

From: [Jennifer Stanhope](#)
To: [Jordan Richard](#)
Subject: Candy darter and MVP
Date: Monday, March 20, 2017 9:57:00 AM
Attachments: [2017Feb Biological evaluation for T,E,S species](#)

Hi Jordan,

Cindy came and talked to me to make sure we don't forget about candy darter for MVP. Attached is a report that MVP submitted to the Forest Service and there is mention of Candy darter. Will you take a look and let me know what you think? I'm also awaiting the revised BA that MVP submitted to FERC and will forward to you when I get it. I don't know yet how they addressed our comments when we provided them on the draft BA.

Thanks!

Jen

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PRIVILEGED AND CONFIDENTIAL

**BIOLOGICAL EVALUATION FOR THREATENED, ENDANGERED, AND
SENSITIVE (TES) SPECIES**

MOUNTAIN VALLEY PIPELINE

**JEFFERSON NATIONAL FOREST
EASTERN DIVIDE RANGER DISTRICT**

28 February 2017

Prepared for:

U.S. Department of Agriculture, Forest Service
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Appendix A: Figures

Appendix B: Documentation of Threatened, Endangered, or Sensitive Species Occurrences for the Jefferson National Forest (Occurrence Analysis Results Table)

Appendix C: Habitat Classifications within the Identified Areas along MVP's potential routes for the Proposed Mountain Valley Pipeline Project within the Jefferson National Forest in Virginia and West Virginia

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1.0 Introduction

1.1 Project Introduction

Mountain Valley Pipeline, LLC (MVP), a joint venture between EQT Midstream Partners, LP, NextEra Energy, Inc., WGL Holdings, Inc., Con Edison Gas Midstream, LLC, and RGC Midstream, LLC, is seeking a Certificate of Public Convenience and Necessity (Certificate) from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act authorizing it to construct and operate the proposed Mountain Valley Pipeline Project (Project) located in 17 counties in West Virginia and Virginia. MVP plans to construct an approximately 488.3-kilometer (303.4-mi), 106.7-centimeter (42-in) diameter natural gas pipeline to provide timely, cost-effective access to the growing demand for natural gas for use by local distribution companies (LDCs), industrial users and power generation in the Mid-Atlantic and southeastern markets, as well as potential markets in the Appalachian region.

The proposed pipeline will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to the existing Transcontinental Gas Pipe Line Company, LLC's (Transco) Zone 5 compressor station 165 in Pittsylvania County, Virginia (Appendix A Figure 1). In addition to the pipeline, the Project will require approximately 171,600 horsepower (hp) of compression at three compressor stations currently planned along the route as well as measurement, regulation, and other ancillary facilities required for the safe operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day (MMDth/d) of natural gas.

1.2 Mountain Valley Pipeline and Jefferson National Forest

Approximately 3.4 miles of the proposed alignment cross Jefferson National Forest (JNF) lands in Monroe County, West Virginia and Giles and Montgomery counties, Virginia. The 6-mile Pocahontas Road (Forest Road 972) and 1-mile Mystery Ridge Road (Forest Road 11080) in Giles County, Virginia are currently proposed to provide access to portions of the alignment near Peters Mountain. Additionally, two additional temporary workspaces (ATWS) are currently proposed in Montgomery County. No ancillary facilities or new access roads are proposed to be constructed on JNF land.

Alternative pipeline alignments were considered and reviewed in the field on JNF. Alternatives 110, 110J, and 110R, identified in Permit BBW433301T issued on April 30, 2015, cross portions of Monroe County, West Virginia as well as Craig, Montgomery, and Roanoke counties, Virginia. Additionally, an extended survey area was requested to the west of the previously approved survey area near Craig Creek in Amendment #1 of Permit BBW433303T. These alternatives and extended survey area are not included as part of the proposed alignment. Alternative 200 (Montgomery

County, Virginia) is included in Amendment #1 of Permit BBW433301T issued on September 29, 2015. This alternative has been incorporated into the proposed alignment.

Tracts were created in order to reference individual crossings of the proposed alignment on JNF lands (Appendix A Figure 2, Maps 1-12). The Project crosses the JNF Eastern Divide Ranger District.

1.3 Biological Evaluation

A Biological Evaluation (BE) is required (Forest Service Manual, Section 2672.4) for all United State Forest Service (USFS) planned, funded, executed, or permitted programs and activities, to assess possible effects on endangered, threatened, proposed, or sensitive species. This differs from a Biological Assessment (BA; referenced in Section 5.0 of this BE) as it is prepared for major federal construction projects requiring an Environmental Impact Statement, in accordance with legal requirements under Section 7 of the Endangered Species Act (ESA).

The objectives of this BE are to:

- Ensure that USFS actions do not contribute to loss of viability of any native or desired non-native plants or animals or contribute to trends toward federal listing of any species;
- Comply with requirements of ESA to ensure that actions of federal agencies will not jeopardize or adversely modify the habitat of federally listed species; and,
- Provide a process and standard by which to ensure that all federal threatened, endangered, and proposed species, and USFS sensitive species receive full consideration in the decision-making process.

JNF has occurrences of and provides known suitable habitat for several threatened, endangered, and sensitive (TES) species, all of which are considered in this BE. A list of species addressed is provided in Appendix B. This BE documents the analysis of potential effects of the project to TES species and associated habitat. It also serves as biological input into the environmental analysis for project-level decision-making to ensure compliance with the ESA, National Environmental Policy Act (NEPA), and National Forest Management Act (NFMA).

2.0 Project Area

2.1 Proposed Alignment on JNF Land

Tracts were identified based on individual JNF crossings. In all, eight tracts were identified along the proposed alignment (Table 1; Appendix A Figure 2, Maps 1-11). Additional tracts for abandoned and alternate routes are referenced in this document but not included in Table 1. For terrestrial effects and impacts analysis, the Project area is considered to be the survey corridor on JNF land. The Project analysis area for aquatic species varies from the terrestrial area and is defined in Section 6.0.

Table 1. Tracts of Jefferson National Forest crossed by the proposed Mountain Valley Pipeline.

Tract	Alignment	Approximate Miles
001	Proposed	1.18
002	Proposed	0.11
003	Proposed	0.04
004	Proposed	0.02
005	Proposed	0.84
006	Proposed	0.96
008	Proposed	0.12
035	Proposed	0.19
Total		3.46

The Project crosses into Tract 001 of the JNF in Monroe County, West Virginia, southwest of the town of Lindside, and continues to the edge of JNF land at the border of Virginia. The proposed alignment continues through Virginia and into Tracts 002, 003, 004, 005, 006, 008, and 035 (Appendix A Figure 2, Maps 1-12).

The West Virginia portion of the Project lies in the Allegheny Plateau, Allegheny Mountains, and Valley and Ridge Physiographic regions. In Virginia, the Project lies in the Valley and Ridge, Blue Ridge, and Piedmont Physiographic regions. All JNF areas crossed by the Project are within the Valley and Ridge Province (Fenneman 1938).

The geologic strata of the Valley and Ridge mountains consist of several bedrock formations. Silurian sandstones underlie ridge tops and upper to middle slopes are underlain by shale and minor sandstone. The lower portion of the mountains is underlain by a layer of calcareous shale, shale, and minor limestone. Mountain bases are characterized by limestone and valleys are underlain by dolomite. The Valley and Ridge province is underlain by essentially the same strata as the Allegheny Plateau,

which is located in western and central New York, northern and western Pennsylvania, northern and western West Virginia, and eastern Ohio. The Valley and Ridge province, however, contains older parts of the stratigraphic column. Structurally, the Valley and Ridge is much more severely deformed than the Allegheny Plateau. The ridges were formed where stronger rocks resisted erosion, and the valleys were formed by constant erosion and down-cutting over time. The Valley and Ridge contrasts the Allegheny Plateau with its longitudinal ridges and much deeper dips in the strata (Fenneman 1938). Elevations of the Project within the JNF range between approximately 518 and 1,097 meters (1,700 and 3,600 ft).

The West Virginia/Virginia border approximately forms the western edge of the Valley and Ridge province, which extends from southeast Tennessee northeast to eastern Pennsylvania in a fairly narrow band. The Valley and Ridge is part of the Oak-Chestnut forest described by Braun (1950). The region was traditionally dominated by oak and chestnut, but chestnut has been replaced in the canopy by oaks and hickories (Braun 1950). The portion of the JNF crossed by the Project is composed primarily of deciduous forest (Appendix C).

2.2 Streams and Wetlands

The Project, as proposed, crosses 10 waterbodies on JNF (Appendix A Figure 3, Maps 1-12). Of these, 6 are unnamed tributaries (UNT). Table 2 provides the names of each crossed waterbody and the stream to which it contributes.

The Project also includes two upstream crossings of Craig Creek. One crossing will be completed via open cut dry-ditch methods to install the pipeline. The second crossing will be done for access to the pipeline via timber mat bridge. No in-stream work or disturbance is proposed at this location.

Table 2. Waterbodies Crossed by the proposed Mountain Valley Pipeline on Jefferson National Forest.

Waterbody Crossed	HUC12 Subwatershed
Clendennin Creek	Clendennin Creek – Bluestone Lake
Curve Branch	Clendennin Creek – Bluestone Lake
Kimballton Branch	Stony Creek
UNT to Clendennin Creek	Clendennin Creek – Bluestone Lake
UNT to Clendennin Creek	Clendennin Creek – Bluestone Lake
UNT to Clendennin Creek	Clendennin Creek – Bluestone Lake
UNT to Clendennin Creek	Clendennin Creek – Bluestone Lake
UNT to Clendennin Creek	Clendennin Creek – Bluestone Lake
UNT to Craig Creek	Trout Creek – Craig Creek
UNT to Craig Creek	Trout Creek – Craig Creek
UNT to Craig Creek	Trout Creek – Craig Creek
UNT to Craig Creek	Trout Creek – Craig Creek

Waterbody Crossed	HUC12 Subwatershed
UNT to Curve Branch	Clendennin Creek – Bluestone Lake
UNT to Kimballton Branch	Stony Creek
UNT to New River	Clendennin Creek – Bluestone Lake
UNT to New River	Clendennin Creek – Bluestone Lake
Craig Creek 1 ^a	Trout Creek – Craig Creek
Craig Creek – Access Road ^b	Trout Creek – Craig Creek

^aNot on JNF property (approximately 0.25 mile upstream)

^bNot on JNF property (approximately 0.01 mile upstream)

Three palustrine emergent wetlands (Wetland IDs W-UU11, W-UU12, and W-HH15) were identified within the Limits of Disturbance (LOD) of Pocahontas Road on JNF. Wetland W-UU11 is approximately 0.008 hectare (0.02 ac; with an open boundary; therefore, size may be larger than reported). Dominant species observed included mountain-laurel (*Kalmia latifolia*), great laurel (*Rhododendron maximum*), polytrichum moss (*Polytrichum commune*), northern spicebush (*Lindera benzoin*), and woolgrass (*Scirpus cyperinus*). Wetland W-UU12 is approximately 0.001 hectare (0.003 ac) (closed boundary). Dominant species observed included mountain-laurel, woolgrass, and wild mint (*Mentha arvensis*). Wetland W-HH15 is approximately 0.01 hectare (0.03 ac; with an open boundary; therefore, size may be larger than reported). Dominant species observed included melic mannagrass (*Glyceria melicaria*) and jewelweed (*Impatiens capensis*).

