insurgence and sinkholes	Minor potential for impact - Highlighted for construction inspection	Yes	Jones Cave, a large spring, and sinkholes, one with a stream insurgence are 400 to 600 feet left (northwest) of the proposed alignment. The proposed alignment also crosses the watershed leading to the sinkholes and crosses the conveyance of a spring-fed stream where the spring is located upslope of the proposed alignment. A proposed access road along existing private and farm roads is located near the sinkholes and Jones Cave.	See Note <u>c/</u> at bottom of table	Giles / Craig
216.65	Spring	Negligible potential for impact	Yes	A spring that serves three <u>d/</u> houses, located approximately 800 feet right (southeast) of proposed alignment	See Note <u>b/</u> at bottom of table	Giles
216.89	Sinkholes	Minor potential for impact - Highlighted for construction inspection	Yes	Two <u>c/</u> sinkholes just left (west) and along workspace of the proposed alignment, and a historic report of a filled sinkhole approximately 300 feet left (northwest) of the proposed alignment.	See Note <u>c/</u> at bottom of table	Giles

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217.03	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 120 feet right (east) of the proposed alignment.	See Note <u>c/</u> at bottom of table	Craig
217.13	Sinkholes	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 50 feet left (northwest) of the proposed alignment. Additional sinkholes approximately 320 and 370 feet left.	See Note <u>c/</u> at bottom of table	Craig
217.24	Sinkhole	Negligible potential for impact	Yes	Sinkhole 180 feet left (northwest) of the proposed alignment.	See Note <u>b/</u> at bottom of table	Craig
218.09	Sinkhole	Negligible potential for impact	Yes	A sinkhole is located approximately 230 feet left (north) of the proposed alignment.	See Note <u>b/</u> at bottom of table	Craig
218.15	Cave and stream insurgence sinkhole	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Possible cave entrance and stream insurgence within an open throat sinkhole approximately 140 feet left (northeast), and about 40 feet down a very steep hill from the proposed alignment. The alignment is likely downstream of the insurgence drainage and karst related features may be relatively near the surface.	See Note <u>c/</u> at bottom of table	Craig
218.20	Contact	Negligible potential for impact	Yes	End of limestone area (approximate).	n/a	Craig
221.70	Contact - Pulaski Fault, begin dolomite. Begin Mount Tabor sinkhole plain	Minor potential for impact - Highlighted for construction inspection	Yes	Approximate beginning of Mt Tabor sinkhole plain (MP 221.70). Approximate location of Pulaski Fault. Geology is poorly mapped in this area. This area is historically known to have extensive and well documented cave and karst development. Dye traces in the Mount Tabor sinkhole plain indicated that karst water flow toward Slussers Chapel Cave and Mill Creek Cave and spring in the TNC-DCR natural area preserve.	See Note <u>c/</u> and Note <u>d/</u> at bottom of table. MVP is evaluating an alternate alignment to avoid the sinkhole plain to the extent practical. See Note <u>d/</u> at bottom of table for certain properties.	Montgomery

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221.86	Note, Stream insurgence	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Alignment stream crossing in vicinity of Pulaski Fault, edge of karst area. Stream insurgence approximately 150 feet left.	See Note <u>c/</u> at bottom of table	Montgomery
221.93	Cave, Stream insurgence	Negligible potential for impact	Yes	Slusser Chapel Cave and stream insurgence are approximately 3,000 feet downstream of the proposed alignment.	n/a	Montgomery
222.26	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 430 feet right (southeast).	See Note <u>b/</u> at bottom of table	Montgomery
222.40	Stream insurgence	Negligible potential for impact	No	A stream insurgence is located approximately 2000 feet right, downstream.	See Note <u>b/</u> at bottom of table	Montgomery
222.84	Note	Minor potential for impact - Highlighted for construction inspection	Yes	Alignment stream crossing in vicinity of Pulaski Fault, edge of karst area.	See Note <u>c/</u> at bottom of table	Montgomery
223.25	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 90 feet right (southwest). Several sinkholes trend to the southwest and appear to be distributed along a lineament.	See Note <u>c/</u> at bottom of table	Montgomery
223.33	Sinkhole	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Sinkholes along alignment workspace.	See Note <u>c/</u> at bottom of table	Montgomery
223.34	Sinkhole	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Open throat sinkhole approximately 70 feet left (north).	See Note <u>c/</u> at bottom of table	Montgomery
223.46	Sinkhole	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Sinkhole along alignment workspace.	See Note <u>c/</u> at bottom of table	Montgomery
223.70	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 310 feet right (southwest).	See Note <u>b/</u> at bottom of table	Montgomery

