

July 19, 2017

July 25, 2017

Maryland Geological Survey response to MDE Questions on the eastern panhandle project.

Maryland Department of the Environment Questions regarding the eastern panhandle project

1. The applicant is proposing to use HDD at a depth of 114 feet under the Potomac River, one mile upstream from the MD 522 bridge at Hancock. Based on MGS's knowledge of the topography/geology of this location and proposed depth, can MSG provide its perspective on the potential environmental risks posed by drilling at this location and at this depth? Would a lesser or greater depth increase or decrease environmental risk and, if so, to what degree? How confident are you of your views/conclusions? What is the state of the science and experience with HDD in this geology at this depth in this part of Maryland? Well understood—or, lots of uncertainties?

Based upon the >100' depth, we cannot identify any undue environmental risk at drilling through the Will Creek Shale and beneath the Potomac at that location. I am not really sure whether a difference in depth would either increase or decrease the nominal risks already evident. W/ regards to our experience, we have little, but that technology has been around for some time and from what my contacts inform me, it is not a high-risks methodology.

2. What type of environmental risk exists of an HDD operation in this area? Of specific concern is the potential release of drilling fluid during installation and the consequences of such a release. How far downstream might materials travel if there were such a release? IS there the ability to estimate downstream concentrations of any pollutants that might be released?

The environmental risks at the Potomac River crossing seem minor, and any drilling fluid release would be minor compared to the average flow of the River. This would even be less significant during winter and spring high flow periods. However, there are several other places in its course in Maryland that the pipeline crosses areas underlain by rocks with modest potential for the reactivation of sinkholes, namely the McKenzie Formation (Figure 1). While MGS has not conducted a karst study of this part of the state, existing LiDAR (Figure 2) seems to show no obvious karst feature development along the pipeline course in Maryland. That being said we recommend caution where the pipeline alignment crosses the outcrop belt of the McKenzie Limestone since it is the most karst susceptible unit within that area.

3. What are the risks associated with the operation of the pipeline over time? Specifically, any concern regarding groundwater "piping" along the installed line generating voids that could compromise the lines integrity?

We have not insight as to pipeline lifetime histories or potential for degradation and really cannot add much on this topic.

