Biological Assessment
WV ERFO FS 2016, Storm Damage Repairs
Pocahontas and Webster Counties, West Virginia

Project Name: Repair of Storm Damaged Roads, Monongahela National Forest
(FHWA Project Numbers WV ERFO FS 2016-1(2), (3), (4), and (5))

Date: June 7, 2019

Page Intentionally Left Blank

Executive Summary

The United States Department of Agriculture, Forest Service (FS) and Federal Highway Administration (FHWA) are proposing to rehabilitate damaged road sections along FS Routes 86 and 150 with aggregate and asphalt surface courses, reconstruct embankments and side slopes, and complete necessary drainage repairs and replacements to provide safe passage through the routes while improving the roadway drainage. Also, at one site on FS Route 133, a damaged stream crossing culvert would be replaced. The action area has been identified that takes into consideration potential direct and indirect impacts associated with the proposed project. The action area is located at 38.359282 degrees north and -80.323951 degrees west.

FHWA initiated informal consultation for the projects in which the repair work was divided for design and construction purposes. These projects are designated as WV ERFO FS 2016-1(2), repairs on FS 86 from milepost 15.0 to 18.4 and repair of FS 133 at milepost 1.19, WV ERFO FS 2016-1(3), repairs on FS 86 from milepost 12.0 to 14.7, WV ERFO FS 2016-1(4), repairs on FS 86 from milepost 8.0 to 11.1, and WV ERFO FS 2016-1(5), repair of FS 86 from milepost 0.2 to 7.4 and repair of FS 150 at milepost 7.7 and 10.8. Informal consultation was initiated for all four projects in June 2018.

FWS responded in a letter dated July 30, 2018, concurring that the repairs proposed in projects WV ERFO FS 2016-1(3) and WV ERFO FS 2016-1(4) may affect, but are not likely to adversely affect Federally-listed species. Informal consultation was completed at this time only for these two projects, as additional information requested by FWS to complete the consultations for WV ERFO FS 2016-1(2) and WV ERFO FS 2016-1(5) was not yet available.

FHWA determined that the running buffalo clover located at the FS 425 site, initially included in WV ERFO FS 2016-1(2), could not be avoided. The FS 425 site repairs were put in a separate construction schedule and the affects to Federally-listed species area evaluated in a separate biological assessment.

As design of the project progressed, it became apparent that modification of the proposed embankment repairs was needed to improve the performance and longevity of the repairs. However, the change in the repairs to extend the rock slope protection down the stream bank to the streambed would require in-water work. Embankment repairs are proposed for all four projects. Also, during this timeframe the candy darter was listed as an endangered species. The proposed scope change requires the re-initiation of consultation for WV ERFO FS 2016-1(3) and WV ERFO FS 2016-1(4), and formal consultation is expected due to the potential to adversely affect the candy darter. Formal consultation was initiated in a letter dated January 29, 2019. Informal consultation currently underway for WV ERFO FS 2016-1(2) and WV ERFO FS 20161-(5) was converted to formal consultation in a letter dated January 29, 2019.

Contents

Table of Figures

Chapter 1. Project Overview

The purpose of this project is to repair sites along FS 86 (Williams River Road), FS 133, and FS 150 (Highland Scenic Highway), that were damaged by the 2016 storm event. FHWA has divided the repair work into four projects, designated as WV ERFO FS 2016-1(2), (3), (4), and (5). The information contained in this BA is based on information obtained from the FWS through previous consultations, information from various Federal, state, local, and private agencies, and through biological surveys.

1.1. Federal Nexus

This BA, prepared by FHWA in cooperation with the FS, addresses the proposed project in compliance with Section 7(c) of the ESA of 1973, as amended. Section 7 of the ESA requires that, through consultation with the FWS, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of designated critical habitat. This BA evaluates the potential effects of the proposed project on one Federally-listed species under the ESA. Specific project design elements are identified that would avoid or minimize adverse effects to listed species. Critical habitat for the candy darter is proposed, but has not yet been listed.

1.2. Project Description

Williams River Road is a two-way road that primarily runs parallel to Williams River within the Monongahela National Forest. Williams River Road, designated as FS Road 86 within the project area, provides access to multiple rustic campsites. The damage locations for which repairs are proposed are located between and milepost 0.2 and milepost 18.4.

Figure 1. Williams River Road near MP 10.7, photo taken 11/30/2017

FS 133 is a single lane two direction aggregate (gravel) surface road that provides access to private properties. FS 150, Highland Scenic Highway, is a paved two-lane road that provides a scenic route through the National Forest with several developed scenic overlooks that provide views of the surrounding mountains and valleys. The damage locations for which repairs are proposed are located at milepost 1.19 of FS 133 and at mileposts 7.7 and 10.8 on FS 150.

Proposed work would rehabilitate damaged road sections along FS 86, 133, 150, with aggregate and asphalt surface courses, reconstruct embankments and side slopes, and complete necessary drainage repairs and replacements to provide safe passage through the routes while improving the roadway drainage. The project includes replacement of damaged or washed out bridges and culverts, and scour (erosion by swift-flowing water) protection as needed.

1.3. Consultation History

The Information for Planning and Conservation (IPaC) website was utilized to obtain a species list for the action area. Botanical field surveys were conducted by AllStar Ecology, LLC from September 11-14, 2017 in the action area.

Informal consultation was indicated in a letter dated June 5, 2018 for all four projects (WV ERFO FS 2016-1(2), WV ERFO FS 2016-1(3), WV ERFO FS 2016-1(4), and WV ERFO FS 2016-1(5). In this letter, the FHWA requested concurrence from the FWS that the proposed project may affect, but is not likely to affect federally-listed species. The correspondence stated that the project would have no effect on Virginia spiraea, shale barren rockcress, small whorled pogonia, and northeastern bulrush because these species were not located during field surveys and potential habitat is not present in the project area. The project may affect, but is not likely to adversely affect Indiana bat and Virginia big-eared bat. Potential summer habitat is present in forested areas surrounding existing roads. Also, potential foraging habitat and travel corridors are located along existing roads and streams. No trees would be cleared between April 1 and November 15 to avoid impacts to bat species. One population of running buffalo clover was located during field surveys at site FS 425, which is included in project WV ERFO FS 2016-1(2). At the time, FHWA thought it could most likely be avoided by the project. It was later determined that the population at FS 425 cannot be avoided, and so this site was separated from the action covered in this BA. A separate consultation is underway for the repairs at this site.

For the northern long-eared bat, FHWA followed the *Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats* and have determined that the action would not cause prohibited incidental take. No tree removal would occur during the pup season from June 1 through July 31. FHWA relied on the finding of the *Programmatic Biological Opinion on the 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions*, and considered the project-specific section 7(a)(2) responsibilities fulfilled unless notified that additional consultation is necessary.

FHWA determined that the project may affect, but is not likely to adversely affect the candy darter because the project would stabilize the sections of roadway embankment that are currently eroding into the River, which would result in an improvement to the habitat quality. Best management practices (BMPs) would be implemented during construction to minimize erosion of exposed soils and sedimentation of the Williams River. FHWA also indicated that the repairs would result in no in-water [Williams River] impacts. During the informal consultation process, FHWA agreed that in order to avoid and minimize impacts to candy darters, for which suitable habitat occurs in the Williams River, all repair work will be completed from equipment stationed on the road or bank with no instream work; all repair work will be conducted during low flow conditions; fiber rolls will be placed downslope prior to any clearing, grubbing, or excavation to minimize the amount of eroded sediment entering the stream; and, temporary and permanent seeding of disturbed banks will occur to help stabilized the slope.

In their response dated July 30, 2018 for projects WV ERFO FS 2016-1(3) and (4), the FWS determined that the federally listed running buffalo clover, Virginia spiraea, shale barren rock cress, and small whorled pogonia, Indiana bat, northern long-eared bat, and candy darter may occur within the vicinity of and may be affected by the project. The Virginia big-eared bat was not indicated to be potentially present in the project area/affected by the project. The FWS concurred that the project is not likely to adversely affect the Indiana bat and found that the project is not located within the regulated radii around known hibernacula or roost trees and will not affect any known northern long-eared bat hibernacula; therefore, any take of northern long-eared bat associated with the project is exempted under the 4(d) rule and no conservation measures are required. No listed plants were found in the vicinity of the FS 86, 133, or 150 repairs. The FWS concurred that the proposed projects are not likely to adversely affect any federally-listed plant species. Informal consultation was completed for these two projects; WV ERFO FS 2016-1(3) and WV ERFO FS 2016-1(4).

The embankment repair that would be completed with no work in Williams River is depicted in Figure 2. As design of this project has progressed, FHWA developed a proposed modification to the embankment and side slope repair to be used in specific locations where scour is worse.

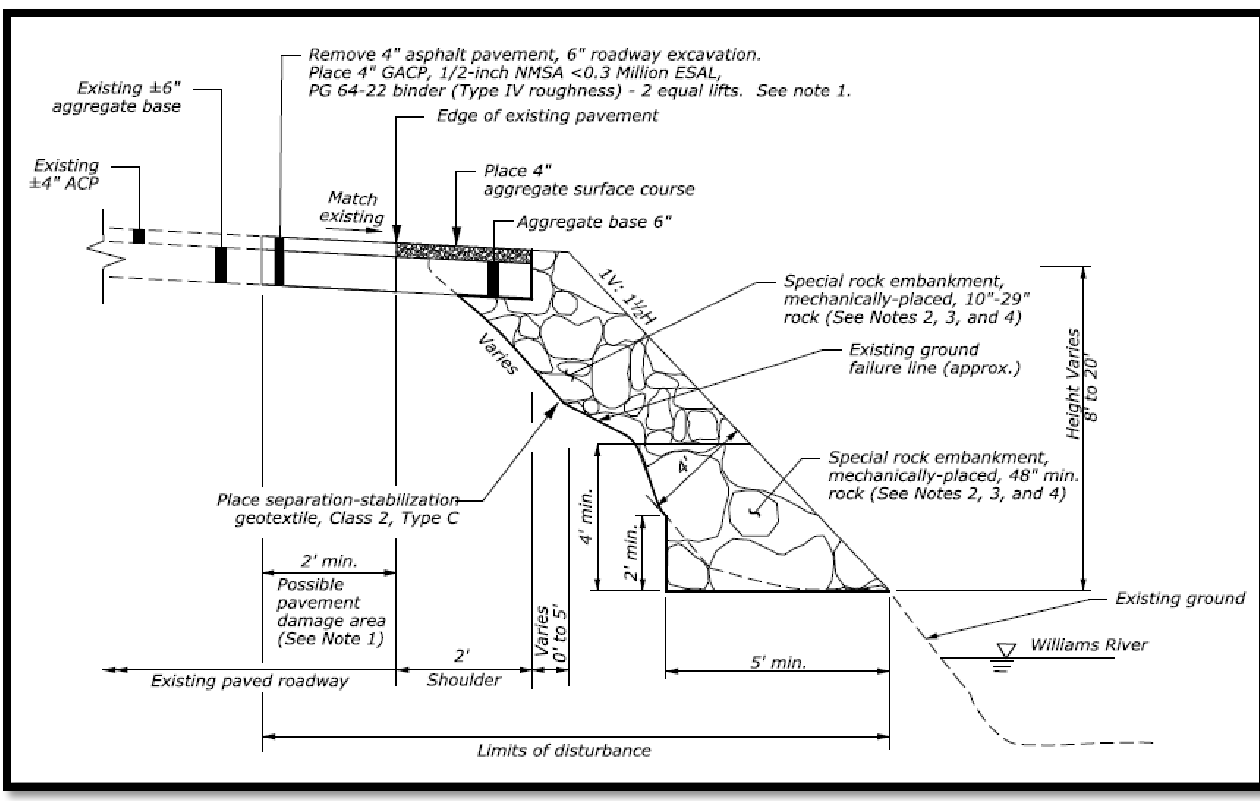

Figure 2. Typical Section of Embankment Repair with No In-water Work

The modified repair would extend the riprap further down the bank to provide better stability. In one location along FS 86 at milepost 10.6, the streambed out be excavated and riprap would be keyed (extended below the ground surface), in order to improve the performance and longevity of the repair. At the rest of the locations where the embankment repair depicted in Figure 3 would occur, there are large boulders or bedrock present that would inhibit the ability to excavate the streambed to install the key.

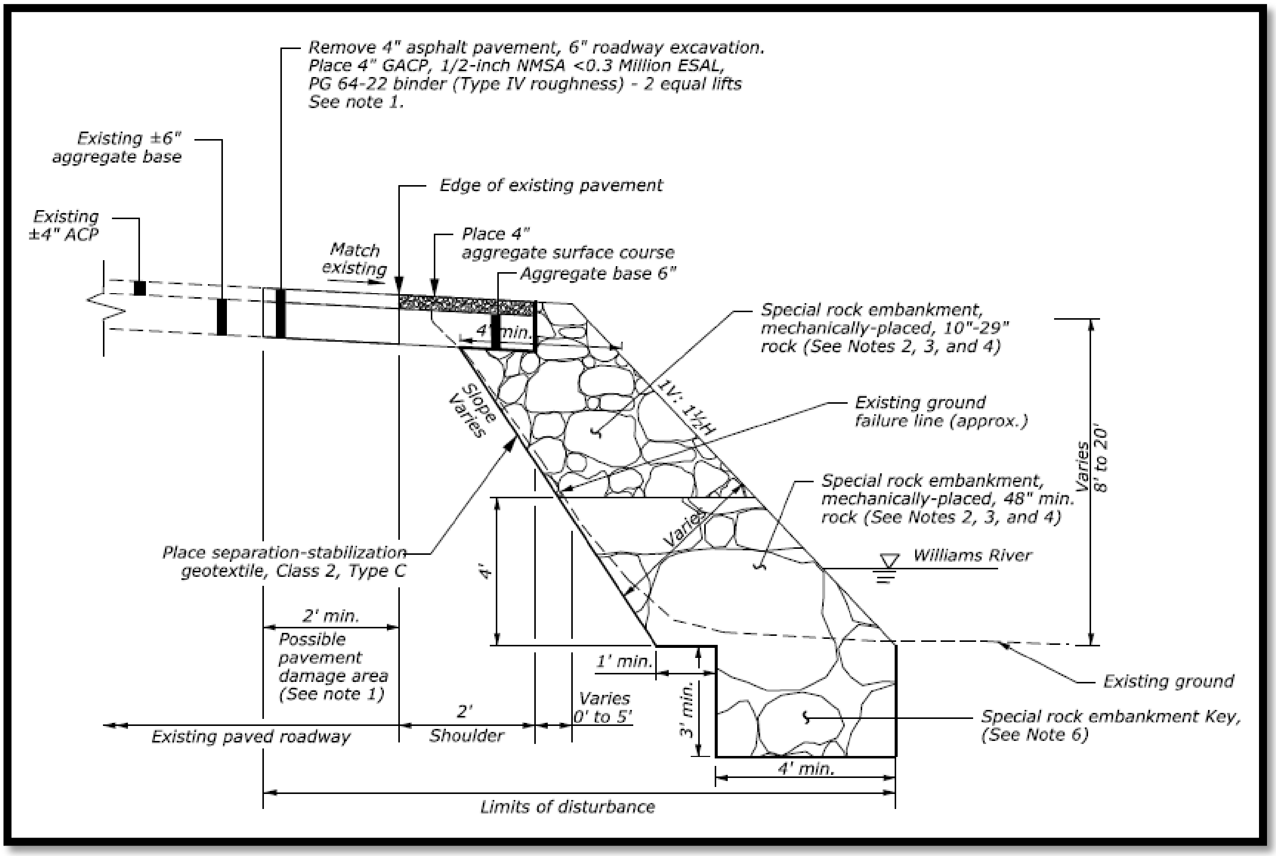

Figure 3. Typical Section of Embankment Repair with In-water Work

The candy darter was listed as an endangered species in December 2018. In-water embankment repairs are proposed for sites in each of the four projects. The proposed scope change requires the re-initiation of consultation for WV ERFO FS 2016-1(3) and WV ERFO FS 2016-1(4), and formal consultation is expected due to the potential to adversely affect the candy darter. Formal consultation was initiated in a letter dated January 29, 2019. Informal consultation currently underway for WV ERFO FS 2016-1(2) and WV ERFO FS 20161-(5) was converted to formal consultation in a letter dated January 29, 2019.

Chapter 2. Federally Listed Species and Designated Critical Habitat

2.1 Survey Methodology

Botanical field surveys were conducted by AllStar Ecology, LLC from September 11 to September 14, 2017 in areas where the proposed repairs were anticipated to extend beyond the regularly maintained (mowed) roadway prism. Field surveys utilized visual reconnaissance and meandering methodologies to fully cover the survey areas. The random meandering methodologies were used to cover areas that appeared likely to harbor federally listed plants, based on the habitat and experience of the surveyor. This survey method was useful in difficult terrain, and involved the investigator walking “randomly” through the site and recording each new species observation. Surveys focused more heavily on habitat areas with high potential for federally listed species and included sampling within each visible habitat type (All Star Ecology, LLC, 2018).

Aquatic surveys for the candy darter were not conducted.

2.2 Species in the Action Area

Table 1. FWS Federally-Listed Species

United States Fish and Wildlife Service Endangered Species Act		
Federally-Listed		
Common Name	***Scientific Name***	**Status**
Candy Darter	(*Etheostoma osburni*)	Endangered
Running Buffalo Clover	*(Trifolium stoloniferum)*	Endangered
Virginia Spiraea	*(Spiraea virginiana)*	Threatened
Shale Barren Rock Cress	(*Arabis serotina*	Endangered
Small-whorled Pogonia	*(Isotria medeoloides)*	Threatened
Indiana Bat	(*Myotis sodalis*)	Endangered
Northern Long-eared Bat	(*Myotis septentrionalis*)	Threatened

Candy Darter

The candy darter was listed by the FWS on December 21, 2018. The candy darter is a small freshwater fish species, measuring only 2-3 inches in length. The candy darter prefers shallow, fast flowing stream reaches with coarse bottom substrate such as gravel, cobble, rocks, and boulders, and does not tolerate excessive sedimentation of the stream bottom (U.S. Fish and Wildlife Service - Northeast Region, 2018). Candy darters are sexually mature at 2 years of age, and are brood-hiding, benthic spawners. Candy darters spawn in mid- to late spring. Females deposit their eggs in areas with finer pebble and gravel, after which the males fertilize the eggs. Incubation lasts 5 to 25 days depending on water temperature. Candy darters primarily feed on small insects such as mayflies and caddisflies, and live up to 3 years (U.S. Fish and Wildlife Service, 2017).

Figure 4. Candy Darter (Photo Credit T. Travis Brown)

The primary threat to the candy darter is the introduction of variegate darter, which was once geographically isolated from the candy darter by Kanawha Falls but have spread into candy darter watersheds, likely through the release of live bait during fishing. Candy darters and variegate darters can hybridize and produce fertile offspring, and after multiple generations, candy darters genes are diluted out of the population. Other threats to candy darter include habitat and water quality degradation, including excessive sedimentation and release of chemicals or fertilizers into streams (U.S. Fish and Wildlife Service, 2017).