2.3 Sedimentation Bounds for Effects Analysis

In order to quantify the amount of sediment expected within waterways and associated impacts to TES species within the JNF and in downstream areas, Environmental Solutions & Innovations, Inc. (ESI) contracted a hydrologist (Hydrogeology Inc.) to investigate the potential for downstream sedimentation impacts. The analysis was developed through consultation with Mr. Ken Landgraf, Natural Resources Group Staff Officer, and Ms. Dawn Kirk, Forest Service fisheries biologist. On June 7, 2016, ESI, on the behalf of MVP, submitted a Hydrologic Analysis of Sedimentation documenting potential sedimentation introduced during Project construction. Upon review, the USFS, ESI, and MVP discussed the analysis and how to best document the level of impacts of potential sedimentation introduced by the Project. Taking into account the USFS comments and recommendations, ESI re-conducted the analysis to include all aspects of the Project.

The Revised Universal Soil Loss Equation (RUSLE; Renard et al. 1997) was used to estimate erosion due to disruption of land from construction, restoration, and operational activities for the Project within the vicinity of the JNF. Specific details regarding the RUSLE and its application to construction activities are available in Renard et al. (1997) and Galetovic (1998) as well as the report submitted in support of this BE (ESI 2017). In brief, the RUSLE is used to estimate the sediment loads and sediment yields by multiplying a series of values representing erosivity (associated with

rainfall and runoff), erodibility, slope length and steepness, land cover and management, and conservation practices and erosion and sediment control measures. The benefit of RUSLE is that it can be easily incorporated into a Geographic Information Systems (GIS) environment, and sediment load can be estimated for a series of cells belonging to a watershed or catchment.

For the proposed Project, the RUSLE was used to estimate sediment loads and yields for all stream catchments within the 1:24,000 National Hydrography Dataset (NHD) within the vicinity of the Project. More specifically, a study area was established that included: (1) all subwatersheds from the U.S. Geological Survey's (USGS) Watershed Boundary Dataset that intersect the boundaries of the JNF and the Project area (Table 3), (2) all subwatersheds upstream of the intersecting subwatersheds (i.e., all upstream drainage areas), and (3) subwatersheds downstream of the intersecting subwatersheds that demonstrate substantial increases in cumulative sediment loads. Sediment loads within these catchments are estimated using current land use (based on the 2011 National Land Cover Database) and expected land use classes during construction, restoration, and operation of the Project within the LOD. Current sediment loads and yields are considered baseline conditions (i.e., baseline treatment) and provide a measure of the present sediment loads within streams in the vicinity of the Project. This baseline treatment is then used to assess potential increases of soil loss expected under Project construction, restoration, and operation (i.e., proposed action treatment).

Table 3. Subwatersheds in Virginia and West Virginia with Limits of Disturbance for the Mountain Valley Pipeline within the Jefferson National Forest.

Subwatershed Name	HUC12	State	Subwatershed Area (mi²) *	Area within JNF (mi²)*
Stony Creek	050500010902	VA,WV	48.9	39.6
Clendennin Creek- Bluestone Lake	050500020403	VA,WV	38.9	7.5
Rich Creek	050500020601	VA,WV	53.3	1.3
Trout Creek-Craig Creek	020802011001	VA	51.9	38.4
Dry Run-North Fork Roanoke River	030101010201	VA	51.3	3.3

* Subwatershed Area and Area within JNF are estimates of the total area of the subwatershed and the area of the subwatershed that is contained in the JNF, respectively.

In order to estimate potential sediment introduced into nearby streams from the Project, construction, restoration, and operational impacts were projected on a two-week interval using a sequential, assembly line construction schedule for each construction segment or spread in a north-to-south direction (see ESI [2017] for a more detailed

description of construction activities and their associated treatments within the RUSLE). Soil losses were then summed to estimate yearly sediment loads and yields for a five-year period that includes Project construction, restoration, and operations. At year five, the landscape was assumed to enter into a new sediment equilibrium, and sediment produced during year five was used to forecast sediment produced for the life of the Project. Results were compared to baseline conditions to assess potential impacts, and the maximum load over any consecutive 52-week period was used to define the sedimentation bounds for effects. Unfortunately, no nationally-accepted sedimentation standard regarding the permissible amount of sediment allowed to enter into waterways is available (Kemp et al. 2011); however, a commonly used impact threshold is one in which the metric of impact is increased by 10 percent or more (USEPA 2003). This approach recognizes the biological reality that even a relatively small (in absolute terms) amount of sediment may degrade a pristine stream, while a larger amount might be needed to further degrade a historically impacted stream. Thus, streams with a 10 percent increase in sediment load over baseline were used to identify the extent of sedimentation effects from the proposed action on JNF and surrounding lands.

Analysis using the RUSLE identified the boundaries associated with a 10 percent increase in sediment load. In total, 45.56 stream kilometers (28.31 mi) downstream of the Project area within the JNF but within the study area are expected to have a 10 percent increase or more (Table 4). However, nearly 21 kilometers (13 mi) of stream impacts can be attributed to a pre-existing approximate 9.7-kilometer (6-mi) Forest Road (Pocahontas Road; Figure 1) that was not represented in the baseline assessment (i.e., using the 2011 NLCD). This road was treated as a construction component of the Project; however, the road will only need to be upgraded in sections and extended to the Project Rights-of-Way (ROW) in order to be used for the Project. Similarly, Mystery Ridge Road (Forest Development Road 11080 [approximately 1.6 kilometers [1 mi]]) was also treated as a construction component of the Project; however, the road is already existing but was not represented by the 2011 NLCD.

Table 4. Waterbodies with an expected increase in sediment load of 10 percent or greater from the proposed Mountain Valley Pipeline within the vicinity of the Jefferson National Forest.

Waterbody	Subwatershed	Stream Kilometers Impacted*
Unnamed Tributaries to Craig Creek	Trout Creek-Craig Creek	3.09
Craig Creek	Trout Creek-Craig Creek	0.47
Unnamed Tributary to Mill Creek	Dry Run-North Fork	2.53
Mill Creek	Roanoke River	5.18
	Dry Run-North Fork	
	Roanoke River	

Waterbody	Subwatershed	Stream Kilometers Impacted*
Unnamed Tributaries to Stony Creek	Stony Creek	1.87
Unnamed Tributaries to Kimbalton Branch	Stony Creek	1.87
Kimbalton Branch	Stony Creek	4.12
Unnamed Tributaries to Clendennin Creek	Clendennin Creek - Bluestone Lake	2.88
Clendennin Creek	Clendennin Creek - Bluestone Lake	6.15
Unnamed Tributaries to Curve Branch	Clendennin Creek - Bluestone Lake	1.69
Curve Branch	Clendennin Creek - Bluestone Lake	3.81
Unnamed Tributaries to New River	Clendennin Creek - Bluestone Lake	5.05
Rich Creek	Rich Creek	6.86
Totals	-	45.56

* Assumes a 79 percent containment of sediment by sediment controls during the construction phase of the Project (ESI 2017).

Sediment yields in excess of 10 percent above baseline are expected within most unique catchments (i.e., the catchment area uniquely draining to an individual stream segment) crossed by the Project during the construction phase of the Project (i.e., year 1). Although many of these catchments are expected to have sediment yields that decrease after the construction phase of the Project, the majority of catchments ($n=20$) are expected to have a new sediment equilibrium in excess of 10 percent above baseline once restoration activities are complete. For 12 catchments, a new sediment equilibrium in excess of 50 percent over baseline is expected; however, these higher equilibriums are in relation to the pre-existing Pocahontas Road. As mentioned above, this road was not represented within the baseline treatment (likely due to a combination of cell resolution or forest canopy), and thus these increases are likely overestimated. The proposed actions of the Project include minor improvements to the road, and any modifications will be returned to original or better condition upon completion of the pipeline facilities as coordinated with the JNF.

To better examine the impacts of these increased sediment yields, expected sediment introduced by the proposed Project was also put into the context of actual stream segments with total sediment loads. In this context, loads above baseline originate from catchments crossed by the proposed action and are expected to be transported to streams downstream of the Project area outside the catchment of origin. Based on this approach, substantial increases (i.e., $\geq 10\%$ over baseline) in sediment loads from the proposed Project are largely ($>90\%$) confined to headwater streams (i.e., 1-3

Strahler order; Table 5); however, increased loads are expected in the larger ordered Rich Creek (Table 5).

Table 5. Maximum yearly sediment loads above baseline in downstream waterbodies and associated percent increases from the proposed Mountain Valley Pipeline in the Jefferson National Forest.

Subwatershed	Waterbody	Location	Drainage Area (km ²)	Strahler Order	Load Above Baseline (ton yr ⁻¹)	Percent Inc.
Trout Creek-Craig Creek	Craig Creek	Above Confluence with Muddy Branch	59.52	4	30.68	2.66
		Above Confluence with Cabin Branch	78.79	4	28.56	1.93
		Above Confluence with Trout Creek	115.10	4	25.81	1.30
		Above Confluence with McAfee Run	150.74	5	23.94	0.94
		Above Confluence with Broad Run	199.46	5	22.06	0.72
		Above Confluence with Meadow Creek	252.24	5	20.54	0.53
		Above Confluence with Johns Creek	284.33	5	19.79	0.40
		Above Confluence with Barbours Creek	596.32	6	15.37	0.23
		Above Confluence with North Fork Roanoke River	10.93	3	148.42	29.42
Dry Run-North Fork Roanoke River	North Fork Roanoke River	Above Confluence with Indian Run	91.22	4	241.16	7.17
		Above Confluence with Slate Lick Run	117.66	4	226.05	6.24
		Above Confluence with Wilson Creek	126.31	4	221.23	5.94
		Above Confluence with Laurel Branch	95.29	4	0.80	0.08
		Above Confluence with Kimbalton Creek	112.74	4	24.41	1.81
Stony Creek	Stony Creek	Above Confluence with New River	125.25	4	126.22	7.30
		Above Confluence with Stony Creek	4.45	2	89.02	69.75
		Above Confluence with New River	3.11	2	58.85	48.76
Clendennin Creek-Bluestone Lake	Clendennin Creek	Above Confluence with New River	9.43	2	64.40	29.15
		Above Confluence with Curve Branch	8862.27	6	174.43	1.00
	New River	Above Confluence with Clendennin Creek	8876.36	6	174.86	1.00
		Above Confluence with Wolf Creek	8911.84	6	174.78	1.00

Subwatershed	Waterbody	Location	Drainage Area (km ²)	Strahler Order	Load Above Baseline (ton yr ⁻¹)	Percent Inc.
		Above Confluence with Rich Creek	9537.74	6	157.28	0.87
		Above Confluence with East River	9882.29	6	164.11	0.89
		Above Confluence with Mud Run	30.38	4	92.98	18.41
		Above Confluence with Crooked Creek	41.08	4	86.44	11.34
Rich Creek	Rich Creek	Above Confluence with Scott Branch	66.69	5	76.93	6.15
		Above Confluence with Brush Creek	85.57	5	72.16	5.12
		Above Confluence with New River	135.15	5	64.42	3.05

Note: A maximum sediment load is defined as the maximum yearly sediment load of any contiguous 52-week period.