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224.00	Sinkhole	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Sinkhole along alignment workspace.	See Note <u>c/</u> at bottom of table	Montgomery
224.06	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 125 feet right (west).	See Note <u>c/</u> at bottom of table	Montgomery
224.33	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 720 feet left (northeast), and approximately 150 feet below access road.	See Note <u>b/</u> at bottom of table	Montgomery
224.59	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 40 feet right (southwest).	See Note <u>c/</u> at bottom of table	Montgomery
225.02	Sinkhole	Negligible potential for impact	No	Sinkhole approximately 470 feet right (south).	See Note <u>b/</u> and Note <u>d/</u> at bottom of table	Montgomery
225.61	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 195 feet right (west).	See Note <u>b/</u> at bottom of table	Montgomery
226.03	Cave	Moderate potential for impact - Additional evaluation during construction may be required	Yes	Orr Pit No.1, No.2. Located along proposed access road MVP-MN-266. The immediate area contains several very small sinkholes likely indicating cutter and pinnacle bedrock surface.	Adjust access road alignment.	Montgomery
226.18	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 165 feet right (southwest).	See Note <u>b/</u> at bottom of table	Montgomery
226.20	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 95 feet left (northeast).	See Note <u>c/</u> at bottom of table	Montgomery
226.39	Sinkholes	Negligible potential for impact	Yes	Several sinkholes approximately 240+ feet left (northeast).	See Note <u>b/</u> at bottom of table	Montgomery
226.51	Sinkholes	Minor potential for impact - Highlighted for construction inspection	Yes	Several sinkholes approximately 145 feet left (northeast) along a lineament.	See Note <u>c/</u> at bottom of table	Montgomery
226.55	Sinkholes	Minor potential for impact - Highlighted for construction inspection	Yes	Several sinkholes approximately 150 feet right (southwest) along a lineament.	See Note <u>c/</u> at bottom of table	Montgomery

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226.89	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Sinkhole approximately 160 feet right (southwest) along a lineament.	See Note <u>c/</u> at bottom of table	Montgomery
226.80	Contact - limestone	Negligible potential for impact	Yes	Approximate contact of Lincolnshire New Market, and Edinburg Limestones. High potential for karst development.	n/a	Montgomery
226.89	Sinkhole lineament	Minor potential for impact - Highlighted for construction inspection	Yes	Several sinkholes are within a linear cluster roughly perpendicular to the proposed MVP pipeline, ranging from approximately 160 to 2,000 feet to the northeast and southwest. This lineament may represent a fracture or zone of weakness in the bedrock. There is a possibility of unconsolidated bedrock along this lineament extended. The access road also passes in the vicinity of these sinkholes.	See Note <u>c/</u> at bottom of table	Montgomery
227.23	Spring, Cave	Negligible potential for impact	Yes	Johnsons spring, water probably from the hollow to (northeast). Johnsons Cave carries a small stream and is approximately 430 feet right (southwest) of proposed MVP alignment. Several sinkholes located near Johnsons Cave and spring.	See Note <u>b/</u> at bottom of table	Montgomery
227.53	Sinkhole lineament	Negligible potential for impact	Yes	Sinkholes observed right (west). This lineament may represent a fracture or zone of weakness in the bedrock. There is a possibility of unconsolidated bedrock along this lineament extended.	See Note <u>b/</u> at bottom of table	Montgomery