Table 2. Summary of candy darter life history information by life stage taken from the Species Status Assessment (SSA) Report for the Candy Darter (Etheostoma osburni) Version 1.4 (U.S. Fish and Wildlife Service, Northeast Region, 2017)

Life Stage	Resource and/or circumstance needs and related information
Eggs	• Spawning occurs from late April to mid-June, depending on location. • Eggs are buried by females in patches of fine substrates. • Mean substrate size for egg deposition sites was between 3 and 50 mm. • Spawning sites characterized by small gravel deposited behind large cobble and boulders where velocity was adequate to prevent siltation.
Young of Year	• Classified by size, approximately 35–40 mm, depending on sex and location. • Select slower, more marginal habitats with higher fine sediment concentration than older individuals. • Select slower water velocities (0.0–0.80 m/s).
Juveniles	• Classified by size, approximately 35–58 mm, depending on sex and location. • Select habitats with velocities more similar to those of adults in fall compared to spring. • Selected small substrates and were less averse to fine sediments than adults. • Selected intermediate water velocities (0.40–1.20 m/s) in both fall and spring.
Adults	• Classified by size, approximately 51–92 mm, depending on sex and location. • Sexual maturity reached by age 2. • Oldest known specimen was age 3. • Found among rubble and boulder in runs and riffles at depths of 0.4–1.0 m. • Select larger substrates than younger life stages, and avoid areas with fine sediments. • Select habitats with the swiftest water velocities available (>1.20 m/s in spring, >0.60 m/s in fall). • Males display antagonistic/aggressive behavior towards one another

	during spawning periods. • Individual pairs spawned one to four times before separating. • At times the spawning act would be interrupted by a large male, which was accompanied by aggression, chasing, and nipping until one male was driven away. • In all observed cases of male-male aggression, the larger male prevailed.
All	Habitat specialists. • Most life stages select microhabitats with moderate flow (>0.19 m/s), shallow depth (sand), and non-embedded and non-silted substrates (<26%). Distribution among habitats: 29% riffle, 40% run, 30% glides, 4% pool. • Embeddedness consistently lower (<6%) in streams with robust populations than in streams with localized or extirpated populations (6-25%). Individuals tend to segregate among habitats based on life stage rather than behavior mode (i.e., activity type). • The strongest and most consistent habitat relationships across life stages were negative relationships with embeddedness. • Densities reported of 0 to 30 individuals per 100 m2

Potential to Occur Within the Project Action Area

The FWS proposed critical habitat designations for the candy darter in the five watersheds in which it lives (U.S. Fish and Wildlife Service, 2018). Candy darters are found in the upper Kanawha River basin in Virginia and West Virginia. The proposed critical habitat is in five units in the Middle and Upper New, Lower and Upper Gauley and Greenbrier watersheds. In West Virginia, these watersheds are located in Greenbrier, Nicholas, Pocahontas, and Webster counties. The action area is located in the Upper Gauley and the candy darter is present in the Williams River and is likely present in its tributaries.

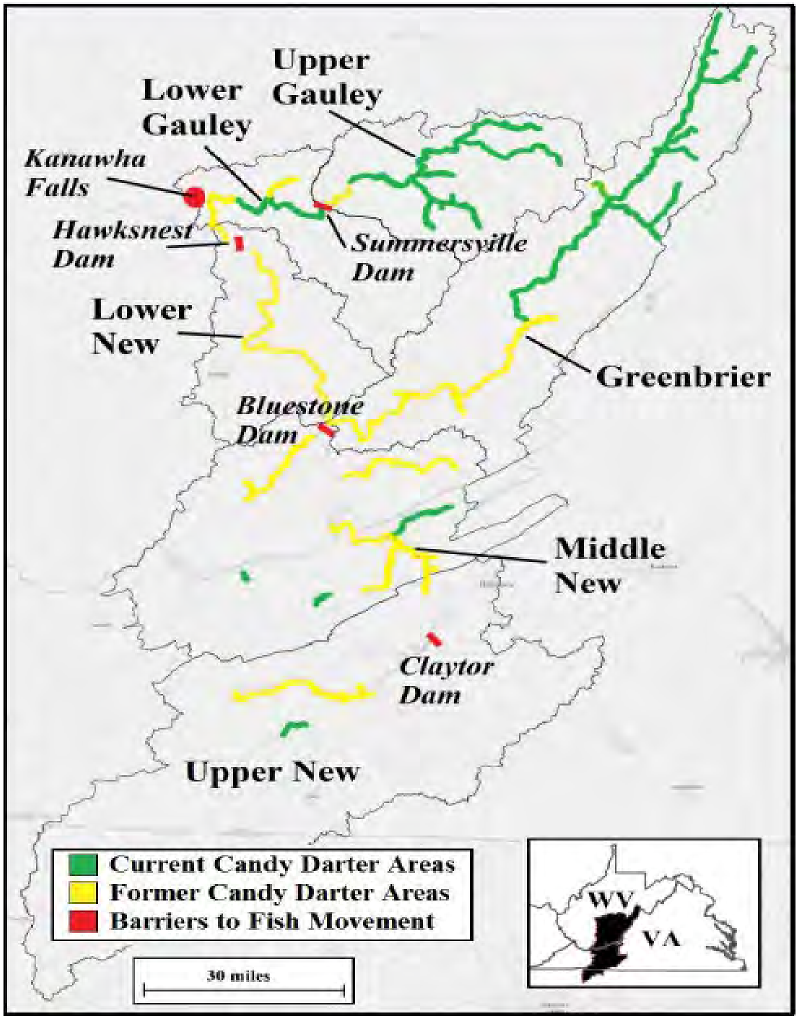

Figure 5. Map of Candy Darter Areas (U.S. Fish and Wildlife Service, 2017)

Coordination with the FS was completed regarding the potential for candy darters to occupy habitat in tributaries to the Williams River in the action area. Candy darters are known to occupy aquatic habitat in the Williams River, including areas adjacent to the tributary streams in the action area: Bridge Creek, Hateful Run, Elbow Branch, Little Lick Branch, and White Oak Fork. Candy darters would likely opportunistically utilize suitable habitat in Williams River tributaries when/where it is accessible. Certain aquatic habitat properties (such as water chemistry, stream size, channel geomorphology, stream gradient, and/or connectivity) associated with various Williams River tributaries influence the likelihood or the degree to which candy darter may occupy habitat in the tributaries themselves. Although the FS has not conducted thorough assessments of candy darter presence in Williams River tributaries, they have aquatic habitat and fish population data from several of these streams. Using the information that is currently available from some Williams River tributaries allows the FS to exercise professional judgement regarding candy darter utilization of aquatic habitats in other tributaries where data is currently absent (Owen, 2019).

Table 3. Candy Darter Likelihood of Occurrence for Tributaries in Action Area (Landress, 2019)

Site	Determination	Comment
FS 86, MP 16.6 – White Oak Fork	Likely to occur	Suitable habitat from confluence, upstream 0.6 miles
FS 133 – Unnamed Tributary to White Oak Fork	Not likely to occur	not suitable habitat (water chemistry and gradient)
FS 86, MP 9.5 – Little Lick Branch	Not likely to occur	not suitable habitat (water chemistry and gradient)
FS 86, MP 10.8 – Elbow Branch	Likely to occur	Suitable habitat from confluence, upstream 0.4 miles
FS 86, MP 5.9 – Hateful Run	Not likely to occur	not suitable habitat (water chemistry and gradient)
FS 86, MP 6.7 – Bridge Creek	Not likely to occur	not suitable habitat (water chemistry and gradient)

Candy darter have not been collected in the tributaries listed in the above table, as these streams have either not been comprehensively sampled or sampling has focused on trout populations with sample sites typically occurring further upstream than candy darter would be expected to occur.

While candy darter may not be expected to occur in some of the tributaries upstream of FS 86, the confluence of all tributaries with the main-stem of the Williams may provide localized suitable habitat at least from the Williams up to the crossing of FS 86. Given that the best time of implementation for sediment reduction is during the low-flow period, this may also coincide with when candy darter would most likely use these stream confluences as temperature refugia. This behavior has been documented at other confluences in the species' range (Landress, 2019).

Shale Barren Rock Cress

Shale barren rock cress is a biennial herb in the mustard family endemic to shale deposits, occurring only on sparsely-vegetated xeric, south or west-facing shale slope openings (barrens) and shale woodlands adjacent to the shale openings at elevations from 1300 to 2000 feet (NatureServe 2011). No potential habitat for this species was located during field surveys and the species was not located during field surveys.

Small-whorled Pogonia

Small-whorled pogonia is a small perennial herb in the orchid family that grows up to 11 inches in height and has a whorl of 5 or 6 leaves near the top of the stem and beneath the flower(s) (NatureServe 2011). It prefers deciduous or mixed-deciduous/coniferous forest in generally second or third growth successional stages, and occurs in both fairly young forests and in maturing stands. The majority of occupied sites have: sparse to moderate ground cover, relatively open understory, proximity to logging roads, streams or other features that create long persisting breaks in canopy, and highly acidic nutrient-poor soil (USFWS 1992). Forested areas located within the project area had potential to support this species; however, the species was not located during field surveys.

Virginia Spiraea
Virginia spiraea is a clonal shrub found on damp, rocky banks of larger high gradient streams, flood-scoured mouths of side streams, rocky isles, and seasonally flooded side channels, in shrub thickets between the river and forest. WV occurrences are among large boulders, flat rock, and flood debris along scoured stream-sides with soils of silt and sand. The elevation ranges from 1000 to 1800 feet (NatureServe 2011). Potential habitat located along the Williams River; however, the species was not located during field surveys.

Running Buffalo Clover
Running buffalo clover is a perennial clover with long basal runners and creamy-white flower heads on ascending stems found on fertile soils in semi-shaded habitats. It is most often found on landscapes underlain with limestone or other calcareous bedrock, but not exclusively. Running buffalo clover has been reported from a variety of moderately disturbed woodland habitats, including floodplains, stream banks, grazed woodlots, savanna-like forests, mowed paths, jeep and skidder trails, mowed wildlife openings within mature forests, old farmsteads, cemeteries, and steep, weedy ravines (NatureServe 2011). The Williams River section of the project contained areas with running buffalo clover geology, along with existing gravel roads. These areas, and areas near running buffalo clover geology types, had the greatest potential to support the species. In addition, some areas located outside of running buffalo clover geology had a slight potential to support the species. These areas included access roads, forest edges, and streambanks. Running buffalo clover was not located in the action area during field surveys.

Northeastern Bulrush
Northeastern bulrush is generally found on the edge of herb-dominated wetlands, but may also be found in deeper water or away from water (NatureServe 2018). No species were observed during the botany survey. In WV, northeastern bulrush is only known to occur in Berkley County in the eastern panhandle.

Indiana Bat
Indiana bats are restricted to underground hibernacula during winter, with preferred areas being caves located in karst areas. However, Indiana bats will also use other cave-like areas, mostly abandoned mine portals. During the summer, Indiana bats roost mainly under exfoliating bark on dead or nearly dead trees, but will also use crevices in trees as roost sites. They will also utilize live trees with exfoliating bark to a lesser extent, mostly hickory species (*Carya spp.*). They select larger trees, which provide more room for roosting and better thermal advantages. They also select trees which are either located near edges or extend above the surrounding trees as these trees provide more sunlight and are easier and safer to approach. Spring and fall roosting areas are usually located near the hibernacula and are similar to summer roosting areas. Indiana bats prefer foraging areas, such as water bodies and open areas, to be near the roosting areas (USFWS Indiana Bat Recovery Plan). Potential summer habitat is available in forested areas surrounding existing roads. Also, potential foraging habitat and travel corridors located along existing roads and streams.

Northern Long-Eared Bat
Similar to the Indiana bat, northern long-eared bat (NLEB) foraging habitat includes forested hillsides and ridges, and small ponds or streams. NLEBs are typically associated with large tracts of mature, upland forests with more canopy cover than is preferred by Indiana bats. Primary roost trees for northern long-eared bats are typically over-topped (i.e., live trees and/or snags), early successional tree species. Selected trees are typically shorter than associated trees within the forest stand and are located in heavy crown cover. NLEBs typically selected trees with cavities but will also roost under sloughing

bark. Potential summer habitat is available in forested areas surrounding existing roads. Also, potential foraging habitat and travel corridors located along existing roads and streams.

Chapter 3. Environmental Baseline

The environmental baseline for this BA describes the current conditions in the action area. The action area consists of forested mountain slopes, forested coves, and riparian habitat. The Williams River and several streams are located in the action area. The Williams River begins on Black Mountain in Pocahontas County and flows west 33 miles to its confluence with the Gauley River near Cowen in Webster County. The Williams River has an average width of 40 feet in the action area.

Disturbance is observable at all of the sites within the action area. These disturbances include access roads, culverted streams, mowing, and logging. Developed campsites were in place along the Williams River. In addition, erosion from these activities is present on road banks, at culverts, and in ditches, some of it severe. This erosion has contributed to stream sedimentation, vegetation damage, and loss of stability. Invasive species are present in varying amounts along most roads.

The closest United States Geological Survey (USGS) gage present is located 3.5 miles downstream of the action area in Dyer, WV (USGS 03186500). Review of monthly mean discharge rates to determine periods of low flow. The mean of monthly discharge indicates that September, on average, has the lowest flow, followed by August, July and October (United States Geological Survey, n.d.).

Figure 6. View of Williams River Road alongside the Williams River

Average flows over the past ten years were obtained from the USGS gage website.

Table 4. Mean Monthly Discharge

Discharge, cubic feet per second,												
YEAR	Monthly mean in ft3/s (Calculation Period: 2007-01-01 -> 2017-10-31) Period-of-record for statistical calculation restricted by user											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	474.5	241.8	878.3	515.4	171.9	168.8	147.2	69.2	85.7	117.3	347.8	698.6
2008	413.6	478	688.8	408	751.3	103.9	68.6	15.5	6.26	8.03	127.8	693.2
2009	574.2	370.7	380.9	562.6	458.1	137.7	89.6	151.3	85.4	291.7	174.4	457.6
2010	752.6	139.4	1,042	265.4	577.9	115.8	107.9	55.8	29.7	136.7	148.4	345.3
2011	271.8	625.8	1,011	912.5	335.8	109	52.2	13.5	95.4	297.9	457	544.9
2012	470	402.2	656	259.1	323.4	34.3	124.1	164.4	108.1	110.8	432.2	331.3
2013	632.5	324	447.5	586.8	410.1	490.6	105.4	262	92.9	42.9	375.9	806.8
2014	303.5	551.1	452.5	319.1	412.1	47.2	32.4	19.9	9.76	219.8	285.3	551
2015	253.8	295.3	1,190	844.6	91.9	257.8	647.7	40.8	37.3	146.1	203.3	543.6
2016	359.3	678.5	349.2	302.7	585.9	711.5	143.4	113.3	41.7	201.3	245.5	537.4
2017	671	256.5	467.6	482.3	537.4	160.3	131.9	137.2	25.2	249.2		
Mean of monthly Discharge	470.62	396.66	687.62	496.23	423.25	212.45	150.04	94.81	56.13	165.61	254.33	500.88

Chapter 4. Project Details

4.1. Alternatives Analysis

The purpose of the project is to repair the damage in-kind to pre-storm conditions (meeting current design standards). For the majority of the in-kind repairs, such as ditch reconditioning, shoulder reconditioning, and pavement repair, no other alternatives were considered. Alternatives were developed for the embankment repairs and large culvert and bridge replacements.

4.1.1. Embankment Repairs

Three embankment repair options were developed based on the extent of the damage. Type I embankment reconstruction would replace 3 to 8 feet of existing ground with rock embankment (Figure 7). The embankment will be mechanically placed rocks ranging in size from 10 inches to 29 inches, placing the larger rocks at the bottom and along the slope and filling in voids with smaller rocks. The slope of the embankment is maintained at 1V:1.5H or matching existing side slope.

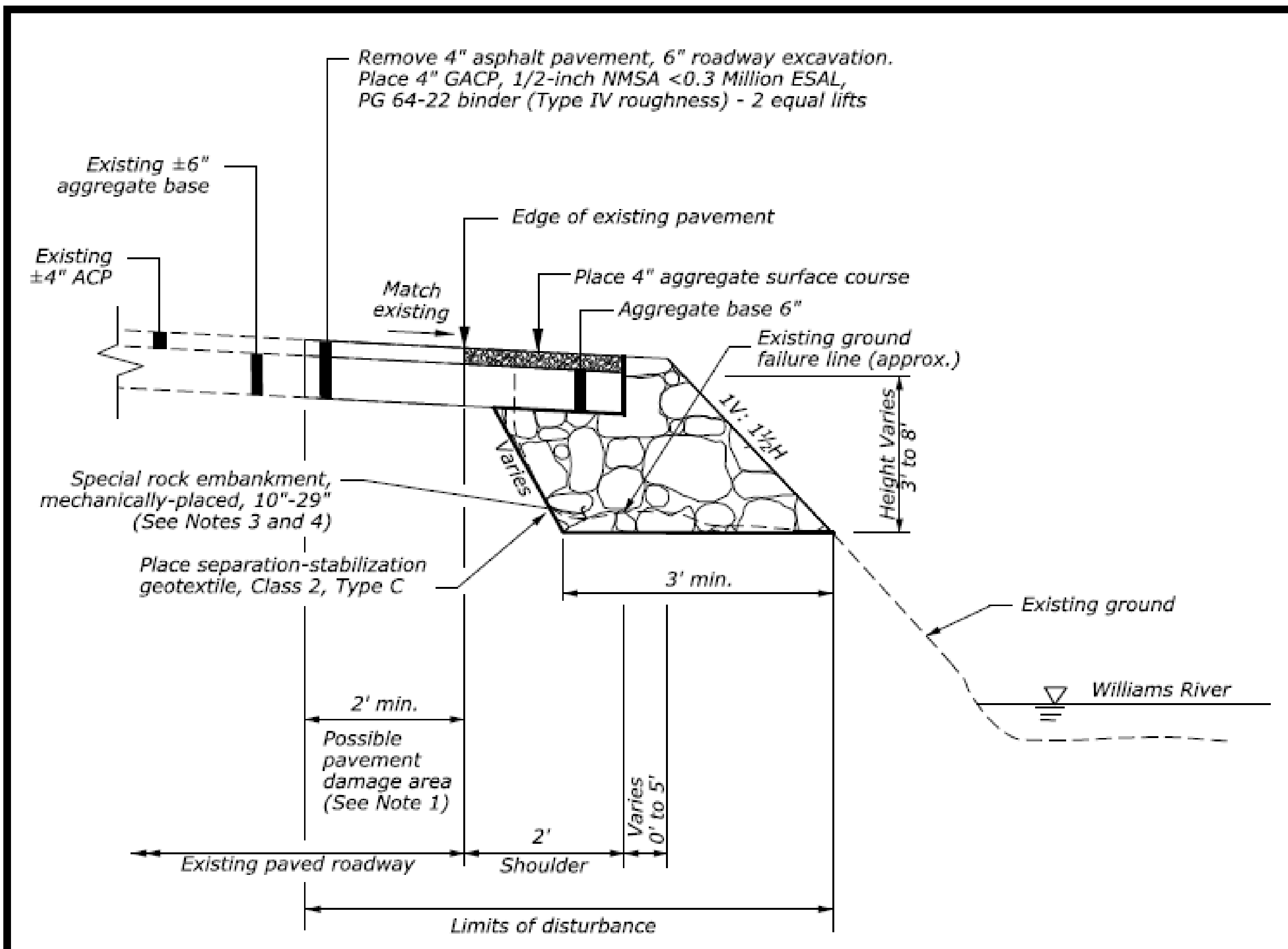

Figure 7. Typical Section of Embankment Repair

Type II is the same as type I, except 8 to 20 feet of ground is being removed and replaced with the rock embankment (Figure 2). Type II would have no in-water impacts. The Type III embankment reconstruction extends the riprap along the slope to the streambed (Figure 3), and would result in in-water impacts. In one location at milepost 10.6 where there is not exposed rock, the riprap would be keyed into streambed substrate.