* Assumes a 79 percent containment of sediment by sediment controls during the construction phase of the Project (ESI 2017).

It is important to recognize that these results are based on the assumption of adherence to the FERC 2013 Upland Erosion Control, Revegetation, and Maintenance Plan and the Project Erosion and Sedimentation Control Plan (E&SCP). Sedimentation is greatly influenced by the amount of bare soil exposed to erosive forces and the distance and method of transport of the eroded soil to the stream system. Adherence to these plans, as well as site-specific erosion and sedimentation control plans, will reduce the amount of sedimentation introduced into waterbodies. In general, MVP will place erosion and sedimentation control measures along the LOD prior to disturbance to the soil. These measures will be monitored and repaired or replaced as needed until revegetation is deemed complete by the appropriate agencies. MVP will revegetate the Project ROW as soon as possible following construction in an effort to reduce sediment run off resulting from exposed soils.

3.0 Proposed Actions

All activities associated with construction, operation, and maintenance of the pipeline and ancillary facilities will be conducted in a manner that complies with the conditions outlined in the FERC Certificate, Bureau of Land Management (BLM) Right-of-Way Grant, State Erosion and Sedimentation Control permits, and other permits, as applicable. Prior to initiating construction-related activities, secure ROW easements and other authorizations will be obtained. The proposed width of the permanent ROW is 15 meters (50 ft) and the proposed width of the construction ROW is 38 meters (125

ft). The following subsections detail construction procedures as they will occur on USFS and not a complete Project-wide construction sequence.

3.1 Typical Upland Construction Procedures

Construction in upland terrain uses conventional overland construction techniques for large-diameter pipelines. The following subsections outline typical steps for this type of construction.

3.1.1 Clearing and Grading

After the ROW has been surveyed and easements have been secured (for the permanent and temporary construction ROW), the permitted ROW will be cleared of obstructions (i.e., trees and stumps, brush, logs, and large rocks) according to the FERC Plan, as agreed upon with the USFS, and as outlined in an updated Annual Standards and Specifications which will be included as Appendix D upon completion. The ROW will be cleared to the width required for construction, but not more than specified on the pipeline alignment sheets. At no time will MVP or its contractor clear or alter any areas outside of the boundaries of the permitted pipeline ROW area.

The pipeline's 38-meter (125-ft) wide construction ROW and temporary workspaces will be cleared of vegetation (including timber) prior to the initiation of construction. All areas to be cleared during construction will be clearly marked by the USFS with paint and staked by the civil survey crew prior to the start of clearing operations. Also, in accordance with the invasive species plan, MVP will arrange a location in which a JNF designated employee will examine and certify that equipment is clean and permitted to be used on USFS property. Once removal has begun, timber will be cut into usable lengths and stacked adjacent to the ROW in accordance with the USFS requirements. Merchantable timber will be hauled away. Stumps will be cut as close to the ground as feasible and left in place except for in areas directly over the trench line. All non-merchantable brush and slash will be windrowed to the edge of the ROW, utilized in downslope areas of the ROW and access roads, or removed from the area in accordance with USFS requirements. The windrows will generally range from 10 to 20 feet in width and 6 to 8 feet in height. Breaks will be left in the windrows at approximately 100 feet intervals in order to provide fire breaks and wildlife crossings.

Where needed and as dictated by the E&SCPs, best management practices (BMPs) will be placed, maintained, and monitored throughout construction and will remain in place until permanent erosion controls are installed and restoration is deemed complete by the USFS and FERC.

3.1.2 Trenching

To bury the pipeline underground, it will be necessary to excavate a trench. The trench will be excavated with a track-mounted backhoe or similar equipment. Explosives will only be used when necessary in areas where rock substrates are found at depths that interfere with conventional excavation or rock-trenching methods. On JNF property, if

requested, subsoil will be stockpiled separately from topsoil (or the upper 30.5 centimeters [12 in] of topsoil, if the topsoil is deeper).

Generally, the trench will be excavated at least 30.5 centimeters (12 in) wider than the diameter of the pipe. The sides of the trench will be sloped with the top of the trench up to 3.6 meters (12 ft) across, or more, depending upon the stability of the native soils. The trench will be excavated to a sufficient depth to allow a minimum of 0.9 meters (3 ft) of soil cover between the top of the pipe and the final land surface after backfilling (minimum of 45.7 centimeters [18 in] of cover will be provided in consolidated rock in Class 1 or greater locations or in ditches, where 61 centimeters [24 in] of cover is required). Locations such as waterbodies, roads and railroads will include 91.4 centimeters (36 in) of cover per applicable permits.

Excavated soils will typically be stockpiled along the ROW on the side of the trench (the “spoil” side) away from the construction traffic and pipe assembly area (the “working” side). Where the route is co-located adjacent an existing infrastructure, the spoil generally will be placed on the same side of the trench as the existing infrastructure.

3.1.3 Padding and Backfilling

After the pipe is lowered into the trench, the trench will be backfilled. Previously excavated materials will be pushed back into the trench using equipment or backhoes. Where the previously excavated material contains large rocks or other materials that could damage the pipe or coating, clean fill will be used to protect the pipe. However, limestone dust or sand, which is typically basic and will often aid in the cathodic protection of the pipeline, may be used as backfill material. The first 30.5 centimeters (12 in) above the top of the pipe will be clean fill free of rocks from the excavation. The remaining fill of the trench will be the aggregate of the excavation material removed at the time of the excavation. If additional fill is brought in, it will be either flowable fill or topsoil. Topsoil will be segregated and will be placed after backfilling the trench above the subsoil. In wetlands, hydrology will be restored to pre-existing conditions. Excess soil will be distributed evenly on the ROW, only in upland areas, while maintaining existing contours and will be in accordance with requirements.

3.1.4 Construction in Rugged Terrain

In mountainous areas where the pipeline will encounter steep slopes, MVP will employ special construction techniques where the slopes typically exceed 30 to 35 degrees. The elevation data were found using 3-meter digital elevation model (DEM) files generated from flown LiDAR. Average slopes were calculated for each 0.1-mile interval along the pipeline centerline, and every 0.25-mile interval along the access road. In each 0.1-miles interval, the steepest data point was taken as the maximum slope. The construction techniques will require expanded workspace areas. ATWS are located outside the 125-foot construction ROW for the pipeline. One acre of ATWS will be utilized within the JNF. These are located along the pipeline alignment on the south side

of Sinking Creek Mountain, between MP 218.5 and 219.0. No additional ATWS are proposed on National Forest System lands. In rugged terrain, temporary sediment barriers, such as silt sock and reinforced silt fences will be installed during clearing to prevent movement of sediment off the ROW. In addition, temporary slope breakers will be installed during grading in accordance with the E&SCP to reduce water runoff or divert water to vegetated areas. Construction activities on rugged terrain will be similar to the typical construction; however, equipment will be tethered via winch lines to other equipment at the top of the slopes to ensure the safety of the construction personnel and surrounding areas.

Equipment used for the construction activity will be suspended from a series of winch tractors to maintain control of the equipment and provide an additional level of safety. All construction equipment and their winch lines will be inspected prior to operation to ensure the equipment is operable and sound. Spoil piles adjacent to the trench will be protected by temporary sediment barriers to keep excavated soils on the ROW. Pipe joints will be stockpiled at the top or bottom of each slope. A side-boom tractor will be suspended from a winch that will carry one joint at a time up or down the slope and place the joint along the trenchline. The joint will then be lowered into the ditch by a tractor. Welders will connect the joint to the previous joint within the trench to assemble the pipeline. Once welding is complete, the welds will be visually and radiographically inspected. The weld joints will be hand-coated with fusion-bonded epoxy coatings in accordance with required specifications. The coating on the pipe and at the weld will be inspected for defects and repaired, if necessary. Sand trench breakers will be installed in the trench along the pipeline to prevent or slow the movement of water along the trench. The pipeline will be padded and the trench will be backfilled by equipment tethered to the winch tractors. The surface of the ROW will be restored to original contours to the extent practical, and permanent slope breakers will be installed in accordance with the E&SCP. Erosion control blankets or hydroseed, in lieu of mulch, will be installed on steep slopes to provide stabilization for vegetation to help control sediment and water runoff.

In areas where the Project route crosses laterally across the face of a slope (side-hill construction), cut-and-fill grading may be required to establish a safe, flat work terrace which will be reclaimed as close as practical to original contours.

MVP will incorporate erosion and sediment control measures such as super silt fence, silt fence, sock filtration, erosion control socks, temporary and permanent water bars, ditch breakers, temporary mulch, and erosion control blankets as per Project design specifications based on slope.

On steep slopes, various measures will be taken in order to properly control erosion and sedimentation on the ROW. Spoil piles from trenching operations will be staged along the side of the ROW and will be compacted via rolling with dozers on site as additional material is added. Once a soil pile is completed, it will be temporarily mulched to control washouts. Additionally, spoil piles will be separated at intervals of 50 feet by temporary

water bars, which will serve to slow the flow of runoff down the ROW and divert it into No. 3 aggregate. Silt fence and super silt fence will be used to stop rocks from rolling off the ROW. Other measures such as erosion control blankets, temporary mulching, hydroseed, and sock filtration may be used.

Within the trench, sand filled sacks will be stacked across the width of the trench as necessary based on field conditions. This will permit water to slowly filter through without carrying large amounts of soil with it. Similarly, permeable trench breakers constructed of sand or aggregate-filled sacks will be installed along the open ditch. Rock-fall protection measures such as rock fences, placement of concrete barriers, or creating catchment areas may be added where excavation is planned subjacent to steep slopes, as determined by the contractor. Once the area is stabilized, following construction, MVP will remove any temporary stabilization methods. Contours will be returned to pre-existing conditions to the extent practicable.

In addition to the measures taken on slopes to control erosion and sedimentation, trench drains will be installed on side slopes and steep slopes before the pipe is placed in order to channel water away from the ditch, and these drains will not be removed after construction is complete. These permanent drains will consist of perforated tile or pipe surrounded with rock (1-inch stone or similar, which may be taken from excavated spoils) that will terminate at a riprap pad near the edge of the ROW. Geotechnical inspectors will evaluate the need for additional engineering controls based on the subsurface conditions exposed in the pipeline excavation; such engineering controls could include regrading adjacent areas, embedding the pipeline in a bedrock trench, installing drains, buttressing unstable slopes, reinforcing fill slopes with geosynthetics, or other stabilization measures as appropriate.

