



Karst Terrain

As proposed, the Mountain Valley Pipeline (MVP) project is a natural gas pipeline system that spans approximately 301 miles from northwestern West Virginia to southern Virginia – and as an interstate pipeline will be regulated by the Federal Energy Regulatory Commission (FERC).

The MVP project team understands and respects issues related to karst topography, and has hired Draper Aden Associates, an environmental engineering, surveying, and design firm, based in Blacksburg, Virginia, to study the project and provide their expertise in identifying and protecting karst topography along the proposed pipeline route.

What is karst terrain?

Karst terrain is a distinct landscape that forms when rain or snow permeates soil and erodes soluble rocks, such as limestone or dolomite, effectively dissolving minerals to form passages below the Earth's surface known as conduits. As minerals dissolve over time, the conduits grow or transform to create sinkholes, caves, or underground waterways.

Karst features are most visible at ground surface in the form of rounded depressions in the landscape known as sinkholes, which are caused by the dissolution of bedrock or collapse of shallow caves. Underground caves are also an excellent example of karst topography. Caves are hollow, underground areas formed by the erosion of rock, resulting in spectacular geologic structures large enough for a human to enter.

Karst terrain exists across the United States and is found beneath approximately 40% of the lands east of the Mississippi River, where several thousand miles of pipeline have been constructed and continue to operate safely. The key is to identify sensitive karst features and water resources, take steps to protect or avoid them, and have a mitigation plan in place.

Water in karst terrain can flow quickly through large conduits, thus becoming vulnerable to pollution transport. Given the porous and changing nature of karst topography, as well as its value to the environment, the MVP project team is committed to developing and implementing an effective karst mitigation plan.

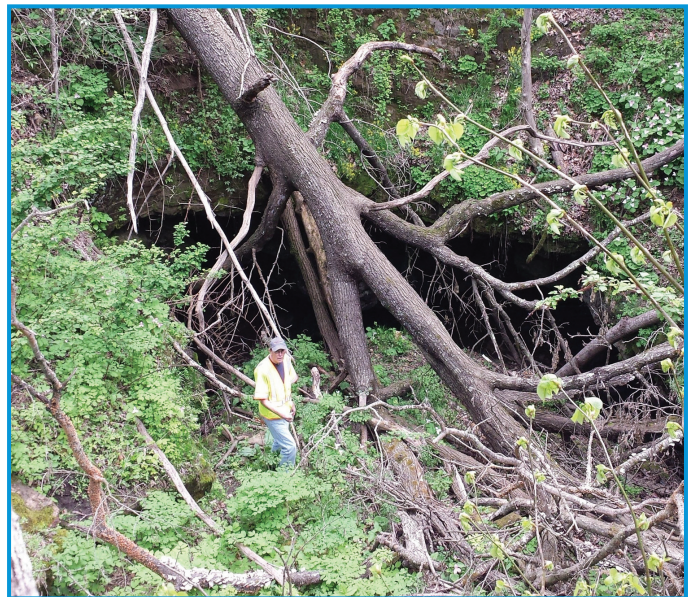
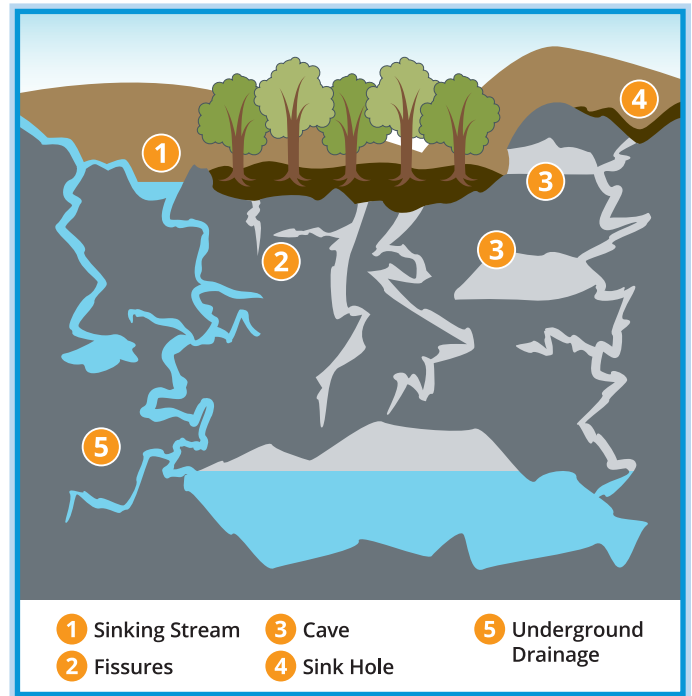
How does the MVP team plan to mitigate karst terrain issues?

The MVP project team has been successful in identifying karst topography and formulating route modifications and a mitigation plan to deal with potential concerns. Based on a review of geographic maps and onsite inspections, the MVP team has concluded that approximately 30 miles of the proposed pipeline route will cross karst terrain. The proposed MVP route is expected to encounter karst topography in Monroe County in West Virginia, as well as Giles, Craig, and Montgomery Counties in Virginia. When possible, the proposed route has been modified to avoid known areas of karst features and the MVP team continues to evaluate areas for avoidance measures.

With the aid of Draper's expertise, the MVP team has developed a Karst Mitigation Plan* to provide recommendations, inspection guidelines, and a working protocol on how to safely construct the proposed pipeline in karst terrain. Karst specialists will be deployed prior to and during construction to help crews confirm, monitor, and mitigate karst features. If the MVP team encounters a previously unidentified karst feature, protocol dictates that work will stop within 150 feet of the feature and the contractor will commence inspection and evaluation of the situation before resuming activities. If previously unidentified karst features are discovered and mitigation, such as sinkhole stabilization, is required, the MVP project team will consult with appropriate state agencies and proceed with their recommendations.

The safety of our communities, our employees, our contractors, and our pipeline will always remain a top priority – as will the preservation and protection of the environment. These are the standards we live by every day, reinforcing what we mean when we say we are completely committed to building the Mountain Valley Pipeline safely and responsibly. Nothing is more important to us.

**The full Karst Mitigation Plan can be found in Appendix 6-D.2 of Resource Report 6, submitted in the October 23, 2015 formal certificate application to the FERC.*



An underground stream flows from left to right just out of view in the entrance to this cave that is in a deep sinkhole. This particular type of feature is known as a 'karst window'.