4.1.2. Large Culverts and Bridges

Double-barrel Corrugated Metal Pipe at Milepost 5.9

Multiple structure types were evaluated to determine which type would work best given the site conditions. Bridges and bottomless culverts were evaluated; however, these options were dismissed. The site does not have shallow bedrock on which to support a bridge or bottomless culvert. The site is also at the confluence of Hateful Run and Williams River, and so the new structure would need to withstand being inundated during flood events. An embedded concrete box culvert was determined the be the best structure type for this location.

20-foot Span Timber Bridge at Milepost 6.7

Bottomless culvert structures and concrete box culverts were ruled out at this location. It is not feasible to raise the road at this location given its proximity to Williams River. The bridge is also located at the confluence of Bridge Creek and Williams River and so the structure would need to be able to withstand being inundated during flood events. The largest reasonable span for a concrete box or concrete frame is 20 feet, and multi-cell concrete boxes were not considered due to the potential debris blockage. Multi-plate structures generally require a 2-foot minimum cover, and a plate-arch structure has reduced cross-sectional area in comparison to a bridge per a given span. Therefore, it was determined that a single span (no piers in the stream) concrete bridge would be the best structure type for this location.

Corrugated Metal Pipe Arch Culvert at Milepost 9.5

An open bottom aluminum box culvert and a concrete box culvert were evaluated at this location. The site does not have shallow bedrock on which to support a bottomless structure. With appropriate material placed below the box culvert and rock protection at the inlet and outlet, erosion for flood waters would not an issue for the concrete box culvert. Therefore, a concrete box culvert was determined to be the best structure type for this location.

20-foot Span Timber Bridge at Milepost 10.8

Multiple structure types were evaluated to determine which type would work best given the site conditions, including an open bottom aluminum box culvert or multi-plate arch culvert, a three or four-sided concrete box culvert, and a precast voided slab bridge. Bottomless culvert structures and concrete box culverts were ruled out at this location because of the site constraints. The bridge is also located at the confluence of Elbow Branch and Williams River and so the structure would need to be able to withstand being inundated during flood events. The largest reasonable span for a three or four-sided concrete box is 20 feet, multi-cell boxes were not considered due to debris blockage, and aluminum box or multi-plate arch structures have reduced hydraulic opening per span. Multi-plate structures generally require a 2-foot minimum cover, and a plate-arch structure has reduced cross-sectional area in comparison to a bridge per a given span. Therefore, it was determined that a single span (no piers in the stream) concrete bridge would be the best structure type for this location.

Double Barrel Structural Steel Arch Pipe at Milepost 16.6

At this location, the road is less than 8 feet above the stream. Because of the shallow depth in relation to the width of the stream, bottomless culvert structures and concrete box culverts were ruled out at this location. The largest reasonable span for a concrete box or concrete frame is 20 feet, and multi-cell concrete boxes were not considered due to potential debris blockage. Multi-plate structures generally require a 2-foot minimum cover, and a plate-arch structure has reduced cross-sectional area in comparison to a bridge per a given span. A single span (no piers in the stream) concrete bridge was determined to be the best alternative.

Structural Steel Pipe along Route 133 at Milepost 1.19

An open bottom structural steel plate arch on concrete footings and an embedded reinforced concrete box were analyzed at this location. The concrete box culvert was dismissed due to constructability issues related to the steep slopes, significant amount of fill, and maintenance of a temporary diversion. The structural plate arch was considered the best option for constructability and for accommodating the amount of fill to meet the proposed roadway alignment.

4.1.3. Stream Diversion Options

The project plans specify the use of a temporary diversion channel or a sandbag/barrier diversion, depending on the site. The project plans (Note 6 in the temporary diversion channel detail – project plans can be found in Appendix A) direct the contractor to design the diversion channel and submit the design drawings to the FHWA Contracting Officer for review and approval according to Subsection 104.03 [of the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-14)] (United States Department of Transportation).

FHWA will be obtaining environmental permits on the diversion/dewatering method specified in the plans. Although the contractor could submit a different diversion/dewatering system option as described below, changes to the diversion method will also require a contract modification and a modification of the environmental permits issued by the U.S. Army Corps of Engineers and West Virginia Department of Environmental Protection.

Stream Diversion Options include the following:

Temporary Diversion Channel: A sandbag dam and bypass channel lined with impermeable membrane, a temporary culvert, and/or rock is constructed to divert the stream water around the excavation. Depending on the channel slope, presence of pools, and ground water elevation, water may need to be pumped (sump pump) out of the work area through a filter bag or sediment trap to infiltrate into a nearby upland area.

Temporary Bypass Dam/Pipe: Sandbags are placed to create a dam on the upstream and downstream ends of the excavation. A bypass pump is used to move water around the work area and discharge downstream of the downstream dam. Depending on the channel slope, presence of pools, and ground water elevation, water may need to be pumped (sump pump) out of the work area through a filter bag or sediment trap to infiltrate into a nearby upland area.

Phased Sandbag/Barrier Diversion: Sandbags are placed to divert stream flow through one side of the channel, working from the upstream end to the downstream end. After diversion-dependent work is completed, sandbags are reconfigured to divert water through the other half of the channel so that the same work can be completed on the second side. Depending on the channel slope, presence of pools, and ground water elevation, water may need to be pumped (sump pump) out of the work area through a filter bag or sediment trap to infiltrate into a nearby upland area.

4.1.4. Project Timeline and Sequencing

The storm damage repair work is split into four separate projects. Below is a table showing the estimated number of working days and the anticipated timeframe during which construction would occur. There would likely be no work between mid-December and the end of March when construction would typically shut down to avoid work during winter weather conditions.

Project	Number of Working Days	Approximate Construction Start	Approximate Construction Completion
WV ERFO FS 2016-1(3)	94	7/15/2019	12/20/2019
WV ERFO FS 2016-1(4)	181	7/15/2019	7/31/2020
WV ERFO FS 2016-1(2)	150	12/16/2019	7/23/2021
WV ERFO FS 2016-1(5)	212	8/3/2020	9/24/2021

The proposed projects have been planned for construction between July 2019 and September 2021. For each project, construction elements comprising the timeline and sequencing would include the installation of erosion and sediment controls, installation of temporary stream diversions/cofferdams, culvert replacements, bridge replacements, embankment and side slope repairs, road reconstruction, site restoration, and removal of erosion and sediment controls.

4.1.5. Construction Access and Staging

Equipment and material staging would occur on existing sections of Williams River Road within the road closure as well as existing campsites or turnarounds. After construction is completed staging areas would be restored to their original conditions.

4.1.6. Description of Work

Proposed work would rehabilitate damaged road sections along FS 86, 133, 150, with aggregate and asphalt surface courses, reconstruct embankments and side slopes, and complete necessary drainage repairs and replacements to provide safe passage through the routes while improving the roadway drainage. The project includes replacement of damaged or washed out bridges and culverts, and scour protection as needed. The following sections provide a breakdown of the repairs at each site in each project.

No asphalt paving will occur in projects (2), (3), or (4). The damaged pavement will be saw-cut and removed. These areas will be replaced with aggregate until the (5) project when all of the asphalt pavement will be done at one time at the end of the project.

Asphalt is a combination of stone, sand, or gravel bound together with an asphalt cement, a product of crude oil. Asphalt is dumped into hoppers located at the front of paving machines. The asphalt is placed to the desired width and then compacted using a heavy roller over the asphalt. The construction contractor is required to contain debris within the construction limits and cannot allow debris to enter waterways.

Table 5. WV ERFO FS 2016-1(2) - FS Milepost 15.0 to 18.4, FS 133

Route	MP	Description of Damage	Work Activities	Construction Duration (Working Days)	Waterbody	One or Both Banks Affected, Linear Length of Stream/River Bank Affected (ft)	Area of Impact (ft2)	Distance to Williams River from Work Area (ft)	Stream/River Width Impacted (ft)	Volume of Fill Material Placed in Stream/River Bank (Cubic Yards)	Diversion (Y/N) and Type, and Linear Feet (ft) and Area of Impact (ft2)	Duration of Channel Diversion
FS 86	**15**	**Significant erosion of the existing embankment. Damage to roadway and erosion at shoulders and ditches.**	**Asphalt concrete pavement (ACP), embankment reconstruction, shoulder and ditch reconditioning.**	**9**	**Williams River**	**One Bank, 70**	**350**	**in water**	**5**	**583**	**N**	**n/a**
FS 86	15.8	Significant erosion of the existing embankment. Damage to the roadway.	Embankment reconstruction, ACP.	17	No In-water Work	n/a	n/a	1	n/a	n/a	n/a	n/a
FS 86	**16.6**	**Damage to culvert. Erosion at outlets. Erosion and shoulders and ditches. Washout of ACP. Culvert not safe for travel by large vehicles.**	**ACP, shoulder and ditch reconditioning, and 72" double arch pipe replacement with bridge.**	**74**	**White Oak Fork**	**Both Banks, 39**	**150**	**3000**	**20**	**118**	**Y, Channel, 112 lnft, 3,663 sqft**	**75**
FS 86	17.2	Damage to roadway and erosion at ditches and shoulders.	ACP, shoulder and ditch reconditioning.	1	No In-water Work	n/a	n/a	1	n/a	n/a	n/a	n/a
FS 86	18.3-18.4	Damage to roadway and culvert and erosion at ditches and shoulders.	ACP, ditch and shoulder reconditioning, and pipe culvert replacement.	4	No In-water Work	n/a	n/a	1	n/a	n/a	n/a	n/a
FS 133	**1.19**	**Damage to culvert and complete overtopping and washout of roadway.**	**Culvert replacement with open bottom arch at MP 1.19 on FR 133.**	**59**	**Unnamed Tributary to White Oak Fork**	**Both Banks, 70**	**2234**	**1500**	**22**	**167**	**Y, Flow Maintained Through Existing Pipe Culvert and Sandbag, 84 lnft, 475 sqft**	**n/a**

<u>WV ERFO FS 2016-1(2) - FS 86 MP 15.0 to 18.4 and FS 133</u>

1. <u>FS 86 at milepost 15.0: Embankment reconstruction, shoulder and ditch reconditioning.</u>

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. Embankment repairs would occur at two locations at this site. At the first location, the failing material of the road embankment and side slope would be excavated to a depth of approximately 8 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. An 8-inch corrugated metal pipe culvert would be extended through the riprap placed for the embankment repair. Aggregate would be placed on top of the rock. No in-water work would be needed to complete this work. At the second location, the failing material of the road embankment and side slope would be excavated to a depth of approximately 10 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

A 24-inch culvert would be installed to improve roadway drainage. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

2. <u>FS 86 at milepost 15.8: Embankment reconstruction, culvert replacement.</u>

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present, including 6 trees, would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 27 feet to create a bench upon which to place geotextile and rock. The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

An 18-inch culvert would be replaced to improve roadway drainage. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

3. FS 86 at milepost 16.6: Shoulder and ditch reconditioning, and 72" double arch pipe replacement with bridge.

Figure 8. Culverts at Milepost 16.6, Photo Taken 5/3/2017

The existing double barrel arch pipes conveying White Oak Fork would be replaced with a 40-foot long single span concrete bridge. Any vegetation present, including 12 trees, would be cleared and erosion and sediment control measures would be installed. A temporary stream crossing would be constructed using a 50-foot long temporary bridge that would span the waterway to the south side of the existing bridge in order to maintain traffic during construction. A stream diversion, using sandbags, would be installed to divert stream flow through one pipe culvert working from the upstream end to the downstream end. The area behind the sandbags would be dewatered using pumps and filter bags and one of the arch pipes would be removed. Filter bags would be set in an adjacent upland area. The new bridge abutment would be constructed and rock would be installed to protect the abutment. The stream diversion would then be reconfigured to divert water through the other half of the channel so that the same work can be completed on the second side. The stream diversion would be removed and the rest of the bridge and roadway approaches would be constructed.

Once the new bridge is in place, the temporary crossing would be removed and the ground would be graded to blend with the surrounding area. Permanent seeding would be applied to revegetate all disturbed areas.

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Erosion and sediment control measures would be installed prior to and during construction. All disturbed areas would be seeded.

4. FS 86 at milepost 17.2: Shoulder and ditch reconditioning.

Erosion and sediment control measures would be installed. Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

5. FS 86 at milepost 18.3-18.4: Ditch and shoulder reconditioning, and pipe culvert replacement.

Erosion and sediment control measures would be installed. Two existing 18-inch culverts would be replaced with 24-inch culverts to improve roadway drainage. The culverts would connect to the roadside ditch to provide discharge points for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipes would be installed, and the road would be reconstructed by replacing the aggregate base material.

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

6. FS 133 at milepost 1.19: Culvert replacement with open bottom arch at MP 1.19 on FS 133

Figure 9. Culvert on FS 133 at Milepost 1.19, Photo Taken 5/3/2017

The existing 9-foot diameter culvert conveying a tributary to the Williams River would be replaced with a 30-foot span structural plate arch culvert, set on concrete footings. The longer span is not expected to change the flow of the stream, as it is intended to span the stream banks. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The existing culvert would remain in place and the road and fill material around the culvert would be removed. Additional material would be excavated on each side of the culvert and the concrete footings would be constructed. Once the concrete footings are in place, the existing culvert would be removed. A stream diversion would be installed around one side of the channel to allow for the structural plate and riprap to be installed. The stream diversion would then be reconfigured and the stream would flow through the other side for the same activities to be completed on the remaining side. The area around and above the new culvert would be backfilled and the road would be reconstructed. Permanent seeding would be applied to revegetate all disturbed areas.

Table 6. WV ERFO FS 2016-1(3) - FS 86 Milepost 12.0 to 14.7

Route	MP	Description of Damage	Work Activities	Construction Duration (Working Days)	Waterbody	One or Both Banks Affected, Linear Length of Stream/River Affected (ft)	Area of Impact (ft2)	Distance to Williams River from Work Area (ft)	In-Water Work (Y/N) and Type (Channel or Reaching)	Stream/River Width Impacted (ft)	Volume of Fill Material (Cubic Yards)	Diversion (Y/N) and Type, and Linear Feet (ft) and Area of Impact (ft2)	Duration of Channel Diversion
FS 86	12	Significant erosion of the existing embankment.	ACP, embankment reconstruction.	2	No In-water Work	n/a	n/a	1	N	n/a	n/a	N	n/a
FS 86	12.3-12.45	Significant erosion of the existing embankment. Damage to culvert and erosion at ditches and shoulders.	ACP, embankment reconstruction, ditch and shoulder reconditioning, and culvert replacement.	4	No In-water Work	n/a	n/a	1	N	n/a	n/a	N	n/a
FS 86	**12.6-12.8**	**Significant erosion of the existing embankment. Damage to roadway and culvert and erosion at ditches and shoulders.**	**ACP, embankment reconstruction, and ditch and shoulder reconditioning.**	**21**	**Williams River**	**One Bank, 520**	**2600**	**In water**	**Y, Reaching**	**5**	**96**	**N**	**n/a**
FS 86	**13.8**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**Ditch and shoulder reconditioning, embankment reconstruction,**	**6**	**Williams River**	**One Bank, 145**	**725**	**In water**	**Y, Reaching**	**5**	**134**	**N**	**n/a**
FS 86	**14.0-14.4**	**Significant erosion of the existing embankment. Damage to roadway and culvert. Erosion at ditches and shoulders.**	**ACP, embankment reconstruction, shoulder and ditch reconditioning and pipe replacement.**	**11**	**Williams River**	**One Bank, 183**	**915**	**In water**	**Y, Reaching**	**5**	**68**	**N**	**n/a**
FS 86	14.7	Large slide where trees and debris have fallen and are protruding into the road and ditches obstructing drainage.	Ditch reconditioning. Clear large trees and debris are on the slide and protruding into the road.	3	No In-water Work	n/a	n/a	16	N	n/a	n/a	N	n/a

WV ERFO FS 2016-1(3) FS 86 MP 12.0 to 14.7

1. FS 86 at milepost 12.0: Embankment reconstruction.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. Embankment repairs would occur at two locations at this site. At both locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 7 feet at the first location and 8 feet at the second location to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

2. FS 86 at milepost 12.3-12.45: Embankment reconstruction, ditch and shoulder reconditioning, and culvert replacement.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. Embankment repairs would occur at two locations at this site. At both locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 6 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Two existing 18-inch culverts would be replaced drainage. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipes would be installed, and the road would be reconstructed by replacing the aggregate base material. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

3. FS 86 at milepost 12.6-12.8: Embankment reconstruction, and ditch and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. Embankment repairs would occur at two locations at this site. The failing material of the road embankment and side slope would be excavated to a depth of approximately 15 feet at the first location and 12 feet at the second location. *At these locations, the embankment repair extends the rock along the side slope to the* *streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

A 24-inch culvert would be installed to improve roadway drainage. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

4. FS 86 at milepost 13.8: Ditch and shoulder reconditioning, embankment reconstruction,

The embankment repair would sawcut, remove, and replace with aggreate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 12 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

5. FS 86 at milepost 14.0-14.4: Embankment reconstruction, shoulder and ditch reconditioning and pipe replacement.

Embankment repairs would be completed at three locations at this site. The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion control measures would be installed. At two of the locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 3 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

At the third location, the failing material of the road embankment and side slope would be excavated to a depth of approximately 10 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

A 24-inch culvert would be installed to improve roadway drainage. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

6. FS 86 at milepost 14.7: Ditch reconditioning. Clear large trees and debris are on the slide and protruding into the road.