On side-hill construction, tree stumps and other organic material will be removed from backfill material along the ROW, as decomposing organic materials and organic soils tend to exhibit low shear strengths and may accumulate water, increasing the likelihood of a landslide. Special attention will be paid to ensure that natural drains alongside slopes are properly restored after construction activities are complete. In order to accomplish this, additional French drains or rock-lined channels may be constructed to efficiently convey water across or around the ROW. Where seeps and springs are observed in the cut slope, cutoff drains and/or transverse trench drains will be installed to prevent saturation of the backfilled material. Where possible, compaction on side-cut sections should be completed in 12-inch lifts using a sheep's foot roller.

Specific slope stability considerations and construction measures are included in the December 20, 2016, *Site-Specific Design of Stabilization Measures in Selected High-Hazard Portions of the Route of the Proposed Mountain Valley Pipeline Project in the Jefferson National Forest* as well as the December 2016, *Landslide Mitigation Plan*. Additional landslide mitigation measures will be prescribed by geotechnical inspectors as subsurface conditions are revealed during construction.

Topsoils are not commonly found on slopes that are greater than 50 percent, as soils in these areas will naturally wash away; therefore, topsoil will not be placed on slopes that are greater than 50 percent during restoration activities. However, these areas will be treated as soon possible to minimize erosion potential. This may be accomplished by hydro-seeding the slope or covering the slope with jute erosion control matting.

3.1.5 Stove Pipe Construction

On slopes steeper than 30 degrees, the pipeline will be installed via a “stovepiping” method (see Figure 6-2). The stovepipe method entails excavating a trench long enough to install two joints of pipe (approximately 40 feet long), lowering the pipe into the trench, and then welding the pipe in the trench. Following welding, inspection, and coating, the welded joint of pipe is backfilled before moving on to the next two joints of pipe. This process is performed for each successive joint of pipe up the slope. This construction technique will reduce the length of pipe that will be handled at any one time and minimize the amount of open trench on steep slopes. The general construction and restoration methods that will be applied during stove pipe construction will be similar to those described above for rugged terrain.

3.1.6 Winter Construction

MVP has developed a Winter Construction Plan (Appendix S of the Plan of Development [POD]), which identifies BMPs for construction activities during snow accumulation. MVP will stop working in winter if weather conditions occur that are deemed unsafe to perform pipeline construction. Inspections will occur within 24 hours of each 0.5 inch of rainfall or snow melt. MVP will ensure the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in the greater environmental impacts.

As necessary during snow accumulation, snow will be removed from construction work areas to expose soils for grading and excavation. Snow removal will be limited to active construction areas and areas needed to maintain access to the construction ROW. Snow will be bladed or pushed to the edges of the ROW with a motor-grader, snowplow, or bulldozer fitted with a “shoe” to minimize impacts on underlying soils and vegetation and stockpiled within the ROW or an approved ATWS areas. Snow will not be bladed off the ROW. Snow removal equipment will access the Project areas from approved access roads and will operate from within the construction ROW or approved ATWS areas. When snow accumulation is more than 1 foot, it will be removed from both the working and spoil sides of the construction ROW prior to topsoil segregation and grading to prevent mixing of snow with excavated spoil. Erosion and sediment control devices and diversion berms will be installed where needed to control snow and melting runoff.

3.1.7 Hydrostatic Test and Final Tie-In

Following backfilling of the trench, the pipeline will be hydrostatically tested to ensure that it is capable of safely operating at the design pressure. No water withdrawals or discharges will occur on JNF land.

3.1.8 Dust Control

Water withdrawal for dust abatement will not occur on JNF land. Water will be obtained through municipal sources. The locations and amount of disbursement of water will be decided by the lead environmental inspector for a specific construction spread.

3.1.9 Cleanup and Restoration

Post-construction restoration activities are undertaken in accordance with measures specified in FERC, USFS, and State restoration guidelines as applicable as well as the Restoration Plan appended to the POD. The ROW and other disturbed areas are finish-graded and construction debris is disposed of properly after a segment of pipe is installed, backfilled, and successfully tested. The surface of the ROW disturbed by construction activities is graded to match original contours and retain compatibility with surrounding drainage patterns. An exception is made at locations where permanent changes in drainage are required to prevent erosion, scour, and possible exposure of the pipeline. Unless otherwise requested by the agency, segregated topsoil is returned to its original horizon. At that time, temporary and permanent stabilization measures, including seed and mulch, are installed.

3.1.10 Typical Waterbody Crossings

Construction across waterbodies is performed to minimize the time that the trenches for the pipeline crossings of flowing streams and rivers are left open. The construction method used at a waterbody crossing depends on characteristics of the waterbody. Each method is performed in a manner consistent with regulatory permit conditions. All streams on JNF will be crossed by open-cut dry ditch dam and pump or flume crossing methods. Descriptions of these methods are provided below.

3.1.10.1 Dam and Pump Crossing Method

The dam and pump method involves installation of temporary dams upstream and downstream of the proposed waterbody crossing. The temporary dams will typically be constructed using sandbags and plastic sheeting. Following dam installation, appropriately sized pumps will be used to dewater and transport the stream flow around the construction work area and trench. Intake screens will be installed at the pump inlets to prevent entrainment of aquatic life, and energy dissipating devices will be installed at the pump discharge point to minimize erosion and stream bed scour. Trench excavation and pipeline installation will then commence through the dewatered portion of the waterbody channel. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the temporary dams will be removed, and flow through the construction work area will be restored. This method is generally only appropriate for those waterbody crossings where pumps can adequately transfer the stream flow volume around the work area. This crossing method generally minimizes the duration of downstream turbidity by allowing excavation of the pipeline trench under relatively dry conditions.

3.1.10.2 Flume Crossing Method

The flume crossing method will consist of temporarily directing the flow of water through one or more flume pipes placed over the area to be excavated. This method will allow excavation of the pipe trench across the waterbody completely underneath the flume pipes without disruption of water flow in the stream. Stream flow will be diverted through the flumes by constructing two bulkheads and using sand bags or plastic dams to direct the stream flow through the flume pipes. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the bulkheads and flume pipes will be removed. This crossing method generally minimizes the duration of downstream turbidity by allowing excavation of the pipeline trench under relatively dry conditions.

3.2 Access Roads and Ancillary Facilities

The 9.7-kilometer (6-mi) Pocahontas Road (Forest Road 972) in Giles County, Virginia is currently proposed to provide access to portions of the proposed alignment near Peters Mountain. This road will need to be upgraded in sections and extended to the Project ROW in order to be useable for the MVP Project. Mystery Ridge Road (Forest Development Road 11080 [approximately 1.6 kilometers [1 mi]]) in Giles County, Virginia will also be used to access portions of the alignment on JNF. Previously existing access roads that were modified and used during construction will be returned to original or better condition upon completion of the pipeline facilities as coordinated with the JNF. No ancillary facilities will be constructed on JNF land.

3.3 Appalachian National Scenic Trail Crossing

For the crossing of the Appalachian National Scenic Trail, pipe will be installed using the conventional bore method. The bore will be approximately 182.9 meters (600 ft). This method requires excavation of two pits, one on each side of the feature bored. A boring machine is lowered into the pit on one side and a horizontal hole is bored to the other bit at a diameter equal to the diameter of the pipe at the depth of the pipeline installation. The pipeline section is then pushed through the bore to the opposite pit. If additional pipeline sections are required to span the length of the bore, they are welded to the first section of the pipeline in the bore pit before being pushed through the bore.

3.4 Surface Disturbance, Erosion, and Downstream Sedimentation

MVP intends to implement the FERC Erosion Control, Revegetation, and Maintenance Plan and Wetland and Waterbody Construction and Mitigation Procedures as well as Virginia Department of Environmental Quality as a minimum standard during construction (unless noted otherwise). Additionally, MVP will also implement its Annual Standards and Specifications. These plans identify mitigation measures for minimizing erosion and enhancing revegetation, as well as minimizing the extent and duration of disturbance on wetlands and waterbodies. Environmental inspectors are present during on-site activities to ensure compliance with requirements for the Project and that proposed measures are implemented. Proposed measures are incorporated

throughout the Project, including during preconstruction filing and planning, installation of the pipeline and associated facilities (e.g., access roads), restoration of the Project area, and post-construction. A brief overview of possible erosion and sediment control measures are provided in the following sections.

3.4.1 Environmental Inspection and Supervision

A minimum of four environmental inspectors with knowledge of wetland and waterbody conditions is assigned to each construction spread during construction and restoration based on the length of the construction spread and the number and significance of the resources affected. Some noted responsibilities of inspectors include ensuring sensitive resources (e.g., cultural; wetlands) are visibly marked, identifying erosion and sediment control and soil stabilization measures (as well as inspection of these controls), ensuring sensitive resources are not impacted by erosion or the deposition of sediment, and the preservation and maintenance of topsoil. The inspectors monitor all aspects of construction and restoration activities and have authority to stop activities that may violate conditions of the ROW Grant and Annual Standards and Specifications as well as all other applicable permits and approvals. The inspectors identify corrective actions and ensures an activity is brought back into compliance. The inspectors keep accurate and detailed records of compliance with environmental conditions and proposed mitigation measures that will be submitted regularly to the USFS and FERC.

3.4.2 Preconstruction Filing and Planning

Project sponsors coordinate with all appropriate local, state, and federal agencies regarding erosion control and revegetation. Construction is planned to limit the amount of open trench sections to the length necessary to safely construct the pipeline in an effort to avoid erosion and sediment deposition in and near sensitive resources. Beneficial reuse of materials will not result in adverse environmental impacts and will comply with all applicable surveys, landowner and agency approval, and permit requirements.

3.4.3 Installation of Pipeline and Associated Facilities

Measures are taken during construction to stabilize soils and to reduce erosion and sedimentation. Temporary erosion controls are installed immediately prior to disturbance of soil. The environmental inspector assigned to each construction spread maintains temporary controls throughout construction until permanent erosion controls are installed or restoration is deemed complete.

Temporary spoil will be placed, if possible, in the construction ROW at least 15.2 meters (50 ft) from the edge of a waterbody and necessary sediment barriers are installed to prevent the flow of spoil or silt-laden water into waterbodies and wetlands.

3.4.4 Restoration

Following the backfilling of a trench, final grading, topsoil replacement, and installation of permanent erosion control structures will be completed within 20 days. If weather

conditions prevent compliance, temporary erosion controls will be maintained until weather improves and allows activities to be completed. Temporary erosion controls will be removed following the installation of permanent erosion controls or when revegetation is deemed successful.

Disturbed areas are planted with appropriate vegetation during the recommended seeding dates within six working days of final grading, weather and soil conditions permitting. If seeding cannot occur within these dates, temporary erosion controls will be maintained until the next recommended seeding dates. Areas are monitored until revegetation is deemed successful.

