Hydrogeomorphic Functional Assessment Summary
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Functional assessments are used to evaluate existing conditions using structural measures that are associated with ecosystem functions. The assessment can then be used as a tool to assess impacts, to determine mitigation requirements, and/or to monitor future changes, both positive and negative, as a result of a proposed activity. In the late 2000s, the United States Army Corps of Engineers (USACE) in the Huntington District identified the need for a stream assessment tool that would consider aquatic resources functions as part of the requirements found in the 2008 Mitigation Rule. Specifically, applicants who apply for authorization under Section 404 of the Clean Water Act are required to offset loss of aquatic resource functions as part of compensatory mitigation and, at that time, a rapid and repeatable methodology for stream assessment was unavailable. To meet the need for such methodology, the USACE Army Engineer Research and Development Center (ERDC) in cooperation with the USACE Huntington District developed the *Operational draft regional guidebook for the functional assessment of high-gradient ephemeral and intermittent headwater streams in western West Virginia and eastern Kentucky*, which used a Hydrogeomorphic (HGM) Approach for assessing streams. The HGM Approach, a collection of concepts and methods used to develop functional indices, was already in use to assess wetlands. Adapting this methodology to streams allowed researchers to collect data in stream segments that were often dry and for which standard assessment methodologies did not provide sufficient information to assess stream function. In 2017, ERDC updated the operational draft, which expanded the reference domain and included shadeable, wadeable perennial streams.

When determining what measures should be assessed for the Mitigation Framework document for the Mountain Valley Pipeline project (Project), Mountain Valley Pipeline LLC (Mountain Valley) considered the use of the HGM Approach for perennial streams and determined that using that methodology was not warranted for several reasons. First, unlike intermittent or ephemeral streams, most standard assessment tools could be utilized for perennial streams because, in most cases, flow was present. Second, the HGM Approach includes streams that have the potential for full canopy closure. The perennial streams found within the limits of disturbance for the Project do not have full canopy cover due to clearing that occurred in 2018, as well as ongoing and future vegetation maintenance once the Project is complete and in operation. Due to this prevailing condition, incorporating an HGM score would potentially devalue the stream, which could result in an undesirable reduction in mitigation requirements. As designed, the HGM Approach for streams is used in conjunction with West Virginia's Stream and Wetland Valuation Metric (SWVM). In this calculator, the HGM score accounts for 50 percent of a stream's value meaning that, if a stream scores poorly for HGM categories, it is reflected in the SWVM score. The Project's pipeline right-of-way is 75 feet along stream corridors, and actual

stream impacts are often limited to the area necessary to place the pipeline and to allow for pipeline access. Thus, one of Mountain Valley's major concerns was that the HGM Approach, which utilizes several variables reflecting riparian condition, may not support instream findings due to the minimal length of disturbance and would artificially depress assessment of the functional value of the stream due to the restricted assessment reach within the right-of-way.

One example of this concern is associated with canopy cover. Canopy cover is used to assess habitat function and biogeochemistry function for perennial streams. Canopy cover can influence temperature and nutrient cycling and can indicate the habitat condition in the riparian corridor. The HGM values for canopy cover range from 1.0 (88 percent cover or greater) to 0.0 for streams with less than 20 percent canopy cover. Canopy cover is indirectly related to water temperature and increases in water temperature reduce dissolved oxygen content. Canopy cover is also related to nutrient cycling where streams with reduced canopy do not have as much allochthonous input that is processed instream as compared to streams with complete canopies. A canopy cover score of zero would assume that associated functions are not occurring. Under normal flow conditions, detrimental temperature increases are not anticipated due to the limited length of exposure (75 feet), and a complete lack of nutrient processing is also unlikely within this narrow corridor.

Lack of tree cover also impacts large woody debris, riparian/buffer zone tree diameter, riparian/buffer zone tree density, and coefficients of conservation. If these variables are zero and all other measures are perfect, the result is a functional capacity to near 0.60. More realistically, if the other variables are closer to 0.80, the functional capacity index is closer to 0.50. When the HGM score is used in the SWVM calculator, it accounts for 50 percent of the index, meaning that the lower the HGM score will reduce the overall SWVM score. By omitting, instead of zeroing, this variable in the calculation, the resultant SWVM score is higher, which is a more conservative approach for restoration and mitigation.