Downed timber and debris would be removed and vegetation would be cleared from the ditch line. Erosion and sediment control measures would be installed. Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

Table 7. WV ERFO FS 2016-1(4) - FS 86 Milepost 8.0 to 11.1

Route	MP	Description of Damage	Work Activities	Construction Duration (Working Days)	Waterbody	One or Both Banks Affected; Linear Length of Stream/River Bank Affected (ft)	Area of Impact (ft2)	Distance to Williams River from Work Area (ft)	In-Water Work (Y/N) and Type (Channel or Reaching)	Stream/ River Width Impacted (ft)	Volume of Material Placed in Stream/River Bank (Cubic Yards)	Diversion (Y/N) and Type, and Linear Feet (ft) and Area of Impact (ft2)	Duration of Channel Diversion (Working Days)
FS 86	**8.0-8.2**	**Significant erosion of the existing embankment. Damage to roadway and erosion at ditches and shoulders.**	**ACP, embankment reconstruction, ditch and shoulder reconditioning**	**7**	**Williams River**	**One Bank, 195**	**390**	**In water**	**Y, Reaching**	**2**	**14**	**N**	**n/a**
FS 86	**8.9**	**Significant erosion of the existing embankment. Damage to roadway. Erosion at ditches and shoulders.**	**ACP, ditch and shoulder reconditioning and embankment reconstruction.**	**6**	**Williams River**	**One Bank, 108**	**1080**	**In water**	**Y, Reaching**	**10**	**80**	**N**	**n/a**
FS 86	**9**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**ACP, ditch and shoulder reconditioning and embankment reconstruction.**	**7**	**Williams River**	**One Bank, 170**	**850**	**In water**	**Y, Reaching**	**5**	**63**	**N**	**n/a**
FS 86	**9.1**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**Embankment reconstruction and ditch and shoulder reconditioning.**	**2**	**Williams River**	**One Bank, 40**	**200**	**In water**	**Y, Reaching**	**5**	**15**	**N**	**n/a**
FS 86	**9.5**	**Damage to culvert and complete overtopping and washout of roadway.**	**Replacement of existing 72" arch culvert with a box culvert, ACP, ditch and shoulder reconditioning and embankment reconstruction.**	**20**	**Little Lick Branch**	**Both Banks, 40**	**271**	**10**	**Y, Channel**	**76**	**47**	**Y, Channel, 22 lnft, 323 sqft**	**12**
FS 86	9.7	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	Embankment reconstruction and ditch and shoulder reconditioning.	14	No In-water Work	n/a	n/a	1	N	n/a	n/a	N	n/a
FS 86	9.9	Significant erosion of the existing embankment. Erosion at ditches and shoulders.	Embankment reconstruction and shoulder reconditioning.	3	No In-water Work	n/a	n/a	1	N	n/a	n/a	N	n/a
FS 86	10	Significant erosion of the existing embankment. Erosion at ditches and shoulders.	Embankment reconstruction and shoulder reconditioning.	3	No In-water Work	n/a	n/a	1	N	n/a	n/a	N	n/a
FS 86	**10.6**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**Embankment reconstruction and shoulder reconditioning.**	**4**	**Williams River**	**One Bank, 180**	**1800**	**In water**	**Y, Reaching**	**10**	**867**	**Y, Sandbag, 190 lnft, 9500 sqft**	**6**
FS 86	**10.7-10.8**	**Damaged existing bridge and siginicant erosion around bridge. Washed out ACP.**	**Bridge replacement, ACP, embankment reconstruction, and ditch and shoulder reconditioning.**	**104**	**Elbow Branch**	**Both Banks, 29**	**167**	**30**	**Y, Channel**	**11.75**	**167**	**Y, Channel, 42 lnft, 653 sqft**	**70**
FS 86	10.9-11.1	Erosion at ditches and shoulders.	Ditch and shoulder reconditioning.	1	No In-water Work	n/a	n/a	5	N	n/a	n/a	N	n/a

WV ERFO FS 2016-1(4) FS 86 MP 8.0 to 11.1

1. FS 86 at milepost 8.0-8.2: Embankment reconstruction, ditch and shoulder reconditioning

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 12 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

2. FS 86 at milepost 8.9: Embankment reconstruction, ditch and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area, including 3 trees, would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 18 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

3. FS 86 at milepost 9.0: Embankment reconstruction, ditch and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 17 feet. *At this* *location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

4. FS 86 at milepost 9.1: Embankment reconstruction, ditch and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area, including one tree, would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 12 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

5. FS 86 at milepost 9.5: Replacement of existing 72" arch culvert with a box culvert, ditch and shoulder reconditioning and embankment reconstruction

Figure 10. Culvert at Milepost 9.5, Photo Taken 4/10/2018

The existing 72-inch arch culvert conveying Little Lick Branch to the Williams River would be replaced with a 12-foot span by 5-foot rise precast concrete box culvert. The work area would be cleared of vegetation and erosion and sediment control measures would be installed. Existing boulders would be removed as needed in order to install the temporary diversion channels and construct the bridge. A temporary diversion channel would be installed by excavating a new channel adjacent to the existing channel and lining the new channel with plastic or riprap. Sandbags would be placed at both ends of the diversion channel to prevent flow and backflow into the natural channel. Water will flow naturally through the diversion channel. The existing channel would be dewatered by pumping water out through a filter bag placed in an upland area.

The existing culvert would be removed and the area beneath the culvert would be excavated to reach the elevation at which the box culvert would be set. The precast concrete box culvert would be set in place and riprap would be installed at the inlet and outlet of the culvert.

After the new culvert is in place, the temporary stream diversion sandbags would be placed to block flow into the diversion channel, the plastic or riprap would be removed, and the channel would be filled. The road would be reconstructed and the areas beyond the road prism would be restored to natural conditions and seeded.

The site also includes embankment repair, which would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present, including 2 trees. would be cleared. The failing material of the road embankment and side slope would be excavated to a depth of approximately 8 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

6. <u>FS 86 at milepost 9.7: Embankment reconstruction and ditch and shoulder reconditioning.</u>

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 12 feet to create a bench upon which to place geotextile and rock. The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. The riprap slope protection would tie into the locations of existing riprap at both ends. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

7. FS 86 at milepost 9.9: Embankment reconstruction and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. Embankment repairs would occur at two locations at this site. At both locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 6 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

8. FS 86 at milepost 10.0: Embankment reconstruction and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment controls would be installed. Embankment repairs would occur at two locations at this site. At both locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 5 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work would be needed to complete this work.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

9. FS 86 at milepost 10.6: Embankment reconstruction and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace with aggregate approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area, including 8 trees, would be cleared and erosion and sediment control measures would be installed. A sandbag (1 cubic yard sandbags with straps, set in place and removed using a crane stationed on the road) stream diversion would be installed. The sandbags would be lined with plastic to minimize water intrusion through the diversion. Water would be pumped from the work area through a filter bag placed in an upland area and would not discharge to Williams River. The failing material of the road embankment and side slope would be excavated to a depth of approximately 15 feet. *At this* *location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

10. <u>FS 86 at milepost 10.7-10.8: Bridge replacement, embankment reconstruction, and ditch and shoulder reconditioning</u>

Figure 11. Timber Bridge at Milepost 10.8, Photo Taken 4/10/2018

The existing 20-foot long timber bridge with stacked stone abutments across Elbow Branch would be replaced with a 30-foot long single span concrete bridge. The work area would be cleared of vegetation and erosion and sediment control measures would be installed. Water would be diverted to flow down one side of the existing stream using sandbags. Existing boulders would be removed as needed in order to install the stream diversions and construct the bridge. One of the abutments and riprap would be constructed behind this diversion berm. After the completion of the first abutment, the flow would then be switched to the other side of the stream by reconfiguring the stream diversion to allow construction of the abutment and riprap on the other side. The bridge deck would be placed and the temporary stream diversion sandbags would be removed and the channel would be restored to natural conditions. The road approaches to the bridge would be reconstructed at a higher elevation to match the elevation of the new bridge.

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

This site also includes one location of embankment reconstruction. The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present would be cleared. Embankment repairs would occur at two locations at this site. At both locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 6 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

11. <u>FS 86 at milepost 10.9-11.1: Ditch and shoulder reconditioning.</u>

Erosion and sediment control measures would be installed. Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

Table 8. WV ERFO FS 2016-1(5) FS 86 Milepost 0.2 to 7.4 , and FS 150

Route	MP	Description of Damage	Work Activities	Construction Duration	Waterbody	One or Both Banks Affected; Linear Length of Stream/River Bank Affected (ft)	Area of Impact (ft2)	Distance to Williams River from Work Area (ft)	In-Water Work (Y/N) and Type (Channel or Reaching)	Stream/River Width Impacted (Feet)	Volume of Fill Material Placed in Stream/River Bank (Cubic Yards)	Diversion (Y/N) and Type, and Linear Feet (ft) and Area of Impact (ft2)	Duration of Channel Diversion
FS 86	0.2	Significant erosion of the existing embankment. Damage to roadway and culvert. Significant erosion at ditches and shoulders.	Embankment reconstruction, ditch and shoulder reconditioning, pipe culvert installation and riprap placement.	4	No In-water Work	n/a	n/a	300	N	n/a	n/a	n/a	n/a
FS 86	0.5	Significant erosion at the outlet of the	Riprap placement.	1	No In-water Work	n/a	n/a	300	N	n/a	n/a	n/a	n/a
FS 86	0.5 to 2.5	Erosion at ditches.	Ditch reconditioning.	2	No In-water Work	n/a	n/a	>14 (varies)	N	n/a	n/a	n/a	n/a
FS 86	1.4	Significant erosion at the inlet and outlet of the culvert.	Embankment reconstruction, and ditch reconditioning.	1	No In-water Work	n/a	n/a	1	N	n/a	n/a	n/a	n/a
FS 86	1.6	Significant erosion at the inlet andoutlet of the culvert.	Slide repair on the fill slope and repair of culvert inlet.	1	No In-water Work	n/a	n/a	1	N	n/a	n/a	n/a	n/a
FS 86	2	Significant erosion at the outlet of the	Repair of small slide on fill slope.	2	No In-water Work	n/a	n/a	300	N	n/a	n/a	n/a	n/a
FS 86	3.9-4.0	Significant erosion of the existing embankment. Damage to roadway and erosion at ditches and shoulders.	ACP, embankment reconstruction, and ditch and shoulder reconditioning.	4	No In-water Work	n/a	n/a	1	N	n/a	n/a	n/a	n/a
FS 86	4.2	embankment. Damage to roadway and culvert and erosion at ditches and shoulders.	Embankment reconstruction, ditch reconditioning and riprap placement.	2	No In-water Work	n/a	n/a	1	N	n/a	n/a	n/a	n/a
FS 86	**5.9**	**Culverts crushed and washed out ACP.**	**Replacement of existing double 54" culverts with box culvert, ACP.**	**16**	**Hateful Run**	**Both Banks, 43**	**336**	**1**	**Y, Channel**	**14**	**74**	**Y, Channel, 60 lnft, 417 sqft**	10
FS 86	**6**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**Embankment reconstruction, repair of culvert and ditch and shoulder reconditioning.**	**12**	**Williams River**	**One Bank, 372**	**1860**	**in water**	**Y, Reaching**	**5**	**1378**	**N**	n/a
FS 86	6.2	Significant erosion of the existing embankment. Damage to outlet of culvert. Erosion at ditches and shoulders.	Embankment reconstruction, ditch reconditioning, and pipe culvert replacement.	1	No In-water Work	n/a	n/a	1	N	n/a	n/a	n/a	n/a
FS 86	**6.3**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**Embankment reconstruction, ditch and shoulder reconditioning.**	**2**	**Williams River**	**One Bank, 123**	**615**	**in water**	**Y, Reaching**	**5**	**114**	**N**	n/a
FS 86	**6.7**	**Damaged existing bridge and siginicant erosion around bridge. Washed out**	**Bridge replacement, and ACP.**	**73**	**Bridge Creek**	**Both Banks, 30**	**318**	**1**	**Y, Channel**	**19**	**105**	**Y, Sandbag, 47 lnft, 561 sqft**	55
FS 86	**6.8**	**Significant erosion of the existing embankment. Erosion at ditches.**	**Embankment reconstruction and ditch reconditioning.**	**2**	**Williams River**	**One Bank, 81**	**405**	**in water**	**Y, Reaching**	**5**	**450**	**N**	n/a
FS 86	**7.2**	**Significant erosion of the existing embankment. Erosion at ditches and shoulders.**	**Embankment reconstruction, ditch reconditioning.**	**4**	**Williams River**	**One Bank, 190**	**950**	**in water**	**Y, reaching**	**5**	**880**	**N**	n/a
FS 86	7.4	Damage to roadway and culvert. Erosion at outlet of existing culvert.	ACP, add a new culvert, and riprap placement.	3	No In-water Work	n/a	n/a	1	N	n/a	n/a	n/a	n/a
FS 150	7.7	Washout of the entrance to the parking area.	Honeycomb Rock Trail Head parking area repair	9	No In-water Work	n/a	n/a	4000	N	n/a	n/a	n/a	n/a
FS 150	10.8	Slide on the cut side. Significant erosion at the outlet of the culvert damaging the end section.	Shoulder and ditch reconditioning, place riprap, remove pipe end section, remove and reset guardrail.	1	No In-water Work	n/a	n/a	8000	N	n/a	n/a	n/a	n/a

<u>WV ERFO FS 2016-1(5) FS 86 MP 0.2 to 7.4 and FS 150</u>

1. <u>FS 86 at milepost 0.2: Embankment reconstruction, ditch and shoulder reconditioning, pipe culvert installation and riprap placement.</u>

Vegetation in the work area, including 5 trees, would be cleared from the work area and erosion and sediment control measures would be installed. The 60-inch pipe culvert would be removed and replaced. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material and asphalt pavement. Riprap would be installed to protect the site from erosion.

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

2. <u>FS 86 at milepost 0.5: Riprap placement; FS 86 at milepost 0.5 to 2.5: Ditch reconditioning, FS 86 at milepost 1.4: Embankment reconstruction, and ditch reconditioning; FS 86 at milepost 1.6: Slide repair on the fill slope and repair of culvert inlet; and FS 86 at milepost 2.0: Repair of small slide on fill slope.</u>

At milepost 0.5, riprap would be placed at the outfall of an existing 24-inch pipe culvert. At milepost 1.4 and 1.6, embankment repairs would occur on both sides of the road. On the western side of the road, the embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 6 feet at milepost 1.4 and 4 feet at milepost 1.6 to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

On the eastern side of the road, the embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 12 feet to create a bench upon which to place geotextile and rock. The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. The riprap slope protection would tie into the locations of existing riprap at both ends. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

At milepost 2.0, riprap would be placed at the outfall of an existing 24-inch pipe culvert to correct a small slide area. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

3. <u>FS 86 at milepost 3.9-4.0: ACP, embankment reconstruction, and ditch and shoulder reconditioning.</u>

Embankment repairs would occur at one larger location and three small locations. The embankment repair would sawcut, remove, and replace with approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. At the three small locations, the failing material of the road embankment and side slope would be excavated to a depth of approximately 5 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock. At the larger location, the embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present would be cleared. The failing material of the road embankment and side slope would be excavated to a depth of approximately 17 feet to create a bench upon which to place geotextile and rock. The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

A 36” pipe culvert would be installed with riprap to protect the outfall. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material. The asphalt pavement would be patched at three locations. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

4. FS 86 at milepost 5.9: Replacement of existing double 54" culverts with box culvert, ACP.

Figure 12. Culverts at Milepost 5.9, Photo Taken 11/30/2017

The existing double 54-inch arch culverts conveying Hateful Run to the Williams River would be replaced with a 12-foot span by 6-foot rise concrete box culvert. The work area would be cleared of vegetation and erosion and sediment control measures would be installed. A temporary diversion channel would be installed by excavating a new channel adjacent to the existing channel and lining the new channel with plastic or riprap. Sandbags would be placed at both ends of the diversion channel to prevent flow and backflow into the natural channel. Water will flow naturally through the diversion channel, and will not require pumping. Existing boulders would be removed as needed in order to install the temporary diversion channels and construct the large culverts.

The existing culvert would be removed and the area beneath the culvert would be excavated to reach the elevation at which the box culvert would be set. The precast concrete box culvert would be set in place, embedded 2 feet below the streambed elevation. The box culvert would be backfilled with native streambed materials.

After the new culvert is in place, the temporary stream diversion sandbags would be placed to block flow into the diversion channel, the plastic or riprap would be removed, and the channel would be filled.

The road would be reconstructed and the areas beyond the road prism would be restored to natural conditions and seeded.

5. FS 86 at milepost 6.0: Embankment reconstruction, repair of culvert and ditch and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 13 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

6. FS 86 at milepost 6.2: Embankment reconstruction, ditch reconditioning, and pipe culvert replacement.

The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 2 feet to create a bench upon which to place geotextile and rock varying between 10 to 29 inches in size. Aggregate would be placed on top of the rock.

A 3-foot section of an 18-inch pipe culvert extending beyond the edge of the pavement would be replaced.

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

7. FS 86 at milepost 6.3: Embankment reconstruction, ditch and shoulder reconditioning.

The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 8 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

8. FS 86 at milepost 6.7: Bridge replacement, and ACP.

Figure 13. Timber Bridge at Milepost 6.7, Photo Taken 4/11/2018

The existing 20-foot long timber bridge with stacked stone abutments across Bridge Creek would be replaced with a 30-foot long single span concrete bridge. The work area would be cleared of vegetation and erosion and sediment control measures would be installed. Water would be diverted to flow down one side of the existing stream using sandbags. Existing boulders would be removed as needed in order to construct the bridge. The abutment and riprap would be constructed behind this diversion berm. The flow would then be switched to the other side of the stream to allow construction of the abutment and riprap on the other side. The bridge deck would be placed and the temporary stream diversion sandbags would be removed and the channel would be restored to natural conditions. The road approaches to the bridge would be reconstructed at a higher elevation to line up with the elevation of the new bridge.

All disturbed areas would be seeded.

9. FS 86 at milepost 6.8: Embankment reconstruction and ditch reconditioning.

The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 20 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

10. <u>FS 86 at milepost 7.2: Embankment reconstruction, ditch reconditioning.</u>

The embankment repair would sawcut, remove, and replace approximately 2 feet of the existing edge of the asphalt-paved road if the edge of the pavement is damaged. Any vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. The failing material of the road embankment and side slope would be excavated to a depth of approximately 12 feet. *At this location, the embankment repair extends the rock along the side slope to the streambed.* The rock at the bottom of the slope would be 48-inch minimum sized rock, on top of which the 10 to 29-inch rock would be placed. Aggregate would be placed on top of the rock. *The embankment repairs would be completed by construction equipment sitting on the road reaching down with a bucket.*

Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

All disturbed areas would be seeded.