3.4.5 Post-construction

Inspections of all disturbed areas will be completed to determine the success of revegetation. A minimum of two inspections are completed: one after the first and one after the second growing seasons. Revegetation in non-agricultural areas is considered successful if upon visual inspection the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed areas. Follow-up inspections and revegetation efforts are continued until revegetation is considered successful. Reporting regarding revegetation efforts is completed following standards in the POD.

3.5 Special Construction Procedures

3.5.1 Blasting

Blasting for grade or trench excavation will be considered only after all other reasonable means of excavation have been evaluated and determined to be unlikely to achieve the required results. MVP may specify locations (foreign line crossings, nearby structures, etc.) where consolidated rock will be removed by approved mechanical equipment, such as rock-trenching machines, rock saws, hydraulic rams, or jack hammers, instead of blasting. Areas where blasting may be required will be surveyed for features such as karst terrain, structures, utilities, and wells. The pre-construction condition of human-occupied buildings will be documented. Occupied buildings and their condition within 150 feet of the blasting area will be documented as to their pre-blast condition. In these areas, MVP is committed to taking measures to prevent damage to underground structures (e.g., cables, conduits, and pipelines) or to springs, water wells, or other water sources. Blasting mats or padding will be used as necessary to prevent the scattering of loose rock. All blasting will be conducted during daylight hours and will not begin until occupants of nearby buildings, stores, residences, places of business, and farms have been notified. Notifications to JNF will be made, placed on their website, and signage will also be posted when entering the Forest and other applicable locations. Where competent sandstone bedrock occurs in the stream bed, blasting may be used to reduce bedrock so that the trench can be excavated. Pre- and post-blasting structural surveys will be conducted of occupied structures, water supply wells, and water supply springs that will be specified in the

site-specific Blasting Plan developed by the contractor conducting the blasting activities.

3.5.2 Karst Area

Based on consultation with MVP's karst experts, Draper Aden, following their local geologic expertise and a preliminary review of mapping from the United States Geological Survey, West Virginia Department of Environmental Protection, and Virginia Department of Mines, Minerals, and Energy, among other sources, it was determined that the pipeline will cross areas with the potential to contain karst features; however, no such features were identified on JNF. MVP will have a geotechnical contractor and Karst Specialists on site daily for construction in karst areas, which is further documented in the Karst Mitigation Plan. The contractor will be able to immediately identify potential problematic features and direct crews to employ mitigation measures as needed. A typical mitigation method for a sinkhole would be to excavate the feature to expose its throat, and then plug the throat using graded rock or sand fill to allow drainage and minimize alteration of flow patterns.

3.5.3 Trench Dewatering

In most cases, trench dewatering will be limited to the removal of storm water or perched groundwater seeping from the trench in the pipe trench excavated in upland locations. Storm water will typically be removed from the trench prior to lowering the pipe into place. The storm water will be pumped from the trench to a location down-gradient of the trench. The trench will be dewatered in a manner that does not cause erosion and does not result in heavily silt-laden water flowing into any waterbody or wetland. The storm water will be discharged to an energy dissipation/filtration dewatering device, such as a hay bale structure. Heavily-silt laden water may first be passed through a filter bag. The dewatering structure will be removed as soon as possible after completion of the dewatering activities. Trench breakers (ditch plugs) will be used where necessary to separate the upland trench from adjacent wetlands or waterbodies to prevent the inadvertent draining of the wetland or diversion of water from the waterbody in to the pipe trench.

3.6 Restoration

Post-construction restoration activities are undertaken in accordance with measures specified in FERC, USFS, and State restoration guidelines as applicable as well as the Restoration Plan appended to the POD. Areas disturbed by construction will be restored to their original grades, condition, and use, to the greatest extent practicable. Restoration will be considered successful if the disturbed surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the land managing agency, revegetation is successful, proper drainage has been restored, and the appropriate federal and state agencies approve).

Herbaceous vegetative cover is re-established by spreading a grass seed and hydro/straw-mulch mixture over the disturbed surface. The type of seed is selected to

match adjacent cover or as approved by JNF in order to avoid introduction of aggressive non-native vegetation. Depending upon the time of year, a temporary seed mix recommended by the USFS may be broadcast or drilled until a more permanent cover can be established. Steep slopes may require erosion control fabric, revetments, or sod. Vegetation success in these areas will be closely monitored and reseeding, fertilizing, and other measures will be employed until the density and cover of non-nuisance vegetation is similar in density and cover to adjacent lands undisturbed by the Project. An exception to this approach is the permanent ROW which must be maintained in herbaceous vegetative cover. No woody vegetation is allowed to grow in the permanent ROW.

MVP will use herbicides as necessary, through consultation with the USFS, to eliminate non-native invasive species within the Project area. An Herbicide Use Plan is included in the POD.

4.0 Species Evaluated

4.1 Desktop Assessment

Federally listed threatened and endangered species, species proposed for federal listing, and Region 8 Forest Sensitive Species that may potentially be affected by the proposed Project were examined using the following existing available information:

- The list of TES plant and animal species known or likely to occur on the JNF and their habitat preferences. This review included the U.S. Fish and Wildlife Service's (USFWS) current list of endangered, threatened, and proposed species for the JNF, dated January 1, 2002 and current Regional Forester's sensitive species list for Region 8 (list attached as Appendix B), dated July 28, 2016;
- Habitat classifications within the identified tracts on the JNF (Appendix C);
- Sources listed in the Literature Cited section of this BE.

Many TES species that occur on the JNF have unique habitat requirements, such as shale barrens, rock outcrops, bogs, caves, and natural ponds. Appendix B lists all 193 TES species currently known or expected to occur on or near the JNF; all were considered during analyses for this Project.

A "step down" process is followed to eliminate species from further analysis and increase focus on species that may be affected by Project activities. Species not eliminated in the "step down" process are analyzed in greater detail. Results of this "step down" analysis process are displayed in Appendix E. First, the range of a species

is considered. Species' ranges on the JNF are based on county records contained in such documents as the Digital Atlas of Virginia Flora (DAVF), Biota of North American Plants (BONAP), NatureServe, the U.S. Department of Agriculture (USDA) PLANTS database and the Virginia Department of Game and Inland Fisheries (VDGIF) Wildlife Environmental Review Map Service (WERMS), but were refined further when additional information was made available, such as more recent occurrences documented in scientific literature or in Natural Heritage databases. Often, range information clearly indicates a species will not occur in the Project area due to a restricted geographic distribution. When the Project area is outside the known range of a species, that species is eliminated from further consideration and is coded as Occurrence Analysis Results (OAR) Code 1 in the Appendix B table. One hundred twenty-eight species were eliminated using this step of the method.

The remaining 65 species were analyzed based on habitat preferences using identified habitat classifications for the proposed Project (Appendix C). Habitat classifications were field verified. If the Project area lacked suitable habitat for a particular species, it was coded as Occurrence Analysis Results (OAR) Code 2. For this Project, 33 species were eliminated from further consideration because suitable habitat was lacking.

Some species could not be eliminated from further consideration based on range or habitat suitability; therefore, a field survey or additional USFS consultation was necessary to determine the presence or probable absence of TES species. Rare communities and rare habitats along the corridor are noted to aid in assessment of TES species.

4.2 Field Surveys

Field surveys are completed along the length of the proposed alignment. A 91-meter (300-ft) study corridor was used for field surveys unless a larger corridor was specified by applicable guidelines. Surveys are based on guidance provided by federal and state agencies, including the USFS for activities on JNF lands.

The survey method consisted of walking the study corridor searching for different habitat types and TES species occurrences. Plant surveys employ a meander search method (Goff et al. 1982) where new habitat variations or unique areas are constantly being searched for in order to maximize floristic variation. Wildlife surveys consist of searching for individuals and/or signs of their presence. Searching for individuals consists largely of visually scanning vegetation and looking under logs and rocks. Searching for signs of species consists of studying scat, tracks, calls, nests, and/or egg masses detected during the survey. Survey intensity is concentrated on potential sites where ground disturbance will be greatest.

Mist net surveys for listed bat species along the proposed alignment (Tracts 001-004, 008, and 035) and Pocahontas Road began in May 2015 and concluded in August

2015 (Appendix A Figure 2, Map 1). Tracts 005 and 006 were not completed in 2015 because Permit BBW433301T was not amended until after the USFWS survey window had closed. These tracts were surveyed in May 2016 (Appendix A Figure 2, Map 2). Mist net surveys were not completed for abandoned routes except in instances where survey buffers along the proposed alignment overlapped these routes.

Portal searches were completed along the proposed alignment and Pocahontas Road on JNF (Tracts 001 – 006, 008, and 035) as well as Tracts 007 – 014 and 032 - 037 (Appendix A Figure 2, Maps 1 – 3). This involves conducting pedestrian searches along the Project ROW and associated features for signs indicative of caves and/or mines which may provide suitable winter habitat for listed bat species. These searches began in July 2015 and concluded in November 2016. Portal searches were not conducted for the remaining alternative routes.

Detailed habitat assessments were completed for Tracts 012 – 014 because these previously proposed crossings were within the buffer, defined by USFWS, around a known bat occurrence (Appendix A, Figure 2, Map 3). These assessments were completed in July and August 2015. No other JNF alternatives cross buffers around known occurrences.

Plant surveys were completed on various tracts on JNF within the varying survey windows of the TES plant species (species listed in Appendix B). The specific survey dates are provided in Table 6.

Table 6. Plant Surveys on Tracts of Jefferson National Forest crossed by the proposed Mountain Valley Pipeline.

Survey	Date(s)	Survey Tracts
1	May 23 – June 3, 2015	009, 011 – 031
2	June 20 – July 1, 2015	009, 011 – 027
3	August 3 – 4, 2015	001 – 004, 007 – 014, 035
4	May 4 – 7, 2016	001 - 006, 008, 033 – 035
5	May 11, 2016	032
6	June 23 – 25, 2016	001 – 006, 008, 035
7	August 2 – 4, 2016	001 – 006, 008, 035

Avian habitat assessments and observations were completed on all tracts on JNF concurrently with other survey activities. These activities began in May 2015 and

concluded in November 2016. An additional aerial nest survey is scheduled for early March 2017.

An abbreviated mussel survey was completed on October 20, 2015 for the current and abandoned Craig Creek crossings. Fourteen hours and 20 minutes of search time was expended along 1,553 meters (5,095 ft) of stream reach at the Project crossing. No signs of mussels (live or deadshell) were observed.

4.2.1 TES OAR Categorization

Based on results of field surveys, additional species are eliminated from further consideration because there is: a) a lack of suitable habitat in the Project area (OAR Code 2) or b) habitat is present and searches for the species were conducted but the species was not found (OAR Code 3).

4.2.2 Species Identified as In the Action Area or Potentially Affected by the Action

Species analyzed and discussed further in this document are those that: a) were in the Project area but outside the area where ground disturbance will occur (OAR Code 4); b) were found in the activity area (OAR Code 5); or c) were not seen during the survey, but possibly occur in the activity area based on habitat observed during the survey or field survey was not conducted when the species is recognizable (OAR Code 6).