APPENDIX L

Karst Features Identified within 0.25 mile of the Mountain Valley Project

Mile Post	Feature	Site Status	Field Confirmed?	Description <u>a/</u>	Potential Impacts and Recommendations for Avoidance/Mitigation	County
227.57	Losing Stream, Insurgence	Minor potential for impact - Highlighted for construction inspection	Yes	Losing stream and wet weather insurgence was observed approximately 100 feet right of proposed MVP alignment. May be associated with sinkhole lineament along ridge. Very likely contributes to the water flowing through Johnsons Cave and spring.	See Note <u>c/</u> at bottom of table	Montgomery
227.70	Stream insurgence	Negligible potential for impact	Yes	Stream insurgence was observed approximately 600 feet left the proposed alignment.	See Note <u>b/</u> at bottom of table	Montgomery
227.70	Contact - end Limestone	Negligible potential for impact	Yes	Limestone ends.	n/a	Montgomery
234.21	Contact - begin dolomite	Negligible potential for impact	Yes	Elbrook dolomite begins.	n/a	Montgomery
234.43	Stream insurgence	Minor potential for impact - Highlighted for construction inspection	Yes	A minor stream sinks approximately 140 feet right (southwest).	See Note <u>c/</u> at bottom of table	Montgomery
234.53	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Numerous small sinkholes (about 6 feet diameter) likely indicate a cutter and pinnacle bedrock surface between MP-234.50 and MP-234.70. These are along and to the left (east) of the alignment.	See Note <u>c/</u> at bottom of table	Montgomery
234.73	Sinkhole	Minor potential for impact - Highlighted for construction inspection	Yes	Proposed alignment along steep edge of a 1.0 Ac., 34 foot deep sinkhole.	See Note <u>c/</u> at bottom of table	Montgomery
235.09	Sinkhole	Negligible potential for impact	Yes	Sinkhole approximately 160 feet left (east) of the proposed alignment.	See Note <u>b/</u> at bottom of table	Montgomery
235.13	Sinkholes	Negligible potential for impact	Yes	Two sinkholes approximately 65 feet right (southwest) of the proposed alignment.	See Note <u>c/</u> at bottom of table	Montgomery
235.79	Contact	Negligible potential for impact	Yes	Begin Rome Formation. Very limited karst potential.	n/a	Montgomery
235.79	Note	Negligible potential for impact	Yes	No karst features identified in this proposed alignment.	n/a	Montgomery
238.67	Contact	Negligible potential for impact	Yes	End Rome Formation. Karst assessment ends.	n/a	Montgomery

APPENDIX L

Karst Features Identified within 0.25 mile of the Mountain Valley Project

Mile Post	Feature	Site Status	Field Confirmed?	Description <u>a/</u>	Potential Impacts and Recommendations for Avoidance/Mitigation	County
Source: Draper Aden Associates , 2016						
Notes:						
<u>a/</u>	left and right location references are relative to increasing milepost on proposed alignment.					
<u>b/</u>	In general, uncontrolled storm water or construction-related fluid release from the Limit of Disturbance could potentially impact groundwater or surface water via the karst feature(s) or spring, and/or accentuate soil raveling and sinkhole formation. Field reconnaissance indicates negligible risk for impact to the karst feature or spring and BMPs will prevent incidental impacts. Construction may encounter pinnacled bedrock or unstable soil or shallow groundwater. Recommendations: Do not convey stormwater or discharge construction-related fluid to a karst feature or drainage leading thereto; Implement Project-specific Erosion Sediment Control Plan and Spill Prevention Control and Countermeasures Plan.					
<u>c/</u>	The karst feature(s) and/or drainage is proximal to the Limit of Disturbance. In general, uncontrolled storm water or construction-related fluid release from the Limit of Disturbance could potentially impact groundwater or surface water via karst feature(s) or spring, and/or accentuate soil raveling and sinkhole formation. Field reconnaissance indicates negligible risk for impact to the karst feature or spring and BMPs will prevent incidental impacts. Construction may encounter pinnacled bedrock or unstable soil or shallow groundwater. Recommendations: Adjust the construction right-of-way to the extent practical to avoid a karst feature. If avoidance is not possible, refer to Karst Mitigation Plan for mitigation and stabilization; Do not convey stormwater or discharge construction-related fluid to a karst feature or drainage leading thereto; Implement Project-specific Erosion Sediment Control Plan and Spill Prevention Control and Countermeasures Plan.					
<u>d/</u>	The primary concern is that MVP was not permitted access to the property to field verify karst feature(s). See Note <u>b/</u> or Note <u>c/</u> above for recommendations. Further recommendations: Provide MVP permission to conduct field verification of the property for potential karst feature(s).					

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