11. <u>FS 86 at milepost 7.4: ACP, add a new culvert, and riprap placement.</u>

Vegetation present in the work area would be cleared and erosion and sediment control measures would be installed. A 24-inch pipe culvert would be installed with riprap to protect the outfall. This culvert would connect to the roadside ditch to provide a discharge point for road runoff. The asphalt pavement would be sawcut and the existing material below the road would be excavated. The pipe would be installed, and the road would be reconstructed by replacing the aggregate base material and asphalt pavement. Riprap would also be placed at the outfall of a second 24-inch pipe culvert. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

12. <u>FS 86 at milepost 8.0 to 18.4: Asphalt Patching and Road Reconstruction</u>

Areas where asphalt pavement was sawcut and replaced with aggregate to make repairs under (2), (3), and (4) would be paved with asphalt. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

13. FS 150 at milepost 7.7: Honeycomb Rock Trail Head parking area repair.

The Honeycomb Rock Trail parking area was damaged by the storm and would be repaired. Vegetation in the work area would be cleared and erosion and sediment control measures would be installed. A 24-inch pipe culvert would be replaced and the stone masonry wall around the parking area would be repaired. The area would be repaved and the split rail fence would be removed and replaced. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

14. FS 150 at milepost 10.8: Shoulder and ditch reconditioning, place riprap, remove pipe end section, remove and reset guardrail.

Vegetation would be cleared from the work area and erosion and sediment control measures would be installed. Riprap would be placed to stabilized the slope impacted by a slide at the culvert outlet, after which the shoulder would be rebuilt with aggregate and embankment material. The existing culvert end section would be replaced. Ditches would be reconditioned by removing all excess debris, sediment and vegetation from the existing ditches and culvert inlets. Ditches are then reshaped to achieve positive drainage (water flows) and a uniform ditch width, depth and grade. Shoulders would be reconditioned by repairing all soft and unstable areas. Debris is removed and excess vegetation is cleared. Shoulders are reshaped as needed to meet the edge of pavement. Stockpiled soil is added to build up the shoulder if needed. If excess material has built up over time it is removed so that water can drain off of the road surface. *No in-water work or placement of fill material into the water would be needed to complete this activity.*

Erosion and sediment control measures would be installed prior to and during construction. All disturbed areas would be seeded.

4.1.7. Mitigation Measures and Best Management Practices (BMPs)

Mitigation measures and BMPs that would be implemented to minimize the potential for impacts to Federally-listed species include the following:

- An FHWA construction engineer would be on-site throughout construction to ensure that contract requirements are being observed.
- Tree clearing would not occur between April 1 and November 15 in order to avoid impacts to bat species.
- In-water work would be completed during low flow conditions between the months of July and October to the extent possible. No in-water work would occur during from April 15 to June 30 when candy darters are spawning.
- Structural (bridge and culvert) replacements on tributaries to the Williams River at mileposts 5.9, 6.7, 9.5 and 10.7 along Williams River Road will occur immediately adjacent to the Williams River; however, the work will occur behind stream diversions that do not extend into Williams River (see Appendix A for plan sheet figures).
- A more detailed Stream Diversion and Dewatering Plan will be prepared by the construction contractor and provided to FS and FWS for review. Comments provided by FS and FWS will be resolved prior to the start of any in-water work activities.
- Native rock and boulders removed to install stream diversions, culverts, and/or bridges will be re-used in lieu of quarried stone riprap to the maximum extent possible. Rock placed in the stream channel should be replaced before the flow is restored or replaced gently within the stream channel after low flow is restored to limit potential injury to aquatic life. FHWA will consult with the FS aquatic specialist on which rocks to replace in order to restore stream flows and benefit future habitat conditions.

- Imported construction materials, such as rock, culverts, and precast concrete elements, will be free from excessive sediment, chemicals or nonnative plant materials to the extent possible.
- Embankment repairs would be completed using equipment stationed on the existing road and no equipment would enter Williams River or any of its tributaries. Rock will be mechanically placed in order to minimize the potential for rock to inadvertently roll into the river or increase turbidity.
- Roadway drainage culvert replacements and installations will be done under dry conditions.
- Debris shields would be installed prior to bridge demolition to minimize the potential for debris to enter the waterway in accordance with FP-14, Subsection 203.04, which states "203.04 Removing Material. (a) Submittals. Submit a bridge removal plan at least 30 days before beginning bridge removal for approval. Include the following: (1) Methods and equipment to be used; (2) Measures to be used for protecting the environment, public, adjacent property, and workers; and (3) Methods to keep debris out of the stream and streambed. (b) General. Saw cut sidewalks, curbs, pavements, and structures when partial removal is required. Construct structurally adequate debris shields to contain debris within the construction limits. Do not allow debris to enter waterways, travel lanes open to public traffic, or areas designated not to be disturbed."
- Construction equipment would be parked only in designated staging areas when not in use.
- Materials would be stockpiled only in designated staging areas.
- Excess material and debris will be disposed of legally off-site in accordance with FP-14 Subsection 203.05, which states, "203.05 Disposing of Material. Dispose of debris, unsuitable material, and excess material as follows: (a) Remove from project. Recycle or dispose of material legally off the project."
- Erosion and sediment control BMPs would be implemented to reduce erosion and sedimentation of the Williams River and its tributaries. Standard BMPs would include fiber roll, rolled erosion control product, and vegetative stabilization.
    - Triple stacked fiber roll with a minimum diameter of 12-inches would be utilized.
    - Rolled erosion control product would be installed to stabilize ditch reconditioning areas.
    - Erosion and sediment control BMPs will be inspected once every four calendar days and within 24 hours after any storm event greater than 0.25 inches per 24-hour period, or the occurrence of runoff from snow melt sufficient to cause a discharge. BMPs will be immediately repaired when damaged. Within 4 days of reaching the final grade, permanent seeding and mulching will be applied to stabilize the disturbed area. Temporary seeding and mulching will be applied within 4 days when areas will not be disturbed for more than 14 days.
    - Sediment deposits will be removed from behind the fiber roll when they reach half the height of the device. The sediment will be disposed of legally off-site.
- Temporary diversion channels at Hateful Run, Bridge Creek, Little Lick Branch, Elbow Branch, White Oak Fork and an unnamed tributary White Oak Fork would be installed using sandbag, concrete barriers, and/or rock and lined with plastic to allow the passage of stream flow through or around the construction area. A sandbag (1 cubic yard sandbags with straps, set in place and removed using a crane) stream diversion would be installed for the embankment repairs along the Williams River at milepost/site 10.6 where a riprap key is needed. The diversions would be removed after the repair work is completed. Water would be pumped through a filter bag placed in an upland area and would not discharge to Williams River.
- Filter bags will be placed in upland area that has been surveyed for botany resources.

- Water pumped out within a cofferdam or behind a stream diversion to a work area that was previously a live stream to create a dry work environment will require the following:
  - Install rigid plastic mesh (1/8” mesh size) across the opening of the intake pipe of the pump to keep fish out of the pump inlet.
  - Install additional screens of increasing mesh sizes around the intake pipe of the pump (1/4”, 1/2”, and 1” mesh sizes, one to two feet apart).
  - Keep screens free of the debris.
  - Run the pump at the minimum speed (lowest RPM) to lower the water gradually.
  - Set up pump as far away from the stream as possible to preclude contamination by unforeseen spills of oil or gas.
  - To minimize sediment of downstream reaches, water pumped to dewater work areas would be pumped into a sediment filter bag or a sediment trap to infiltrate.
  - A backup pump would be available for deployment and operation in the event the primary pump fails, using the same procedures above.
  - Prior to pumping water out of the work area at Hateful Run, Bridge Creek, Little Lick Branch, Elbow Branch, White Oak Fork, an unnamed tributary White Oak Fork and MP 10.6, all fish species found within the work area will be removed. Fish will be translocated to a pre-determined habitat upstream of the project area. The pre-determined relocation area will be approved by the FS and FWS. Fish will be collected by electrofishing, netted, and placed into bags containing water free of silt and turbidity; and the water used will be from the stream/river in which work is being completed. The bag of fish will then be transferred in iced down coolers that maintain the thermal tolerance of the fish. Fish will be immediately taken to the habitat location upstream and released.
  - Trained qualified personnel, familiar with the candy darter and its habitat, would be present during all in-channel and over-channel demolition or construction activities. A summary of the qualifications and experience of the person, along with a plan that details the means and methods of electrofishing, capture, transport, and proposed relocation area will be provided to the FS and FWS for review. This person will monitor the site to ensure that all the terms and conditions of the reasonable and prudent measures are followed at all times. If at any point during work a candy darter is observed, all work will cease and the FWS would be contacted immediately.
  - Special conditions if candy darter(s) are found during construction:
    - The finding of the darter(s) will be documented by providing notes of its condition and by taking photos of the fish
    - The darter(s) will be placed into separate plastic bags filled with the same stream water and filled with oxygen (a portable oxygen tank/cylinder would be on-site at all times during construction activities);
    - The oxygenated bags(s) containing the darter(s) will then be transferred in iced down coolers that maintain the thermal tolerance of the fish. Fish will be immediately taken to the predetermined, appropriate habitat located upstream and released.
- Turbidity monitoring will be implemented during construction in active in-water work areas in order to monitor for elevated turbidity, or amount of suspended solid particles, in the stream. The work area will be continuously observed and turbidity measured at locations not more than 25 feet upstream and downstream of the active work area to ensure that there are no generation of sediment plumes. Water samples will be taken at least once a day and the nephlometric turbidity unit (NTU) level will be analyzed. Turbidity will be monitored at different depths depending on

the depth of the water in the stream. For example, near the bottom, ½ depth from the bottom, and near the surface; or at a representative depth if there is a shallow water depth. If a sediment plume is observed or the downstream sample exceeds the upstream sample by more than 10%, work will stop and corrective actions will occur. It is likely that the species can tolerate slight increases in turbidity for short periods of time. However, extended periods of increased turbidity, such as three to seven days, would indicate a problem in BMP management that would be corrected.

- At no time will vehicle refueling or maintenance take place within 100 feet of aquatic habitats. If equipment will be parked or staged within 100 feet of an aquatic habitat, drip pans and emergency spill equipment will be on hand for use and cleanup. A Spill Prevention Control and Countermeasures (SPCC) plan would be developed following the requirements under 40 CFR 112. Additionally, spills large enough to discharge to surface waters would be reported to the National Response Center. Construction vehicle and equipment will be operated in accordance with FP-14 Subsection 107.10, which states, "Environmental Protection. (a) Federal Water Pollution Control Act (Clean Water Act) 33 USC § 1251 et seq. (1) Do not operate equipment or discharge material within the boundaries of wetlands and the waters of the United States as defined by the federal and state regulatory agencies. Permits are issued by the U.S. Army Corps of Engineers according to 33 USC § 1344 and delegated by the agency having jurisdiction. If an unauthorized discharge occurs: (a) Prevent further contamination; (b) Notify appropriate authorities and the CO; and (c) Mitigate damages. (2) Construct and maintain barriers in work areas and in material sources to prevent sediment, petroleum products, chemicals, and other liquids and solids from entering wetlands or waters of the United States. Remove and properly dispose of barrier collected material. (3) Do not revise terms or conditions of permits without the approval of the issuing agency. (b) Oil and hazardous substances. Submit a "Spill Prevention, Control, and Countermeasure (SPCC) Plan" if required at least 2 days before beginning work. If a SPCC plan is not required, submit a hazardous spill plan at least 2 days before beginning work. Describe preventative measures including the location of refueling and storage facilities and the handling of hazardous material. Describe actions to be taken in case of a spill. Do not use equipment with leaking fluids. Repair equipment fluid leaks immediately. Keep absorbent material manufactured for containment and cleanup of hazardous material on the job site."

4.1.8. Post-Project Site Restoration

Restoration measures would include the seeding of any disturbed soil. The seed mix would contain species such as annual rye (*Lolium multiflorum*), deertongue (*Dichanthelium clandestinum*), Canada wild rye (*Elymus canadensis*), Virginia wild rye (*Elymus virginicus*), cereal rye (*Secale cereale L.*), autumn bentgrass (*Agrostis perennans*), partridge pea (*Chamaecrista fasciculata*) and winter wheat (*Triticum aestivum*). In riprarian areas, Sycamore (*Platanus occidentalis*) seed would also be applied.

Seeding includes preparation of the seedbed. Seedbed preparation would be completed in accordance with FP-14 subsection 625.04, which states, "625.04 Preparing Seedbed. Grade the seeding area to line and grade. Remove weeds, sticks, stones 2 inches (50 millimeters) in diameter and larger, and other debris detrimental to application, growth, or maintenance of the turf. Apply limestone and grub proofing if specified. Cultivate the seeding area to a minimum depth of 4 inches (100 millimeters) and prepare a firm, but friable seedbed before seeding."

Non-native Invasive Species (NNIS) Plan

Non-native invasive species found in the action area include: Japanese stilt grass (*Microstegium vimineum*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), Coltsfoot (*Tussilago farfara*), crownvetch (*Securigera varia*), and Morrow's honeysuckle (*Lonicaera morrowii*) (All Star Ecology, LLC, 2018).

Strategies:

1. Avoidance of NNIS in Materials Brought On-site During Construction.

Topsoil cannot be brought into the Forest. Existing topsoil will be stockpiled and reused. Straw mulch will be certified weed free. Equipment will be thoroughly cleaned and formally inspected to ensure that it is free of weeds and their seeds prior to entering FS lands.

2. Use of Seed Mixes with no NNIS.

The seed mix to be used on this project does not contain any NNIS and has been approved by the FS for use within the Forest.

3. Monitoring and Selective Treatment of NNIS During Construction.

FHWA will monitor and record the success of revegetation in disturbed areas for one year after construction has been completed to ensure that NNIS do not overtake the area. Infestations of NNIS would be removed by hand cutting. Additional monitoring and treatment would be completed by the FS.

Control Measures:

- The contractor will adhere to the project specific erosion and sediment control plan to ensure that sediment movement and the spread of non-native seeds into newly disturbed soils are minimized.
- Prior to mobilization to entering FS lands, contractors will thoroughly clean all construction equipment with high-pressure washing equipment. Cleaning will consist of the removal of all dirt, grease, debris and materials that may harbor noxious weeds and their seeds. The contractor will make their equipment available for visual inspection by the FHWA and FS prior to entering FS lands.
- During construction in areas of known infestation areas, the contractor will clean equipment to remove excess soil prior to the movement of equipment to other locations in the Forest.
- All disturbed area will be stabilized and seeded promptly after final grading.

Chapter 5. Project Action Area

5.1. Limits of an Action Area

The action area includes all areas affected directly or indirectly by the proposed action, not only the area where the project activity would occur. For the purposes of this BA, the action area was determined by considering potential impacts caused by in-water work associated with the project and the potential for sediment to wash downstream during rain events. The action area is shown in the figure below. The repairs sites along the Williams River extend approximately 78,050 feet (14.78 miles) along the river; however, the linear feet of embankment repairs with in-water work total approximately 2,377 feet. At each distinct location, sediment could travel approximately 350 feet downstream, creating a larger action area in which indirect effects could occur. However, it is difficult to estimate the distance of sediment transport given that the distance is a factor of the particle size and velocity of the river flow.