In addition to species within the Action Area, aquatic species potentially occurring outside the Action Area are analyzed and classified as: a) aquatic species that occur outside the hydrological analysis area downstream from the Project area (OAR Code 7) or b) aquatic species that are known or suspected downstream of a project or activity area and are within identified geographic bounds of the water resource cumulative effects analysis area (OAR Code 8). If aquatic species are determined to occur in a 6th level watershed based on the USFWS/USFS T&E Mussel and Fish Conservation Plan, an OAR Code 9 is assigned and appropriate conservation measures apply.

5.0 Field Survey Results and Effects Determinations

Field surveys were completed to determine the presence or probable absence of the remaining 32 TES species that may occur within the proposed alignment. The locations of TES species identified during field surveys are provided in Appendix A, Figure 4. Additionally, observations and notes from the field surveys are provided in Appendix F.

Effects determinations for federally listed species are not included in this document. Those determinations, as well as analyses of direct, indirect, and cumulative effects,

will be detailed in a BA. Based on coordination with the USFS, effects determinations for Forest Service Sensitive Species differ from federal determinations. These determinations are provided and defined as follows: A **No Impacts** determination is appropriate when the action will have no impacts on the species. A **Beneficial Impacts** determination is appropriate when positive effects occur without any adverse effects. Two types of **May Impact Individuals** determinations can be made: one is appropriate when the impact is not likely to cause a trend toward federal listing or loss of viability, and the other is appropriate when the impact is likely to cause a trend toward federal listing or loss of viability.

5.1 Federally Listed Species

Four federally listed species with potential to occur in the Project area were identified based on a desktop habitat assessment and coordination with the appropriate federal and state agencies. Field habitat assessments and surveys began in May 2015 and concluded in August 2016. Two of the four species were eliminated from further consideration because they were not found during field surveys (OAR Code 3). OAR Codes for the remaining federally listed species are provided in Table 7. The respective codes were assigned to the Roanoke logperch and James spinymussel due to the vicinity of the Project to sensitive habitat.

Additionally, a fifth federally listed species, the rusty patched bumblebee (*Bombus affinis*), is listed in Table 7. The final rule designating endangered species status for this species was published in the Federal Register on January 11, 2017. An OAR Code for the species has been provided below; however, it will be detailed in a BA.

Table 7. OAR Codes for federally listed species associated with Jefferson National Forest along the Mountain Valley Pipeline in Virginia and West Virginia.

Species	OAR Code(s)
Roanoke logperch (<i>Percina rex</i>)	7 and 9
James spinymussel (<i>Pleurobema collina</i>)	8 and 9
Indiana bat (<i>Myotis sodalis</i>)	3
Northern long-eared bat (<i>Myotis septentrionalis</i>)	3
Rusty patched bumblebee (<i>Bombus affinis</i>)	6

5.2 Forest Service Sensitive Species

Twenty-eight Forest Service Sensitive Species had potential to occur in the proposed Project area based on habitat suitability. Field habitat assessments and surveys began in May 2015 and concluded in November 2016. Twelve of the 28 species were eliminated from further consideration because they were not found during field surveys (OAR Code 3). One Forest Service Sensitive Species, rock skullcap (*Scutellaria*

saxatilis), was identified along the proposed alignment and Pocahontas Road (OAR Code 5). An additional Forest Service Sensitive Species, eastern small-footed bat (*Myotis leibii*), was also found along the proposed alignment and Pocahontas Road; however, suitable roosting habitat was not present (OAR Code 4). One additional species, American barberry (*Berberis canadensis*) was found on tracts no longer associated with the proposed alignment (OAR Code 4). A third species, Maureen's shale stream beetle (*Hydraena maureenae*), was assigned an OAR Code 4 based on previous surveys by USFS biologists. OAR Codes were assigned to the remaining 12 Forest Service Sensitive Species based on the results of these assessments and surveys. OAR Codes for the Forest Service Sensitive Species are provided in Table 8.

Table 8. OAR Codes for Forest Service Sensitive Species associated with Jefferson National Forest along the Mountain Valley Pipeline in Virginia and West Virginia.

Species	OAR Code(s)
Maureen's shale stream beetle (<i>Hydraena maureenae</i>)	4
Eastern small-footed bat (<i>Myotis leibii</i>)	4
American barberry (<i>Berberis canadensis</i>)	4
Rock skullcap (<i>Scutellaria saxatilis</i>)	5
Diana fritillary (<i>Speyeria diana</i>)	6
Regal fritillary (<i>Speyeria idalia</i>)	6
Sweet pinesap (<i>Monotropsis odorata</i>)	6
Yellow lance (<i>Elliptio lanceolata</i>)	7
Candy darter (<i>Etheostoma osburni</i>)	8
Roughhead shiner (<i>Notropis semperasper</i>)	8
Orange-fin madtom (<i>Noturus gilberti</i>)	8
Kanawha minnow (<i>Phenacobius teretulus</i>)	8
Atlantic pigtoe (<i>Fusconaia masoni</i>)	8
Green floater (<i>Lasmigona subviridis</i>)	8
Green-faced clubtail (<i>Gomphus viridifrons</i>)	8
Allegheny snaketail (<i>Ophiogomphus incurvatus alleganiensis</i>)	8

5.2.1 Maureen's Shale Stream Beetle (*Hydraena maureenae*)

Maureen's shale stream beetle is a very small 1.2 – 1.5-millimeter (0.05-0.06-in) aquatic beetle (White 1983). It prefers the margins of very clear mountain streams, occurring mostly among fine shale gravels but sometimes on aquatic vegetation. Appalachian shale-bottom streams are considered habitat for this species. Sedimentation and subsequent loss of interstitial spaces in the shale gravels are a threat. This species has been collected from Allegheny, Bath, Bland, Botetourt, Craig,

Highland, and Rockingham counties in Virginia (USFS, Dawn Kirk and Fred Huber, *personal communication*).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for the Maureen's shale stream beetle. Information from JNF consultation indicates surveys for this species were previously completed in the Project area (but not for this specific project) by JNF biologists. The species was located in Broad Run near the confluence with Craig Creek; however, it was not found in the immediate vicinity of the Project. The species is likely absent from the Project impact area; therefore, it is unlikely to be directly impacted by Project development and operation.

5.2.2 Eastern Small-footed Bat (*Myotis leibii*)

The eastern small-footed bat roosts in vertical cracks of cliff faces and horizontal cracks on talus slopes near deciduous or coniferous forest. It may also use man-made structures such as rip-rap and bridges. This bat hibernates in caves during the winter. The eastern small-footed bat forages widely in forested and open habitat types of mountainous habitat. Along the project ROW, it is specifically known from Giles County, Virginia and Monroe County, West Virginia (Best and Jennings 1997, Amelon and Burhans 2006).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for the eastern small-footed bat. Potential summer habitat for the eastern small-footed bat appeared limited along the proposed alignment and Pocahontas Road on JNF during field surveys (mist netting and portal searches). Four eastern small-footed bats (three adult males and one pregnant female) were captured during survey efforts along the existing Pocahontas Road (Appendix A Figure 4, Maps 1-4). The closest captured individual was approximately 0.9 kilometer (0.60 mi) from the western boundary of the construction ROW. No suitable cave openings or portals were observed along the proposed alignment or Pocahontas Road on JNF. There are no known winter hibernacula along the proposed alignment; however, it is likely suitable winter habitat for the species is present on or within the vicinity of JNF as summer and winter habitats are often close together.

This species may be temporarily affected by construction of the proposed alignment and modifications to Pocahontas Road if it is using the Project impact area for summer roosting; however, this habitat is considered marginal. It is likely the bats are roosting outside of this area (a limestone quarry was observed south of the Project area) and only using Pocahontas Road as a travel and/or foraging corridor. This species may benefit from additional clearings associated with Project development and operation as this will increase the amount of foraging habitat and may also expose currently marginal rocky outcrops thus increasing their suitability for summer roosting. This is especially important for maternity colonies as roosts with greater solar exposure

decrease required energy expenditures and provide more thermal stability for young thus increasing their probability of survival.

5.2.3 American Barberry (*Berberis canadensis*)

American barberry is a deciduous shrub with a range from southern Pennsylvania to northern Georgia and as far west as Missouri. Its habitat includes dry open woodlands, rocky slopes, cliffs, bluffs, exposed hillsides, mountains, and occasionally calcareous siltstone, shale, and sandstone (Hill 2003). Neutral well drained soils are preferred (Harvill et al. 1981).

A **No Impacts** determination is made for American barberry. This species was found at four locations during plant surveys on abandoned routes on JNF land in Craig County, Virginia (Appendix A Figure 4, Maps 1-4). These locations are not along the proposed alignment. Although potentially suitable habitat is present within the Project development area, the species is likely absent from the Project impact area based on the negative survey results. It is unlikely to be directly impacted by Project development and operation; however, this species may benefit from an increase of potentially suitable habitat (woodland clearings and exposed hillsides) associated with the construction of the ROW.

5.2.4 Rock Skullcap (*Scutellaria saxatilis*)

Rock skullcap is a perennial herb that prefers mesic to dry, rocky forests and boulder fields. It frequently occurs in mountains and occasionally can be found on stream banks. This species is known from all counties crossed by the proposed alignment on JNF land (Strausbaugh and Core 1978, Gleason and Cronquist 1991).

A **May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for rock skullcap. A single population of approximately 10,000 individuals was identified along the proposed alignment and Pocahontas Road. This population spans approximately 1.45 hectares (3.58 ac); however, only an approximate 0.78 hectare (1.94 ac) are within the respective proposed construction ROWs (Appendix A Figure 4, Maps 1-4) as the proposed alignment was shifted in this area to avoid the majority of this population. Additionally, the construction footprint of the pipeline ROW in this area was reduced to 23 meters (75 ft) to minimize impacts to this species.

5.2.5 Diana Fritillary (*Speyeria diana*)

The Diana fritillary feeds on a variety of flowering plant species while occupying deciduous or mixed forests with moist rich soil (Wells and Smith 2013). The species may also occupy adjacent fields, pastures, shrublands, and grasslands during various stages of its life. The Diana fritillary is known from Monroe County, West Virginia and Giles and Montgomery counties, Virginia.

A Beneficial Impacts determination is made for the Diana fritillary. Potentially suitable habitat was identified during field habitat assessments; however, the species itself was not observed during surveys. The biggest threat to the Diana fritillary from Project development and operation would be removal of potentially suitable habitat from the Project area; however, this species is known to benefit from the presence of woodland clearings, including ROWs as it increases the amount of nectar forage available. Construction of the ROW will increase the amount of potentially suitable habitat for this species. Revegetation of the ROW will follow a two-step process as recommended by the USFS. This includes stabilization of soils immediately following tree removal and construction activities with appropriate seed mixes and techniques as well as revegetation of the ROW corridor as needed with native seed mixes recommended in consultation with the USFS.