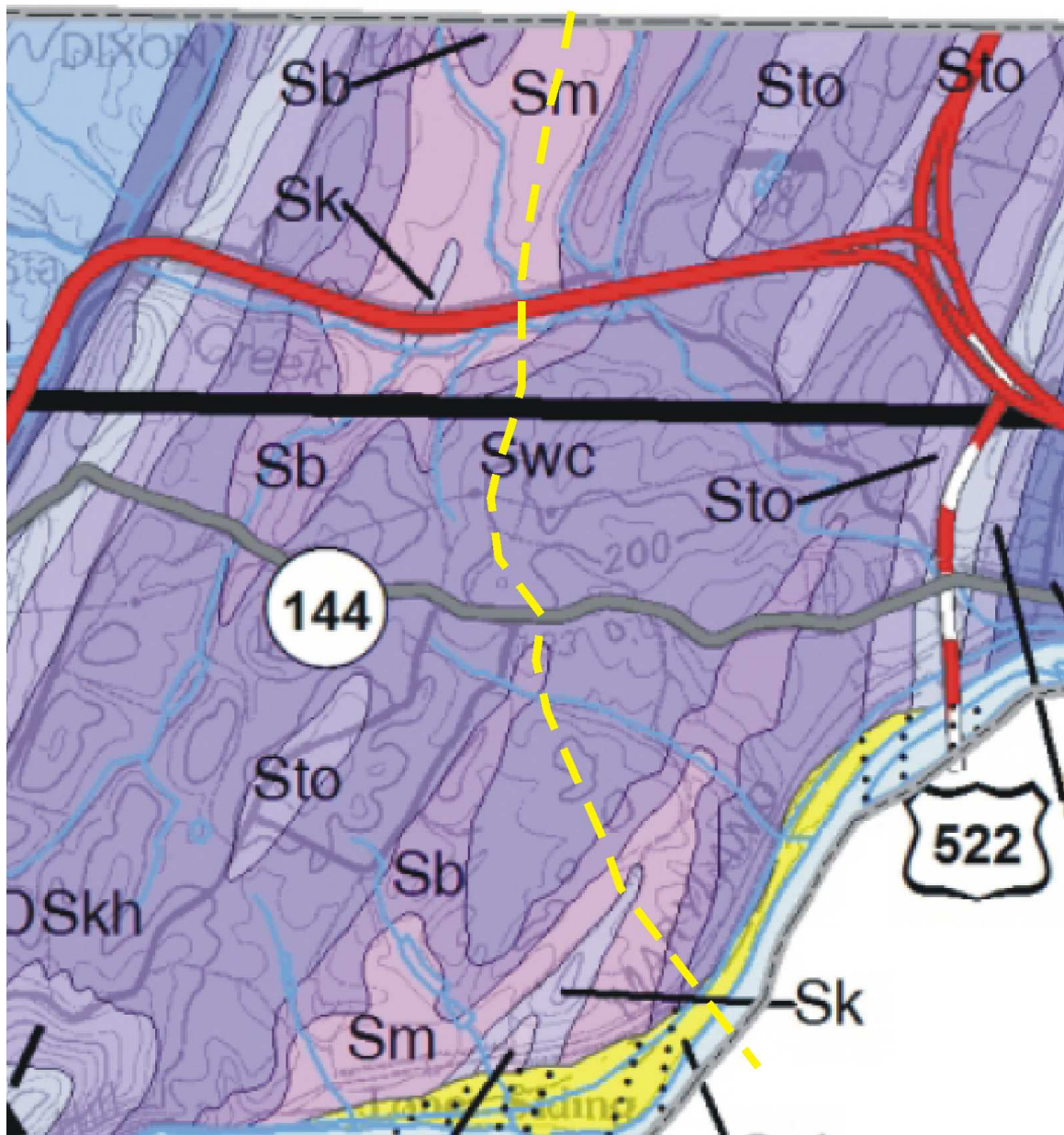


Figure 1.- Geologic map of area underlain by proposed pipeline course.
 Sm=McKenzie Formation-limestone and shale=karst potential modest
 Sb=Bloomsburg Formation-red sandstone and shale=karst potential none
 Swc=Wills Creek Formation-gray shale and tan dolomite=karst potential low
 Sk=Kefer Sandstone-white to tan sandstone=karst potential, none

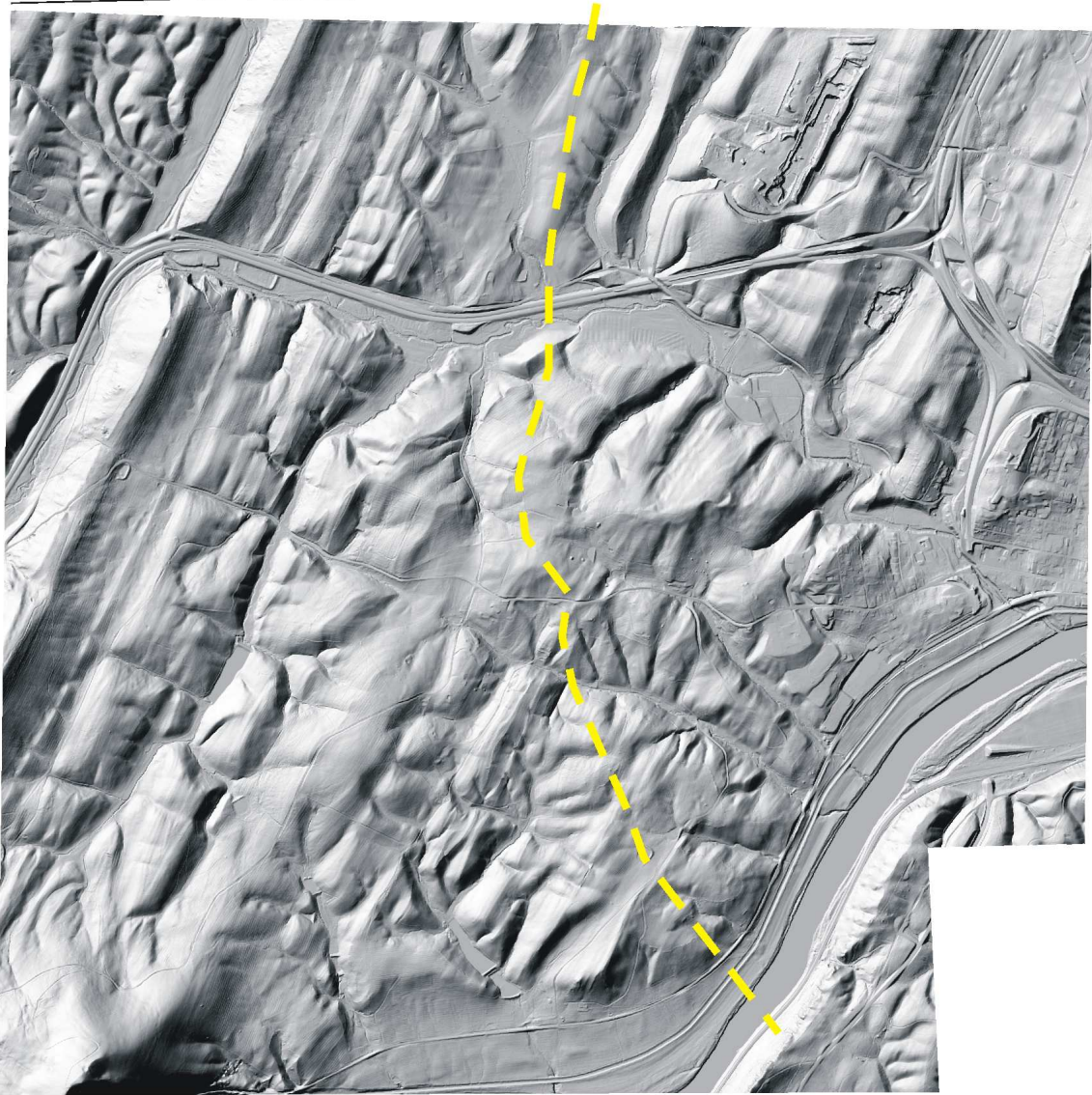


Figure 2.- LIDAR image of proposed pipeline course.