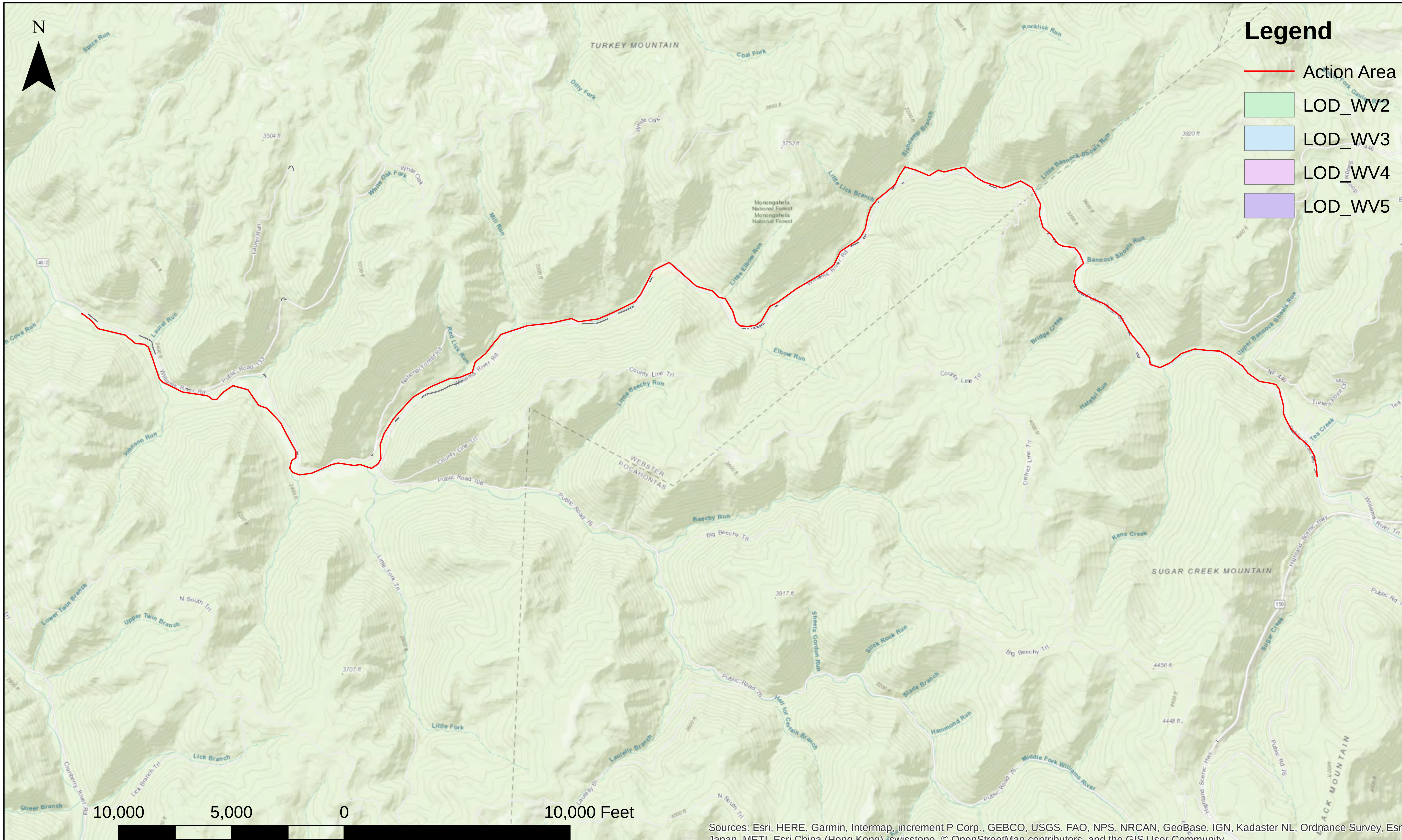

Figure 14. Action Area

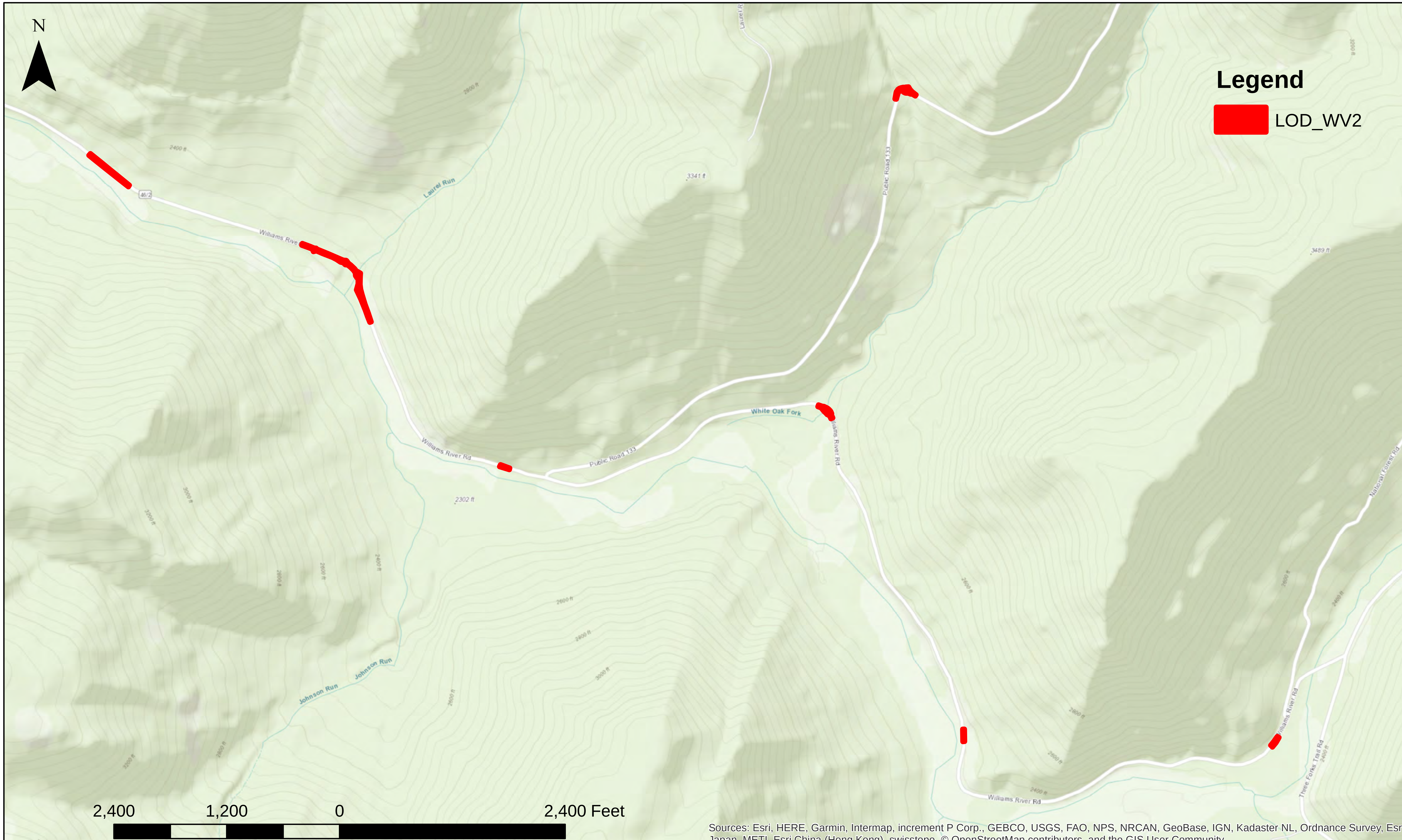

Figure 15. WV ERFO FS 2016-1(2) Action Area

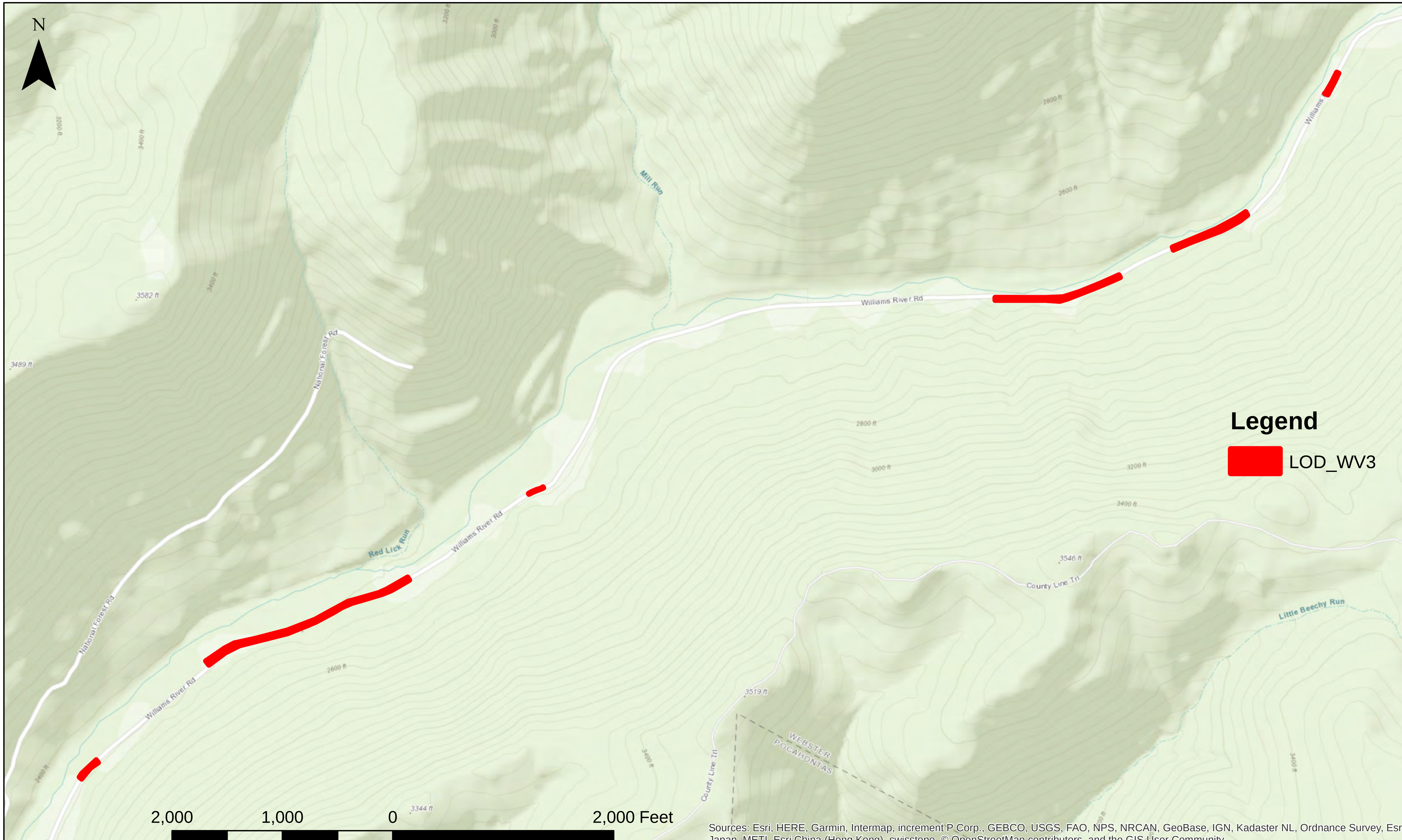

Figure 16. WV ERFO FS 2016-1(3) Action Area

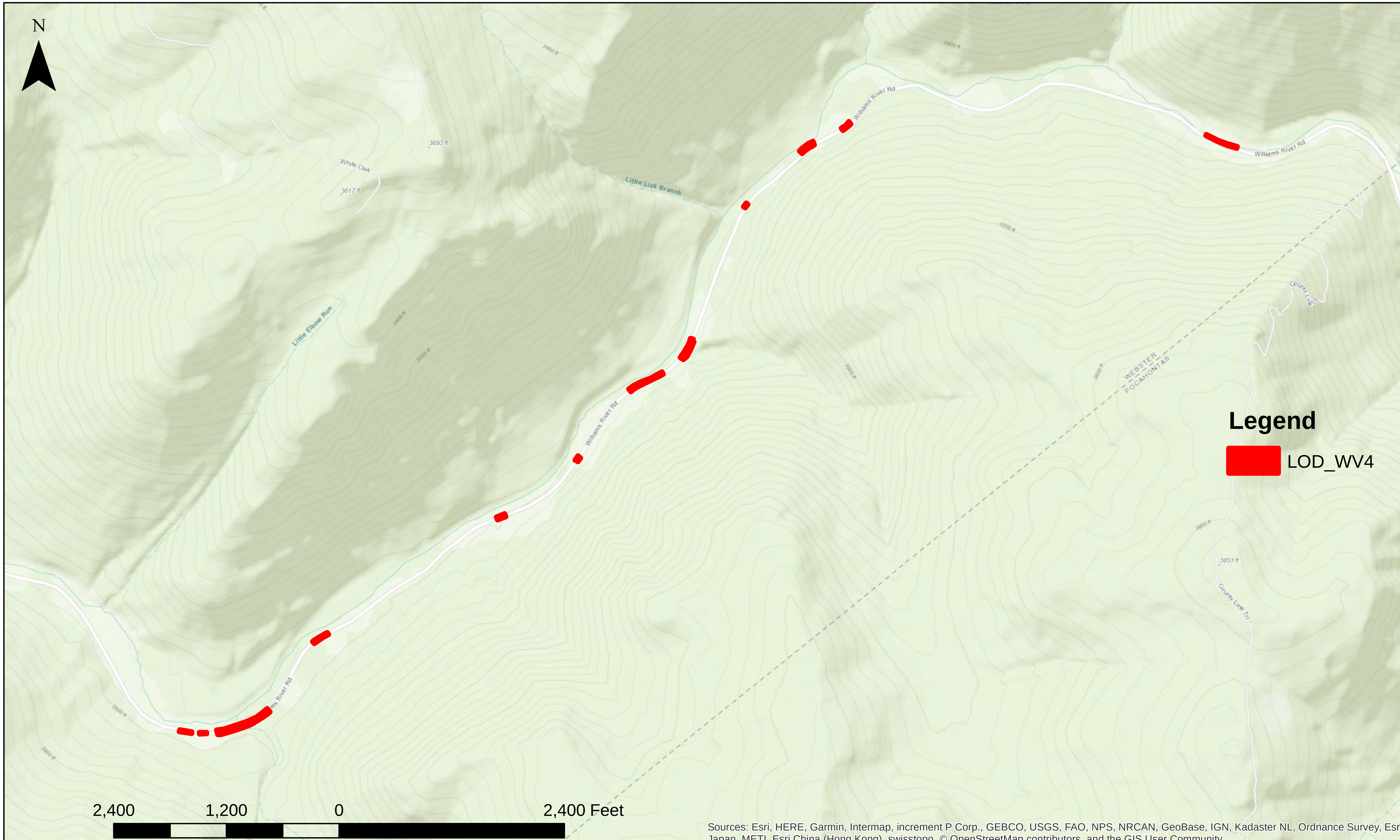

Figure 17. WV ERFO FS 2016-1(4) Action Area

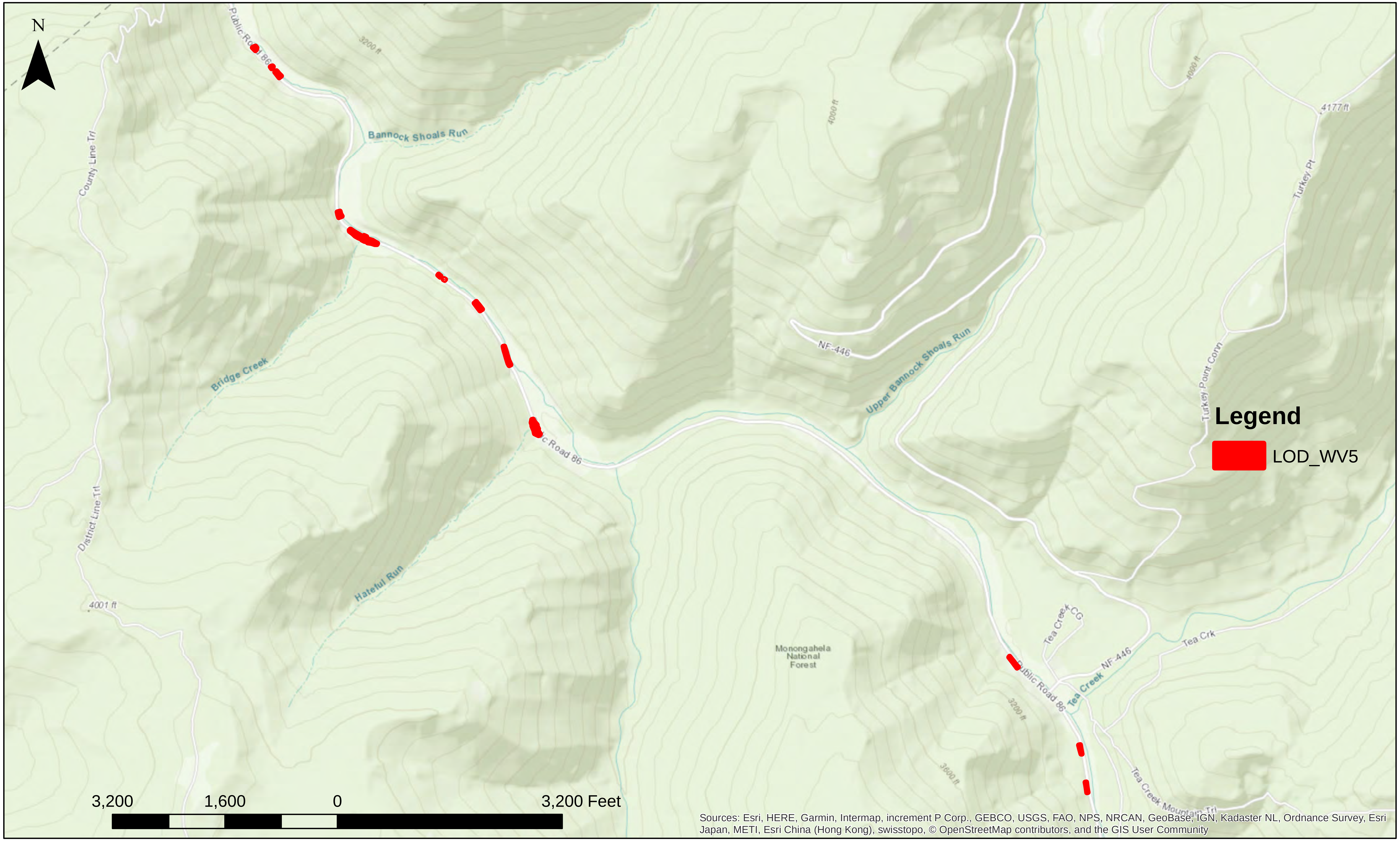

Figure 18. WV ERFO FS 2016-1(5) Action Area (1 of 2)

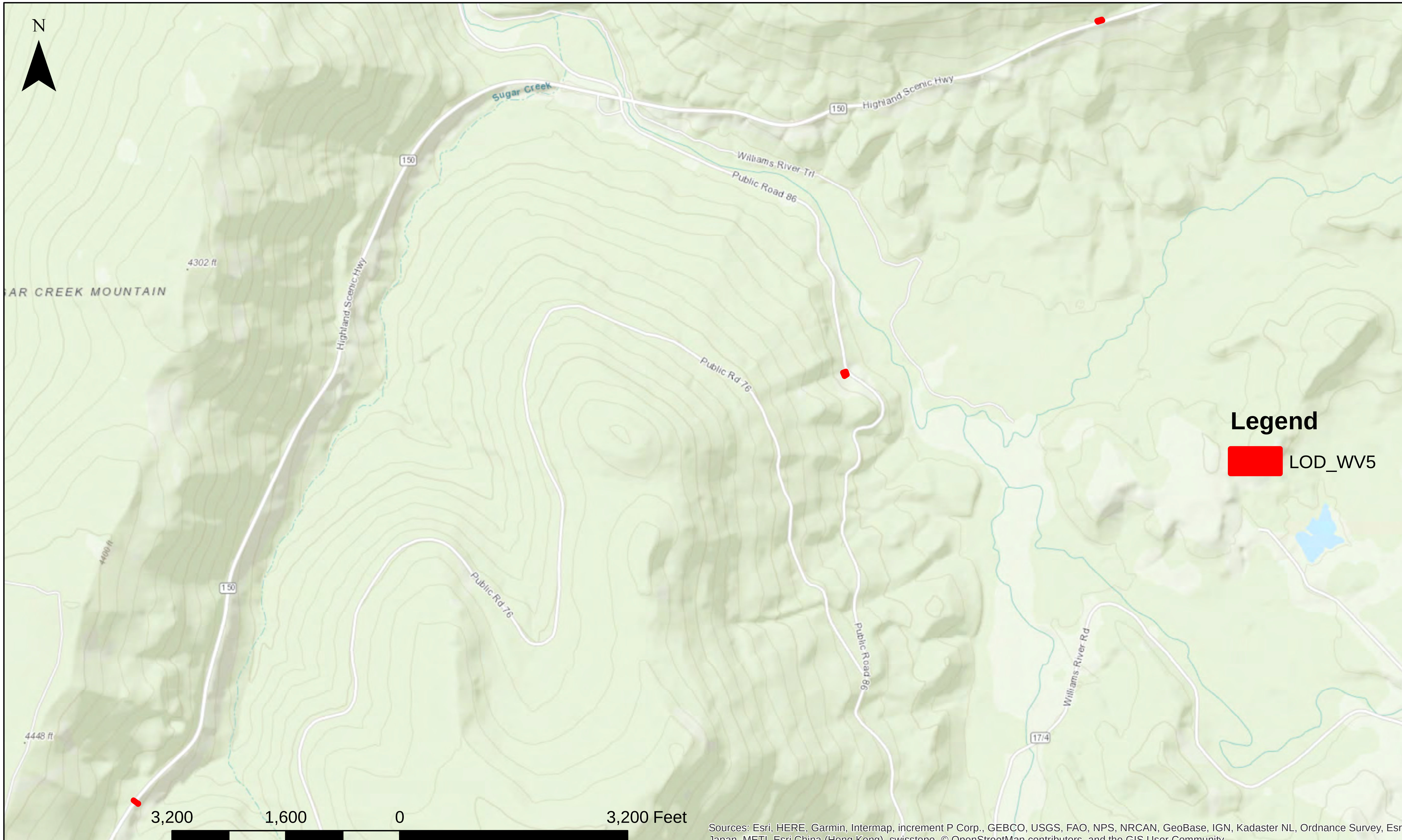

Figure 18. WV ERFO FS 2016-1(5) Action Area (2 of 2)

Chapter 6. Effects Analysis

6.1. Direct and Indirect Effects

The four projects would produce direct impacts over a roughly 26-month timeframe and are planned for construction between July 2019 and September 2021. Impacts would be dispersed throughout the 26-months, depending on the schedule of each of the four projects.