5.2.6 Regal Fritillary (*Speyeria idalia*)

A petition to list the regal fritillary was submitted to the USFWS in April 2013 (Guardians 2013); listing status is currently under review. The regal fritillary is a relatively large butterfly that uses a variety of habitats such as herbaceous wetlands, riparian areas, grasslands, old fields, and savannas; however, it prefers high quality remnant tallgrass prairies. Nectar sources for the entire flight season are very important, and the regal fritillary prefers areas with wet patches or streams (Wagner et al. 1997, Wells and Smith 2013). The species primarily deposits eggs in close proximity to violets (especially birdfoot violet, *Viola pedata*, and prairie violet, *V. pedatifida*), which are the sole sources of food for larvae (Allen 1997). If the regal fritillary is still extant in Giles and Montgomery counties, Virginia and Monroe County, West Virginia, suitable habitat exists along the proposed alignment.

A Beneficial Impacts determination is made for the regal fritillary. This species was not observed during field habitat assessments and surveys; however, it possibly occurs along the proposed alignment based on the presence of potentially suitable habitat. The biggest threat to the regal fritillary from Project development and operation would be removal of potentially suitable habitat from the Project area; however, this species is only known from clearings in forested ecosystems and would potentially benefit from the presence of woodland clearings, including ROWs. Construction of the ROW will increase the amount of potentially suitable habitat for this species. This includes stabilization of soils immediately following tree removal and construction activities with appropriate seed mixes and techniques as well as revegetation of the ROW corridor as needed with native seed mixes recommended in consultation with the USFS.

5.2.7 Sweet Pinesap (*Monotropsis odorata*)

Sweet pinesap is a vascular plant found in mesic to dry upland forests, typically under oaks, pines, or shrubs (Kartesz 1994). In Virginia, it is known from Montgomery County (Kartesz 1994). This species is difficult to observe in the field due to its small size and propensity for blending in with and being covered by leaf litter

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for sweet pinesap. Potentially suitable habitat for this species was identified in the field; however, this plant was not found during the plant survey. It may occur in the Project area based on the presence of potentially suitable habitat and its obscure nature. The biggest threat to this species from Project development and operation would be removal of potentially suitable habitat from the Project area; however, given the abundance of such habitat, coupled with this species' often concealed nature, it is likely sweet pinesap is more common than documented.

5.2.8 Yellow Lance (*Elliptio lanceolata*)

The yellow lance is an elongate freshwater mussel approximately 7.6 centimeters (3 in) long and is usually found in the main channels of streams, some as small as 0.9 meter (3 ft) in width (Johnson 1970). It is native to Atlantic slope drainages such as the James River basin. The species is typically found in clean, unimpounded areas of streams of varying sizes with substrates of smaller material (e.g., sand and fines).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for yellow lance. Populations of this species were not identified at any of the Project stream crossings, and the closest known population (according to the VDGIF WERMS database) occurs in Craig Creek downstream of the confluence with Barbours Creek approximately 58 stream kilometers (36.0 mi) downstream of the Project area. However, given the known presence of the species within the Upper Johns Creek Subwatershed (0208020011101), a similarly sized watershed adjacent to the Trout Creek-Craig Creek Subwatershed, suitable habitat for the species may exist closer to the Project area. The species is known to occupy the Upper James River (HUC Code 02080201) subbasin; however, it typically inhabits relatively large creeks and small rivers. The biggest threat to the yellow lance includes temporary sedimentation increases within potentially suitable habitat downstream of the Project area. Acute siltation events and chronic turbidity have been documented to reduce growth rates and survivability in other mussel species. According to the *Hydrologic Analysis of Sedimentation* conducted in support of this BE (ESI 2017), increased sedimentation rates in excess of 10 percent are not expected to occur outside the negative survey extent for the Project. More than 20 mussel survey records exist in the aforementioned subwatershed (including past records upstream and downstream of the Project crossing and mussel surveys associated with the Project); however, no yellow lance have been collected.

5.2.9 Candy Darter (*Etheostoma osburni*)

The candy darter, a benthic fish species that is a candidate for federal listing as endangered or threatened, is considered rare in Virginia. Adults inhabit unsilted runs, riffles, and swift pockets of current in and around large rubble and boulders. Candy darters are threatened by degraded water quality resulting primarily from siltation,

stocked trout, and habitat disturbance by recreationists (i.e., anglers walking through possible spawning site) (Leftwich et al. 1996). Their range includes the New River drainage, in the Ridge and Valley of Virginia, and the Appalachian Plateaus of West Virginia. In Virginia, they are commonly found in Big Stony Creek (also referred to as Stony Creek), perhaps solely above the gypsum plant at Kimbalton (Leftwich et al. 1996). They are extremely localized in Laurel Fork and Clear Creek of the Wolf Creek system and Dismal Creek. They are also known from Reed, Big Walker, Little Stony, and Sinking creeks, and Spruce and Pine runs (Jenkins and Burkhead 1994).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for the candy darter. Potentially suitable habitat and populations are likely at the Project crossings of Stony Creek near JNF as well as downstream of the Project area in the New River. Extensive surveys in 1995 in Stony Creek demonstrated that the species was distributed throughout the upper portion (i.e., upstream of the gypsum plant of Stony Creek) (Leftwich et al. 1996). The proposed Project crossing occurs downstream of the gypsum plant at Kimbalton and presumably downstream of the candy darter population. The Project crosses Stony Creek approximately 1.9 kilometers (1.2 mi) upstream of the confluence with the New River, thereby limiting the potential for sedimentation impacts only to fish populations in the lower portions of Stony Creek. The increased river discharge of the New River will help facilitate the dilution of potential sedimentation effects if they are to occur. The biggest threat to the candy darter from Project development and operation would be temporary destabilization or removal of localized substrates. Fish removal surveys are proposed to occur in Virginia at each perennial stream crossing immediately prior to construction. Therefore, all fishes will be removed from the instream construction footprint, limiting the potential for a direct take of individuals, if present. Downstream populations of candy darter may potentially experience minimal and temporary indirect effects in the form of sedimentation as a result of upland and instream construction activities; however, the implementation of erosion and sediment control measures is expected to limit such impacts. According to the Hydrologic Analysis of Sedimentation conducted in support of this BE (ESI 2017), sediment loads originating from the Project are expected to be less than 10 percent above baseline within this portion of Stony Creek. The Project crossing of Stony Creek is downstream of Kimbalton and therefore downstream of suitable habitats that occur on JNF. Due to avoidance of suitable habitats, implementation of erosion and sediment control measures during construction, and adherence to time-of-year restrictions (TOYR), the Project is not likely to cause a trend toward federal listing or a loss of viability for this species.

5.2.10 Roughhead Shiner (*Notropis semperasper*)

The roughhead shiner is a medium-sized minnow with an elongated body and pointed dorsal and anal fins with falcate margins. This species is endemic to the Ridge and Valley Province of the upper James River watershed (Stauffer et al. 1995). Habitat for the roughhead shiner includes clear rocky pools and backwaters of small to large rivers (Page et al. 2011) as well as cool to warm clear pristine streams with moderate

gradient, hard bottom, and little siltation. This species prefers moderate currents of runs but can occasionally be found in swifter water (Jenkins and Burkhead 1994).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for the roughhead shiner. The Project traverses Craig Creek in the Trout Creek-Craig Creek subwatershed. Craig Creek is known to support populations of roughhead shiner; however, all known occurrence records (according to the VDGIF WERMS database) are approximately 27.1 kilometers (16.9 mi) downstream of the Project crossing and outside of the Trout Creek-Craig Creek subwatershed. Therefore, direct effects to the species are unlikely. Fish removal surveys are proposed to occur at each perennial stream crossing in Virginia immediately prior to construction. Therefore, all fishes will be removed from the instream construction footprint, limiting the potential for a direct take of individuals, in the unlikely event that roughhead shiner is present. The biggest threat to the roughhead shiner would involve temporary sedimentation increases within potentially suitable habitat downstream of the Project area. The implementation of erosion and sediment control measures is expected to reduce the sedimentation yields in the Trout Creek-Craig Creek subwatershed; however, elevated sedimentation rates are predicted to occur for approximately 0.47 kilometer (0.29 mi) within Craig Creek and 3.09 kilometers (1.92 mi) within unnamed tributaries (Table 4). Given that the closest known occurrence of the Roughhead shiner is approximately 27.1 kilometers (16.9 mi) downstream of the Project area, any potential impacts are expected to be minimal and temporary and not likely to cause a trend toward federal listing or a loss of viability for this species.

5.2.11 Orangefin Madtom (*Noturus gilberti*)

The orangefin madtom has a long, slender body and a flattened head ranging in length from 5 to 7.6 centimeters (2 to 3 in). It is olive to brown in color on the dorsal side, and yellow to white on the ventral side, with yellow to white edges on its fins. The species occurs in rocky riffles in small swift-moving rivers and streams. The species typically spawns in 10 to 20 degree Celsius water from April through May. Orangefin madtom is a federal species of concern and is considered a state-threatened species in Virginia.

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for the orangefin madtom. Two distinct populations of this species occur in Virginia: a native population in the Roanoke River drainage and an introduced population in the James River drainage. The Project traverses both drainages and is therefore within the range of both populations. The species is known to occupy the Upper James River (HUC Code 02080201) and Upper Roanoke River (HUC Code 03010101) subbasins; however, there are no collections of the species within the Trout Creek-Craig Creek or Dry Run-North Fork Roanoke River subwatersheds. The native population in the Roanoke River subbasin is not likely to occur on JNF lands; however, the introduced population in Craig Creek is known to occur immediately downstream of the Trout Creek-Craig Creek

subwatershed. Fish removal surveys are proposed to occur at each perennial stream crossing in Virginia immediately prior to construction. Therefore, all fishes will be removed from the instream construction footprint, limiting the potential for a direct take of individuals, if present. The biggest threat to the orangefin madtom would involve temporary sedimentation increases within potentially suitable habitat downstream of the Project area. The implementation of erosion and sediment control measures is expected to reduce the sedimentation yields in the Trout Creek-Craig Creek subwatershed; however, elevated sedimentation rates are predicted to occur for approximately 0.47 kilometer (0.29 mi) within Craig Creek and 3.09 kilometers (1.92 mi) within unnamed tributaries (Table 4). Project-related impacts may potentially affect individuals and potentially suitable habitats of the introduced population in the Trout Creek-Craig Creek subwatershed. Any impacts are expected to be minimal and temporary and not likely to cause a trend toward federal listing or a loss of viability for this species.

5.2.12 Kanawha Minnow (*Phenacobius teretulus*)

The Kanawha minnow is an elongate, slender minnow with a dark dorsal, greenish sides, a pale, silvery underside and orange-tinged fins and tail. This species is endemic to the New River system of North Carolina, Virginia, and West Virginia. This species prefers the riffles and runs over bedrock or boulder substrates in medium-sized rivers (Stauffer et al. 1995). The species is known to occupy the Middle New River (HUC 05050002) subbasin; however, according the VDGIF WERMS database, the species has only been captured in a few localities within the subbasin.