6.1.1. Candy Darter

Life stages of the candy darter include: Eggs; Young of Year (Newly hatched individuals until age 1 when total length is greater than 1.8 inches); Juveniles (From age 1 until females have a total length greater than 2.4 inches and until males have a total length greater than 2.6 inches); and, Adults.

Activities that could directly affect the candy darter include the following activities. The life stage affected by the activities is also indicated.

- Site Preparation: Site preparation activities include vegetation clearing and the installation of erosion and sediment controls. Tree clearing could result in a loss of shading and decreased nutrient input. Exposure of bare soil during these activities could increase erosion and sedimentation. Loss of shading, decreased nutrient input, and increases in turbidity and sedimentation could potentially indirectly affect all life stages, and so the potential for these affects to occur as a result of site preparation activities is detailed below.

  Excessive sedimentation could result in sediment deposition and filling of pool and interstitial spaces among gravel and larger substrates (Jessup, 2015). As indicated in Table 2, embeddedness negatively affects all life stages. Excessive sedimentation could also cause the abrasion or smothering of gills and other organs, which would affect young of year, juvenile, and adult candy darters. BMPs to contain sediment in the work area and minimize the potential for sediment to enter the waterway would be implemented, and so the action is highly unlikely to discharge sediment loads that would result in a discernable embedding of areas downstream of the work areas.

  Although 24 trees greater than 6-inches diameter breast height (dbh) would be cleared that currently shade Williams River, the clearing of discreet trees located along the 14.78-mile section of Williams River Road and Williams River is not anticipated to result in a measurable increase in water temperature. Large sections of the river bank along the road are already clear of vegetation that would be large enough to provide shading to aquatic species.

  At White Oak Fork, candy darters are more likely to use this tributary during hotter times of the year (late summer and early fall) for cooler water temperatures. A total of 12 trees greater than 6-inches dbh would be cleared at this location. Increases in water temperature could result in greater physiological stress, increased metabolic demand, and increased risk of disease and parasites (Williams J.E., 2015). The presence of the road has already resulted in the absence of vegetation and breaks in the canopy at this location along White Oak Fork, and so the clearing of 12 trees is unlikely to cause more than a negligible increase in water temperatures.

The decreased nutrient input is highly unlikely to impact the candy darter due to the small number of trees cleared and the fact that they are being cleared in dispersed discreet locations.

- Embankment Repairs: Operation of heavy construction equipment would increase noise levels; however; increased noise is unlikely to be an issue worth considering for candy darter given the provisions that would be used (e.g. isolating work areas and relocating fish from these areas) (Owen, 2019). The excavation of the failing embankment would expose bare soils susceptible to erosion. BMPs to minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages. The effects of sedimentation are discussed under Site Preparation. The placement of geotextile, rock, aggregate topsoil, and seeding would stabilize the slope and reduce the potential for erosion.

- Small Roadway Drainage Culvert Replacement and Installation: The excavation of the road would expose base soils susceptible to erosion. BMPs to minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages. The effects of sedimentation are discussed under Site Preparation.

- In-Water Embankment Repairs: Operation of construction equipment would increase noise levels; however; increased noise is unlikely to be an issue worth considering for candy darter given the provisions that would be used (e.g. isolating work areas and relocating fish from these areas) (Owen, 2019). Excavation would expose bare soils susceptible to erosion. The effects of sedimentation are discussed under Site Preparation. The placement of rock, aggregate topsoil, and seeding and would stabilize slope and reduce the potential for erosion. Reduction in the amount of sedimentation would have long-term beneficial effects to the species.

  Rock bank protection would be installed at a 1 vertical to 1.5 horizontal slope and compacted to provide a stable slope. The height of the road in relation to the height of the riverbed would cause the rock to extend into Williams River. For example, if the road is 10 feet higher than the River, the rock would extend a distance of 15 feet. Placement of rock within the river channel would result in permanent modification and potentially loss of candy darter habitat that would directly affect all life stages. The placement of rocks along the bank of Williams River in discreet locations is not anticipated to lead to changes in flow at these locations because the existing channel morphology would be essentially maintained.

  Approximately 2,377 linear feet of Williams River's bed (over a distance of 78,050 feet) would be permanently impacted through the placement or riprap. However, the amount of river bed impacted is negligible in comparison to the total bed area of Williams River. Using the average width of 40 feet (for the width of Williams River), the impact of 12,740 square feet of candy darter habitat in relation to the total 3,122,000 square feet of available candy darter habitat in the project area results in an impact of 0.4%. Studies have found that fast moving, shallow water areas and large stones are important habitat for adult candy darter. In a study of Stony Creek by the U.S.D.A Forest Service's Center for Aquatic Technology Transfer, candy darters were widely distributed throughout the study area; however, the percentage observed varied by habitat type. Candy darters were observed in 74% of the habitat units sampled. At least one candy darter as observed in 90% of the runs, 82% of the riffles, 79% of the glides, and 41% of the pools that were sampled (USDA Forest Service, 1996). The distribution of habitat types within the area directly impacted by the project is unknown. However, the embankment repairs range in length from 40 linear feet to 372 linear feet, and each location would likely include multiple habitat types. After construction is completed, the installation of large rocks along the edge of the bank would create important habitat for adult candy darters.The life stages potentially impacted by this activity includes eggs and young of year because of their vulnerability due to no or limited mobility. The placement of rock on the river bed could cover or crush candy darter eggs or young of year individuals. Juvenile and adults would be able to swim away from the work area.

- Electrofishing: Electrofishing would be used to catch candy darters in the sandbag diversion and stream channel diversion areas prior to dewatering the channel. The electric current causes fish to swim towards the anode, after which they stop swimming and go into short-term (a few seconds) narcosis. The fish are then netted, put in a holding tank and relocated to a predetermined location.

  Electrofishing can result in harmful effects on fish. Spinal injuries and associated hemorrhages have been documented in fish examined internally after experiencing electrofishing. One study noted that over 50% of the fish experienced these effects. The U.S. Fish and Wildlife Service noted in a 2003 publication that, "Such injuries can occur anywhere in the electrofishing field at or above the intensity threshold for twitch. These injuries are believed to result from powerful convulsions of body musculature (possibly epileptic seizures) caused mostly by sudden changes in voltage as when electricity is pulsed or switched on or off. Significantly fewer spinal injuries are reported when direct current, low-frequency pulsed direct current (<30 Hz), or specially designed pulse trains are used." The report further stated that, "Other harmful effects, such as bleeding at gills or vent and excessive physiological stress, are also of concern. Mortality, usually by asphyxiation, is a common result of excessive exposure to tetanizing intensities near electrodes or poor handling of captured specimens. Reported effects on reproduction are contradictory, but electrofishing over spawning grounds can harm embryos." (U.S. Fish and Wildlife Service, 2003). Electrofishing would impact all life stages; however, only adults, and juveniles would likely be able to be netted and relocated.

- Sandbag Diversion in Williams River (MP 10.6): The placement of sandbags into Williams River in front of the repair area would occupy potential habitat. The pumping of water from behind the diversion to dewater the work area may capture individuals that need to be relocated. Any young of year, juvenile or adult candy darters inadvertently captured during pumping associated with the dewatering of work areas would be relocated. Relocation is not feasible for eggs or young of year candy darters, as they would be smaller than the mesh openings and being more vulnerable would likely not survive relocation efforts.

  For a duration of 6 working days, sandbags placed along the bank would constrict and redirect flow to the center of the channel. The resulting increase in flow velocity is unlikely to impact candy darters of any life stage as the velocity would be within the range experienced during normal rainfall events. During the site visit, FWS found most of the river at MP 10.6 (about 70% of the river in the work area) to be marginal to poor quality candy darter habitat, with the remainder being high quality habitat. Given the minimal amount of high quality habitat and short duration, impacts to candy darter would be minimal. While the sandbags are in place sediment may accumulate around the sandbags. Removal of the sandbags would likely result in a plume of sediment release; however, given the short duration of work the amount of sediment accumulation is anticipated to be minimal. The effects of sedimentation are discussed under Site Preparation.

- Large Culvert Replacement with Stream Diversion Channel: Operation of heavy construction equipment would increase noise levels; however; increased noise is unlikely to be an issue worth considering for candy darter given the provisions that would be used (e.g. isolating work areas and relocating fish from these areas) . The excavation of the existing road to install the temporary stream diversion channel could expose bare soils susceptible to erosion until the plastic liner or riprap is installed. The temporary stream channel may also change the flow of the stream by increasing the velocity of the water due to the smaller channel size in decrease in channel roughness. Pumping of water to dewater the natural channel could capture (and relocate) or kill young of year, juvenile, and adult candy darters. The excavation of the existing road and embankment material to remove the existing culvert would expose bare soils susceptible to erosion. The effects of sedimentation are discussed under Site Preparation. BMPs to minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages.

- Bridge Construction with Stream Diversion: Operation of heavy construction equipment would increase noise levels; however; increased noise is unlikely to be an issue worth considering for candy darter given the provisions that would be used (e.g. isolating work areas and relocating fish from these areas) (Owen, 2019). The installation of the temporary stream diversion around each abutment and pumping of water to dewater the natural channel could capture (and relocate) or kill young of year, juvenile, and adult candy darters. The excavation of the existing road and embankment material to remove the existing culverts (milepost 16.6) and existing bridge abutments would expose bare soils susceptible to erosion. The effects of sedimentation are discussed under Site Preparation. White Oak Fork and Elbow Branch provide suitable habitat for candy darter, of which 39 linear feet/150 square feet and 29 linear feet /167 square feet (respectively) of candy darter habitat would be impacted. BMPs to isolate the work area and minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages.

- Ditch Reconditioning: Ditch reconditioning would expose base soils susceptible to erosion. The effects of sedimentation are discussed under Site Preparation. BMPs to minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages.

- Shoulder Reconditioning: Shoulder reconditioning would expose base soils susceptible to erosion. The effects of sedimentation are discussed under Site Preparation. BMPs to isolate the work area and minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages.

- Road Reconstruction and Asphalt Patching: If the bare soil below the pavement section is exposed, road reconstruction would expose bare soils susceptible to erosion. The effects of sedimentation are discussed under Site Preparation. Best management practices to isolate the work area and minimize the potential for sediment to enter the waterway would be implemented. Increases in turbidity and sedimentation could potentially indirectly affect all life stages.

The type of heavy construction equipment used for each activity is at the discretion of the construction contractor. Heavy construction equipment typically used in projects of a similar scope include, excavators, skid steers, loaders, bulldozers, cranes, dump trucks, and compactors.

Aspects of the project that could indirectly affect candy darters include temporary increase in turbidity and siltation within the action area and indirect action area during construction. The indirect action area extends 350 feet downstream of the action area, the distance that sediment generated in the action area could travel downstream.

Behavioral Impacts

Reproduction: Candy darters spawn in mid- late spring, approximately late April through June, typically selecting patches of pebble and gravel situated among larger cobble and bounders in riffles. Incubation lasts approximately 5 to 25 days depending on the water temperature (U.S. Fish and Wildlife Service, Northeast Region, 2017).

The proposed action would have no in-water work during the timeframe in which reproduction occurs, and so there would be no direct impacts to this behavior (spawning). Sedimentation has a low potential to indirectly affect reproduction since spawning occurs in high flow areas (see Table 2) in which sediment would not be deposited and erosion and sediment control BMPs would be implemented during construction to minimize the amount of sediment leaving the action area. Because BMPs would be installed to minimize erosion and sedimentation during construction and the repairs would stabilize the eroding sections of the streambank, the project would decrease sediment to the stream system and result in beneficial indirect impacts to candy darter reproduction.

There may be some unhatched eggs and newly hatched young that remain in or in close proximity to the spawning locations after June 30, which in-stream work is planned to occur. The placement of rock in the water for embankment repairs, installation of the sandbag cofferdam, and installation of stream channel diversions for culvert and bridge replacements may kill eggs and young of year, which are less mobile.

Movement/Dispersal: Limited information exists regarding the movement patterns of candy darters within their habitat and whether they complete their lifecycle within single riffles or riffle complexes, or move upstream and downstream between these areas. Water with high levels of turbidity (measure of water's clarity due to the presence of suspended particles) can adversely affect candy darter movement; however, candy darters experience seasonal events that increase turbidity, such as high precipitation rain and flood events. (U.S. Fish and Wildlife Service, Northeast Region, 2017).

The proposed action includes multiple discreet sites over approximately 14.78 miles. The repairs in Williams River are also along only one river bank, allowing the rest of river habitat available for movement by the candy darter. The proposed action has a low potential to directly affect movement or dispersal. Stream channel diversions installed at Hateful Run, Bridge Creek, Little Lick Branch, Elbow Branch, White Oak Fork and an unnamed tributary to White Oak Fork would allow for stream flow to be maintained so that effects to candy darter movement are minimized. However, construction of the structures on these tributaries during low flow time periods may affect the ability for candy darters to use these stream confluences as temperature refugia (localized patches of colder water). Juvenile and adult candy darters would likely relocate to other suitable habitat during construction activities.

Few, if any, candy darters are anticipated to be encountered during efforts to capture and relocate them during project site preparations. Other than White Oak Fork and perhaps in the case of a severe flooding, stream crossing projects in the Williams River tributaries would be unlikely to affect candy darter movement due to existing poor quality and inaccessible habitats during low summer flows. Also, the limited extent and duration of disturbance to potentially suitable candy darter habitat at any individual project sites would likely restrict the potential for impacts to candy darter movement. The repairs would improve habitat connectivity when compared to the existing condition by replacing the existing culverts located on tributaries to the Williams River with larger structures with a natural substrate bottom (Owen, 2019).

Feeding: Candy darters are thought to feed primarily on benthic macroinvertebrates such as mayflies and caddisflies (U.S. Fish and Wildlife Service, Northeast Region, 2017). Benthic macroinvertebrates were sampled as part of the Environmental Protection Agency's effort to develop the West Virginia Stream Condition Index (Tetra Tech, Inc). Four sampling points in the Williams River indicate EPT taxa (counts of distinct taxa within selected taxonomic groups sensitive to disturbance; mayflies, stoneflies, and caddisflies) scores of 11, 7, 11, and 15 (Standard (best value) of 13) and % EPT (proportions of individuals belonging to specific selected taxonomic groups) of 69, 63, 71 and 74 (Standard (best value) of 91.9).

Activities associate with the proposed action would have a low potential to impact candy darter feeding. Mayfly and caddisfly larvae are abundant throughout the action area (Tetra Tech, Inc) and their availability would not change as a result of the construction activities because the action is highly unlikely to generate excessive sediment. Although sedimentation has the potential to indirectly affect feeding through increases in turbidity and a resulting decrease in dissolved oxygen; erosion and sediment control BMPs would be implemented to avoid and minimize the potential for this to occur. The amount of sediment entering the river would decrease as repairs are completed because the eroding road embankment would be stabilized. Exponentially more sediment is released under existing conditions than would be generated during storm events. The negligible increase in sedimentation from the action would cause no discernable impact on the availability of benthic macroinvertebrates.

Sheltering: Young of year candy darters shelter in benthic substrates in slower, shallower stream habitats while adults typically shelter near rock cover. Candy darters have been observed to overwinter under the cover of stones and woody debris in deep water habitats. Studies have shown that fast moving, shallow water areas and large stones are important habitat for adult candy darters (U.S. Fish and Wildlife Service, Northeast Region, 2017).

The proposed action occurs primarily along sections of the Williams River bank that are actively eroding, which provide marginal sheltering habitat for young of year, juvenile, and adult candy darters. Sedimentation has the potential to indirectly affect sheltering through increases in sedimentation, which is more likely in slower flowing areas and pools. Excessive sedimentation could result in sediment deposition and filling of pool and interstitial spaces among gravel and larger substrates (Jessup, 2015). As indicated in Table 2, embeddedness negatively affects all life stages. Erosion and sediment control BMPs would be implemented to avoid and minimize the potential for this to occur. The negligible increase in sedimentation during implementation of the action would cause no measurable adverse effect on candy darter sheltering behavior. Repair of the eroding embankment and installation of large rocks along the river bank would provide additional sheltering opportunities for adult candy darters.

6.1.2. Running Buffalo Clover

Potential habitat is available in the action area; however, the species was not located during field surveys.

6.1.3. Virginia Spiraea

Potential habitat is available in the action area; however, the species was not located during field surveys.

6.1.4. Shale Barren Rock Cress

No potential habitat was found in the action area and the species was not located during field surveys.

6.1.5. Small-Whorled Pogonia

Potential habitat is available in the action area; however, the species was not located during field surveys. The small amount of potentially suitable habitat observed was located away from the existing roads and likely outside any areas which will potentially be disturbed as a result of the project.

6.1.6. Indiana Bat

Potential summer habitat in forested areas surrounding existing roads. Also, potential foraging habitat and travel corridors located along existing roads and streams. Field presence/absence surveys were not conducted for the species. Tree clearing will be marginal, if any, and would occur during the time of year when bats are not active. The roads will remain, providing travel corridors for bats, while the surrounding forest will not be impacted. A total of 36 trees measuring greater than 6 inches dbh and 28 trees measuring less than 6 inches dbh would be cleared in order to complete the proposed repairs.

6.1.7. Northern Long-eared Bat

Potential summer habitat in forested areas surrounding existing roads. Also, potential foraging habitat and travel corridors located along existing roads and streams. Field presence/absence surveys were not conducted for the species. Tree clearing will be marginal, if any, and would occur when bats are not active. The roads will remain, providing travel corridors for bats, while the surrounding forest will not be impacted.

6.2. Interrelated and Interdependent Actions and Activities

There are no interrelated or interdependent actions in the action area.

6.3. Cumulative Effects

The Forest Service Schedule of Proposed Actions for the Monongahela National Forest indicates that there are no other present and reasonably foreseeable future actions in the action area.

Chapter 7. Effect Determinations

7.1. Effect Determinations for Listed Species

Running Buffalo Clover: May affect, not likely to adversely affect

Virginia Spiraea: May affect, not likely to adversely affect

Shale Barren Rockcress: May affect, not likely to adversely affect

Small-whorled Pogonia: May affect, not likely to adversely affect

Indiana Bat: May affect, not likely to adversely affect

Northern Long-eared Bat: No prohibited incidental take

Candy Darter: May affect, likely to adversely affect

The action would not result in jeopardy to the continued existence or recovery of the candy darter and take would be minimized through conservation measures.