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for the Kanawha minnow. According to the VDGIF WERMS database, the closest known population occurs within the Little River drainage, a tributary of the New River located upstream and outside of the Project Area; therefore, direct effects to the species are not expected. Fish removal surveys are proposed to occur at each perennial stream crossing in Virginia immediately prior to construction. Therefore, all fishes will be removed from the instream construction footprint, limiting the potential for a direct take of individuals, in the unlikely event the species is present. The biggest threat to the Kanawha minnow would involve temporary sedimentation increases within potentially suitable habitat downstream of the Project area; however, with the exception of Rich Creek, impacts to waterbodies within the New drainage are largely confined to smaller waterbodies where the Kanawha minnow is unlikely to occur (Stauffer et al. 1995). Due to avoidance of suitable habitats and implementation of erosion and sediment control measures during construction, the Project is not likely to cause a trend toward federal listing or a loss of viability for this species.

5.2.13 Atlantic Pigtoe (*Fusconaia masoni*)

The Atlantic pigtoe, a freshwater unionid mussel, is typically found in swift, clean, and well-oxygenated streams, larger in size (e.g., large creek to medium-sized river) with

gravel and sand substrates (Terwilliger 1991). This species was designated as state threatened in Virginia in January 1987 and designated as a federal candidate species November 15, 1994 (USFWS 1994). This species is one of the Atlantic slope unionids that prefers to inhabit the upper parts of rivers, usually above the geological boundary, typically denoted by rapids or a waterfall, between an upland region and a plain (i.e., fall line).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for Atlantic pigtoe. Populations of this species were not identified at any of the Project stream crossings, and the closest known population (according to the VDGIF WERMS database) occurs in Craig Creek downstream of the confluence with Johns Creek approximately 48.6 stream kilometers (30.2 mi) downstream of the Project Area. However, given the known presence of the species within the Upper Johns Creek Subwatershed (0208020011101), a similarly sized watershed adjacent to the Trout Creek-Craig Creek Subwatershed, suitable habitat for the species may exist closer to the Project Area. The species is known to occupy the Upper James River (02080201) subbasin; however, it typically inhabits relatively large creeks and small rivers. The biggest threat to the Atlantic pigtoe includes temporary sedimentation increases within potentially suitable habitat downstream of the Project area. Acute siltation events and chronic turbidity have been documented to reduce growth rates and survivability in other mussel species. According to the *Hydrologic Analysis of Sedimentation* conducted in support of this BE (ESI 2017), increased sedimentation rates are not expected to occur outside of the Trout Creek-Craig Creek Subwatershed, and the cumulative impact area (i.e., areas with a 10 percent increase or more in sediment load) is confined to the negative survey area. According to the VDGIF WERMS database, more than 20 mussel survey events occurred in the Trout Creek-Craig Creek Subwatershed (including past records upstream and downstream of the Project crossing and mussel surveys associated with the Project); however, no Atlantic pigtoe have been collected.

5.2.14 Green Floater (*Lasmigona subviridis*)

The green floater, state-threatened in Virginia, is a small freshwater mussel, typically less than 5.1 centimeters (2 in). It has a trapezoidal to subovate shape, and is yellow-green in color. This species mainly occurs in stagnant pools and other calm-water pockets in 0.3 to 1.2 meters (1 to 4 ft) in depth. It is native to many drainage basins in the United States, including the New and James River basins. The species is typically found in clear pool habitats of streams of varying sizes with substrates of gravel and sand. The species is known to occupy the Middle New River (HUC Code 05050002) and Upper James River (HUC Code 02080201) subbasins.

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for green floater. Mussel surveys were performed at stream crossings, known or with potential to, support freshwater mussels in Virginia and West Virginia. Green floater mussels were not encountered during

surveys; therefore, a direct take of individuals is unlikely. Green floater populations may occur both upstream and downstream of JNF land, particularly within Stony Creek. According to the VDGIF WERMS database, the closest known occurrence of green floater within the Upper James occurs outside of the Craig Creek drainage. However, within the Middle New, relic shells have been collected in relative proximity to the Project, but only within the New River between Little Stony Creek and Stony Creek (Pinder et al. 2002). Although no individuals have been collected within Stony Creek, the drainage area may be large enough to contain the species, and suitable habitat was available at the crossing when assessed for the Project. The proposed Project crosses Stony Creek approximately 1.9 kilometers (1.2 mi) upstream of the confluence with the New River thereby, limiting potential sedimentation impacts only to populations (if present) in the lower portions of Stony Creek. According to the Hydrologic Analysis of Sedimentation conducted in support of this BE (ESI 2017), sediment loads originating from the Project are expected to be less than 10 percent above baseline within this portion of Stony Creek. Acute siltation events and chronic turbidity have been documented to reduce growth rates and a lack of survivability in other mussel species. Any impacts are expected to be minimal and temporary and not contribute to reduced growth rates and a lack of survivability.

5.2.15 Green-faced Clubtail (*Gomphus viridifrons*)

The green-faced clubtail is a small, primarily black dragonfly with a clear gray-green face. It prefers clean, small to large highly oxygenated streams with a moderate current. The larval (i.e., nymph) stages of the species prefers substrates that consist of gravel-sand and lightly silted rocks. This species has an extremely local distribution, slightly under 50 counties across approximately 15 states (Dunkle 2000).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for green-faced clubtail. The proposed alignment traverses streams within the known range of the green-faced clubtail and some streams may support populations of the species. Populations of the species (nymph stages) may occur at Project stream crossing locations where a direct take of individuals could occur, and downstream of construction activities, nymphs (if present) may be subject to sedimentation issues. Adults are highly mobile and are likely able to avoid direct mortality by construction activities within the Project area. Green-faced clubtail exhibits a broad geographic distribution across numerous regions and states and any potential indirect effects due to temporary sedimentation are not likely to cause a trend toward federal listing or a loss of viability for this species.

5.2.16 Allegheny Snaketail (*Ophiogomphus incurvatus alleganiensis*)

The Allegheny snaketail is a dragonfly that requires riffle areas of spring-fed piedmont streams for nymph growth and seems to prefer shallow waters where gravel lies over soft mud. It has been found in Monroe County, West Virginia but is considered to be possibly extirpated from Giles County, Virginia along the proposed alignment (Schweitzer 1989, Needham et al. 2000).

A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability determination is made for Allegheny snaketail. The proposed alignment traverses streams within the known range of the green-faced clubtail and some streams may support populations of the species. Populations of the species (nymph stages) may occur at Project stream crossing locations where a direct take of individuals could occur, and downstream of construction activities, nymphs (if present) may therefore be subject to sedimentation issues. Adults are highly mobile and are likely able to avoid direct mortality by construction activities. An overall lack of distribution and life history information for the species makes it difficult to provide an accurate effects determination for this species; however, any potential effects are not expected to cause a trend toward federal listing or a loss of viability of this species.

6.0 Recommendations for Removing, Avoiding, or Compensating for Adverse Effects and Impacts

Project-wide mitigation measures are included in Appendix G. Conservation measures to avoid and minimize the potential for adverse effects from construction, operation, and maintenance activities on federally listed species and their suitable habitat will be detailed in the BA whereas such measures for Forest Service Sensitive Species are provided below.

6.1 Eastern Small-footed Bat

Notifications will be made to JNF biologists and the appropriate federal and state agencies if undocumented caves, mine openings, or rock outcrops are observed during construction activities. These openings will be assessed for use by bats and conservation measures will be implemented based on coordination with JNF and the respective agencies.

6.2 Rock Skullcap

The construction footprint through the rock skullcap area will be reduced to 23 meters (75 ft) to minimize impact to the species. Additionally, seeds from existing rock skullcap plants will be collected prior to construction. These seeds will be planted during the appropriate time of year upon the completion of construction activities in locations determined in consultation with the USFS.

6.3 Forest Service Sensitive Fishes

The proposed alignment traverses streams within the known range of the candy darter, roughhead shiner, orange-fin madtom, and Kanawha minnow. Avoidance and minimization measures will be implemented to prevent adverse effects to the species. In Virginia, fish removal surveys will occur prior to instream construction to prevent a

direct take of individuals. Instream construction activities will be scheduled in accordance with the Virginia TOYR at streams potentially supporting sensitive fish populations. The TOYR for Roanoke logperch and roughhead shiner are March 15 to June 30, and March 15 to May 31 for orangefin madtom within its native range (Roanoke River drainage). The native population of orangefin madtom in the Roanoke River subbasin is not likely to occur on JNF lands or in subwatersheds immediately downstream. Adhering to TOYR guidelines will help avoid elevated turbidity and sedimentation in the streams during critical autecological time periods (e.g., spawning, egg development, larval development) and help facilitate survival and proliferation of populations. To further minimize potential adverse indirect effects of sedimentation to the species, strict erosion and sediment control measures will be implemented. The quality of these control measures will be instrumental in reducing sediment yields to all streams, particularly those watersheds expected to exceed baseline conditions (i.e., Stony Creek, Clendenin Creek – Bluestone Lake, and Trout Creek – Craig Creek).

6.4 Forest Service Sensitive Mussels

The proposed alignment traverses streams within the known range of the yellow lance, Atlantic pigtoe, and green floater. Avoidance and minimization measures will be implemented to prevent adverse effects to the species. Mussels were not located at stream crossings in the vicinity of JNF therefore occupied habitats are avoided, and there will not be a direct take of individuals. Instream construction activities will be scheduled in accordance with the Virginia TOYR in streams potentially supporting mussel populations of these species. Adhering to TOYR guidelines for short-term brooding mussels (e.g., yellow lance and Atlantic pigtoe) between May 15 and July 31 and long-term brooding mussels (e.g., green floater) between April 15 to July 15 and August 15 to September 30, will help avoid elevated turbidity and sedimentation in the streams during critical autecological time periods (e.g., spawning, glochidia liberation, juvenile development) and help facilitate survival and proliferation of populations. To further minimize potential adverse indirect effects of sedimentation to downstream mussel populations, strict erosion and sediment control measures will be implemented. The quality of these control measures will be instrumental in reducing sediment yields to all streams, particularly those watersheds expected to exceed baseline conditions (i.e., Stony Creek, Clendenin Creek – Bluestone Lake, and Trout Creek – Craig Creek).

6.5 Forest Service Sensitive Dragonflies

The proposed alignment traverses habitats (i.e., nymph and adult) within the known range of the green-faced clubtail and Allegheny snaketail. To minimize direct mortality to adults by vehicle, slow speed limits along constructed access roads will be established. To further minimize potential adverse indirect effects of sedimentation to nymphs, strict erosion and sediment control measures will be implemented. The quality of these control measures will be instrumental in reducing sediment yields to all streams, particularly those watersheds expected to exceed baseline conditions (i.e., Stony Creek, Clendenin Creek – Bluestone Lake, and Trout Creek – Craig Creek).

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