Chapter 8. References

All Star Ecology, LLC. (2018). *WV Emergency Relief for Federally Owned Roads 2016 Flood Damage Biological Assessment.* Federal Highway Administration.

Jessup, B. K. (2015, October). *Technical Memorandum #2 Relative Applicability of Particle Distribution Measures and Bank Slope Stability in Evaluating NPS Watershed Projects.* Retrieved from https://www.epa.gov/sites/production/files/2015-10/documents/tech_memo_2_oct15.pdf

Landress, C. (2019, March 26). Forest Fisheries Biologist, Forest Service. (E. Correspondence, Interviewer)

Owen, M. D. (2019, March 20). Aquatic Ecologist, Forest Service. (E. Correspondence, Interviewer)

Owen, M. D. (2019, June 3). Aquatic Ecologist, Monongahela National Forest. *Personal Communication*.

Tetra Tech, Inc. (n.d.). *A Stream Condition Index for West Virginia Wadeable Streams.* Retrieved from https://www.lrh.usace.army.mil/Portals/38/docs/WV%20Stream%20Condition%20Index%20for%20Wadeable%20Streams.pdf

U.S. Fish and Wildlife Service - Northeast Region. (2018, October 1). *Candy Darter Recovery Outline.* Retrieved from https://www.fws.gov/northeast/candydarter/PDF/2018-CD-Recovery-Outline.pdf

U.S. Fish and Wildlife Service. (2003). *Electrofishing and Its Harmfull Effects on Fish.* U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service. (2017). *Candy Darter.* Retrieved from https://www.fws.gov/northeast/candydarter/PDF/Candy_Darter_FS.pdf

U.S. Fish and Wildlife Service. (2018, November 20). *Candy Darter Listed as Endangered Under Endangered Species Act*. Retrieved from https://www.fws.gov/news/ShowNews.cfm?ID=3183CA7E-DA01-73D8-A742854C6D1099FD

U.S. Fish and Wildlife Service, Northeast Region. (n.d.). Retrieved from https://www.fws.gov/northeast/candydarter/PDF/FWS_R5_ES_2017_0056_0002.pdf

U.S. Fish and Wildlife Service, Northeast Region. (2017). *Species Status Assessment (SSA) Report for the Candy Darter (Etheostoma osburni).* Retrieved from https://www.fws.gov/northeast/candydarter/PDF/FWS_R5_ES_2017_0056_0002.pdf

United States Department of Transportation. (n.d.). *Standard Specifications for Construction of Roads and BRidges on Federal Highway Projects, FP-14.* Retrieved from https://flh.fhwa.dot.gov/resources/specs/fp-14/fp14.pdf

United States Geological Survey. (n.d.). *USGS 03186500 Williams River at Dyer, WV*. Retrieved from USGS Surface-Water Monthly Statistics for West Virginia : https://waterdata.usgs.gov/wv/nwis/monthly?referred_module=sw&site_no=03186500&por_03186500_159748=1547794,00060,159748,1929-09,2017-11&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list

USDA Forest Service. (1996). *The Candy Darter (Etheostoma osburni) in Stony Creek, George Washington - Jefferson National Forest, Virginia.* USDA Forest Service.

Williams J.E., I. D. (2015). *Cold-Water Fishes and Climate Change in North America.* Retrieved from https://www.fs.fed.us/rm/boise/AWAE/projects/stream_temp/downloads/Cold-waterFishesAndClimateChangeInNorthAmerica.pdf

Chapter 9. Appendix A

- FWS Consultation Letters
- IPaC Species Lists
- Project Design Plans (Includes Erosion and Sediment Control Plan)
    - WV ERFO FS 2016-1(2)
    - WV ERFO FS 2016-1(3)
    - WV ERFO FS 2016-1(4)
    - WV ERFO FS 2016-1(5)

FWS Consultation Letters

U.S. Department
of Transportation
**Federal Highway
Administration**

Eastern Federal Lands
Highway Division

21400 Ridgetop Circle
Sterling, VA 20166-6511

JUN 0 5 2018

In Reply Refer to: HFPP-15

FEDERAL EXPRESS

Mr. John Schmidt
U.S. Fish and Wildlife Service
West Virginia Field Office
90 Vance Drive
Elkins, WV 26241

Subject: WV ERFO FS 2016-1(2), (3), (4), and (5), Repair of Storm Damaged Roads
Monongahela National Forest
Request for Concurrence

Dear Mr. Schmidt:

The Eastern Federal Lands Highway Division Office of the Federal Highway Administration (FHWA) in cooperation with the USDA Forest Service (FS), Monongahela National Forest (MNF), proposes four projects to rehabilitate damaged road sections along Routes 86, 133, 150, and 425 with aggregate and asphalt surface courses, reconstruct embankments and side slopes, and complete necessary drainage repairs and replacements to provide safe passage through the routes while improving the roadway drainage. The project includes replacement of damaged or washed out bridges and culverts, and scour protection as needed. In two locations, FS 86 Milepost 10.8 and FS 86 Milepost 6.7, 20-foot span timber bridges with masonry abutments were damaged by the 2016 floods and are proposed for replacement. The enclosed list of project sites provides additional detail regarding the proposed repairs included in each of the four subject projects.

According to the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation website (IPaC); the following species have the potential to occur within the project area: running buffalo clover *(Trifolium stoloniferum);* Virginia spiraea *(Spiraea virginiana);* shale barren rock cress (*Arabis serotina);* and small whorled pogonia *(Isotria medeoloides);* northeastern bulrush (*Scirpus ancistrochaetus*); Indiana bat (*Myotis sodalis*); northern long-eared bat (*Myotis septentrionalis*); Virginia big-eared bat (*Corynorhinus townsendii virginianus*); and the candy darter (*Etheostoma osburni*). A Biological Assessment was completed, which included botanical field surveys to document Federally-listed plants present in the project area. One population of running buffalo clover was located during field surveys at a site included in project WV ERFO FS 2016-1(2). The running buffalo clover population can most likely be avoided by the project. The population would be flagged prior to construction, and if impacts cannot be avoided, individuals would be relocated adjacent within the adjacent habitat. A small amount of running buffalo clover habitat may be disturbed during construction, but this will not likely adversely affect the population due to the need of additional light gaps associated with the population. In addition, running buffalo clover is a disturbance-dependent species and requires occasional disturbance. The population did not appear very vigorous, and flowers or fruit were not observed. Running buffalo clover requires dappled sunlight. This population may have been over-shaded; therefore, limited tree removal would most likely benefit the occurrence. A copy of the Biological Assessment is enclosed.

As documented in the Biological Assessment, FHWA has determined that the proposed project would have no effect on Virginia spiraea, shale barren rockcress, small whorled pogonia, and northeastern bulrush because the species was not located during field surveys. The project may affect, but is not likely to adversely affect running buffalo clover, because while physical avoidance can likely be avoided during construction, the work has the potential for indirect impacts. The project may affect, but is not likely to adversely affect Indiana bat and Virginia big-eared bat. Potential summer habitat is present in forested areas surrounding existing roads. Also, potential foraging habitat and travel corridors are located along existing roads and streams. Trees would be cleared between November 15 and March 31 to avoid impacts to bat species and repairs would be completed during the day when bats are not active.

For the northern long-eared bat, we have followed the *Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats* and have determined that the action would not cause prohibited incidental take. No tree removal would occur during the pup season from June 1 through July 31. We will rely on the finding of the *Programmatic Biological Opinion on the 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions*, and consider our project-specific section 7(a)(2) responsibilities fulfilled unless notified that additional consultation is necessary.

Potential habitat for the candy darter exists in the Williams River. The project would stabilize the sections of roadway embankment that are currently eroding into the River, which would result in an improvement to the habitat quality. A small amount of streambed may be impacted during bank stabilization; however, the impacts would be negligible. Best management practices would be implemented during construction to minimize erosion of exposed soils and sedimentation of the Williams River. Therefore, FHWA had determined that the project may affect, but is not likely to adversely affect the candy darter.

Please note that four separate projects are submitted in this request for concurrence given their similar scope and geographic proximity, but that one Biological Assessment was completed to cover all four projects. Design plans are available for projects WV ERFO FS 2016-1(3) and WV ERFO FS 2016-1(4), and so enclosed you will find copies of those plan sets. The repairs proposed for projects WV ERFO FS 2016-1(2) and WV ERFO FS 2016-1(5) are similar in scope, and copies of the plan sets can be provided to you when they are available.

The FHWA respectfully requests your review of the proposed projects and concurrence with our determination within 30 days of receipt of this letter. If you have any questions concerning this matter, please contact Ms. Lisa Landers, Environmental Protection Specialist, at Lisa.Landers@dot.gov or (571) 434-1592.

Sincerely,

Kevin S. Rose
Environmental Compliance Specialist

Enclosures

cc:
Ms. Jane Bard, U.S. Forest Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
90 Vance Drive
Elkins, West Virginia 26241

July 30, 2018

Mr. Kevin Rose
Federal Highway Administration
Eastern Federal Lands Highway Division
21400 Ridgetop Circle
Sterling, Virginia 20166

Re: WV ERFO FS 2016-1(3), (4), (6), and (7) Repair of Storm Damaged Roads, Monongahela National Forest, Greenbrier and Webster Counties, West Virginia
FWS File Numbers: 2018-I-0950 and 2018-I-0997

Dear Mr. Rose:

This letter is in response to your June 5, 2018, correspondence for the above-mentioned projects. These proposed projects occur within the Monongahela National Forest in Greenbrier and Webster Counties, West Virginia, and propose to rehabilitate flood-damaged road sections. These comments are provided pursuant to the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information provided, the U.S. Fish and Wildlife Service (Service) has determined that the federally listed Indiana bat (*Myotis sodalis*), northern long-eared bat (NLEB) (*Myotis septentrionalis*), running buffalo clover (*Triofolium stoloniferum*), small whorled pogonia (*Isotria medeoloides*), Virginia spiraea (*Spiraea virginiana*), shale barren rockcress (*Arabis serotina*), and the proposed candy darter (*Ethostoma osburni*) may occur within the vicinity of and may be affected by the proposed projects.

Bats

The Indiana bat and NLEB may use the project area for foraging and roosting between April 1 and November 15. Indiana bat summer foraging habitats are generally defined as riparian, bottomland, upland forest, and old fields or pastures with scattered trees. Roosting/maternity habitat consists primarily of live or dead hardwood tree species which have exfoliating bark that provides space for bats to roost between the bark and the bole of the tree. Tree cavities, crevices, splits, or hollow portions of tree boles and limbs also provide roost sites. In West Virginia, the Service considers all forested habitat containing trees greater than or equal to 5 inches in diameter at breast height to be potentially suitable as summer roosting and foraging habitat for the Indiana bat.

Indiana bats feed on emerged aquatic and terrestrial flying insects. Moths, caddisflies, flies, mosquitoes, and midges are major prey items. Aquatic insects that have concentrated emergences or that form large mating aggregations above or near water appear to be preferred prey items. As a result, streams, wetlands, and associated riparian forests are often preferred foraging habitats for pregnant and lactating Indiana bats. Indiana bats also forage within the canopy of upland forests, over clearings with early successional vegetation (e.g., old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. Increased erosion and sedimentation of streams reduces diversity and biomass of benthic invertebrates, i.e. insects. Some projects propose impacts to aquatic features such as streams or wetlands, which could result in a decrease in insects available to both bat species for foraging.

Similar to the Indiana bat, NLEB foraging habitat includes forested hillsides and ridges, and small ponds or streams. NLEB are typically associated with large tracts of mature, upland forests with more canopy cover than is preferred by Indiana bats. NLEB seem to be flexible in selecting roosts. They choose roost trees based on suitability to retain bark or provide cavities or crevices, and this species is known to use a wider variety of roost types than the Indiana bat. Males and non-reproductive females may also roost in cooler places like caves and mines. Although rare, this bat has also been found roosting in structures like barns and sheds.

Indiana bats and NLEB use caves or mine portals for winter hibernation between November 15 and March 31. These species also use the hibernacula and the areas around them for fall-swarming and spring-staging activity (August 15 to November 14 and April 1 to May 14, respectively). Some males have been known to stay close to the hibernacula during the summer and may use the hibernacula as summer roosts. There may be other landscape features being used as hibernacula by NLEB during the winter that have yet to be documented.

The Service has reviewed the number of acres of potentially suitable foraging and roosting habitat on the West Virginia landscape available to each Indiana bat, versus the total acreage of forest. On that basis, we have determined that small projects, more than 10 miles from a known priority 1 or 2 Indiana bat hibernaculum, more than 5 miles from a known priority 3 or 4 Indiana bat hibernaculum, or more than 2.5 miles from any known maternity roost, or more than 5 miles from summer detection sites where no roosts were identified, that affect less than 17 acres of forested habitat, and will not affect any potential hibernacula, will have a very small chance of resulting in direct or indirect effects to the Indiana bat, and therefore these effects are considered discountable. **Please note that the Service may review and update this assessment at any time as new information becomes available.**

The Service concurs that this project is not likely to adversely affect the Indiana bat because your project: 1) will affect less than 17 acres of potential Indiana bat foraging or roosting habitat; 2) is not within any of the Indiana bat hibernacula or summer use buffers described above; 3) will not affect any potential caves or mines that could be used as hibernacula for this species; and 4) effects to aquatic features used for foraging habitat will be insignificant.

The NLEB may occur within the range of the proposed project, and may be affected by the proposed construction and operation of this project. Any take of NLEB occurring in conjunction with these activities that complies with the conservation measures (as outlined in the 4(d) rule), as necessary, is exempted from section 9 prohibitions by the 4(d) rule and does not require site specific incidental take authorization. Note that the 4(d) rule does not exempt take that may occur as a result of adverse effects to hibernacula and that no conservation measures are required as part of the 4(d) rule unless the proposed project: 1) involves tree removal within 0.25 miles of known NLEB hibernacula; or 2) cuts or destroys known, occupied maternity roost trees or any other trees within a 150-foot radius around known, occupied maternity tree during the pup season (June 1 to July 31). This proposed project is not located within any of these radii around known hibernacula or roost trees and will not affect any known NLEB hibernacula, therefore any take of NLEB associated with this project is exempted under the 4(d) rule and no conservation measures are required.

Plants

Running buffalo clover occurs in mesic habitats of partial to filtered sunlight, where there is a prolonged pattern of moderate periodic disturbance, such as mowing, trampling, grazing, or flood-scouring. It is often found in regions with limestone or other calcareous bedrock underlying the site, though limestone soil is not a requisite determining factor for the locations of populations of this species. Populations of running buffalo clover have been found in a variety of habitat types, including mesic woodlands, streambanks, grazed woodlots, mowed paths, old logging roads, trails, hawthorne thickets, locust savannahs, mowed wildlife openings within mature forests, savannahs, sandbars, and steep ravines. This species can also be found on infrequently used ATV trails and gravel drives. All populations are associated with light to moderate disturbance such as occasional ORV or foot traffic, stream scour, or grazing.

Small whorled pogonia is a perennial member of the orchid family, generally known from deciduous woods with acid soil. It flowers from about mid-May to mid-June, typically with only one flower per plant, which lasts only a few days to a week. Individual plants may not flower every year and extended dormancy, although not scientifically documented, is purported to occur under certain conditions. This plant is believed to be self-pollinating by mechanical processes; no evidence of insect pollination has been observed.

Virginia spiraea is a clonal shrub of the rose family that can be found among large boulders, flatrock, and flood debris along scoured streamsides and rivers, as well as roadside wet areas and wet marshy meadows. Virginia spiraea requires periodic flood scouring to eliminate taller woody competitors and to create river-wash deposits and early successional habitats.

Shale barren rock cress is a biennial herb of the mustard family and is one of several endemic species restricted to the mid-Appalachian shale barrens of the Ridge and Valley province of the Appalachian Highlands. Shale barren vegetation occurs on eroding shale formations. Mid-Appalachian shale barrens occur on eroding shale formations and typically have open, scrubby growth of pine, oak, red cedar, and other woody species adapted to xeric conditions.

Your June 5, 2018, correspondence included the results of a botanical survey for federally listed plants within the proposed action area. This survey was completed by AllStar Ecology from

September 11 to 14, 2017. No listed plants were found within the vicinity of these proposed projects The Service concurs that the proposed projects are not likely to adversely affect any federally listed plant species.

Candy Darter

The candy darter was proposed for listing as threatened on October 4, 2017. This vibrant darter species is native to the Gauley, Greenbrier, and New River watersheds. It prefers shallow, fast flowing stream reaches with rocky bottoms and feeds on small insects such as mayflies and caddisflies. The primary threat to the candy darter is the introduction of variegate darter, which was once geographically isolated from the candy darter by Kanawha Falls but have spread into candy darter watersheds, likely through the release of live bait during fishing. Candy darters and variegate darters can hybridize and produce fertile offspring, and after multiple generations, candy darter genes are diluted out of the population. Other threats to candy darter include habitat and water quality degradation, including excessive sedimentation or release of chemicals or fertilizers into streams.

Suitable habitat for the candy darter occurs along portions of the proposed ERFO FS 2016-1(3) and (4) projects where they parallel the Williams River. In electronic correspondence provided on June 18 and July 18, 2018, for WV ERFO FS 2016(3) and (4) respectively, the following measures to avoid and minimize impacts to candy darters were provided:

- All repair work will be completed from equipment stationed on the road or bank with no instream work.
- All repair work will be conducted during low flow conditions.
- Fiber rolls will be placed downslope prior to any clearing, grubbing, or excavation to minimize the amount of eroded sediment entering the stream.
- Temporary and permanent seeding of disturbed banks will occur to help stabilize the slope.

Based on your commitment to these measures, the Service concurs that these projects may affect, but are not likely to adversely affect the candy darter.

No biological assessment or further section 7 consultation under the ESA is required with the Service for the proposed road repair projects. Should project plans change or amendments be proposed that we have not considered in your proposed action, or if additional information on listed and proposed species becomes available, or if new species become listed or critical habitat is designated, this determination may be reconsidered. If you have any questions regarding this letter, please contact Liz Stout of my staff at (304) 636-6586, ext. 15, or elizabeth_stout@fws.gov or at the letterhead address.

Sincerely,

John E. Schmidt
Field Supervisor

IPaC Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
West Virginia Ecological Services Field Office
694 BEVERLY PIKE
ELKINS, WV 26241
PHONE: (304)636-6586 FAX: (304)636-7824
URL: www.fws.gov/westvirginiafieldoffice/

Consultation Code: 05E2WV00-2017-SLI-0394
Event Code: 05E2WV00-2017-E-00757
Project Name: WV ERFO 2016 Route 86 Repairs 3

March 10, 2017

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This list can also be used to determine whether listed species may be present for projects without federal agency involvement.

If the official species list you receive identifies any listed, proposed, or candidate species as potentially occurring in the proposed project area, then further section 7 consultation under the ESA is required with the Fish and Wildlife Service. Please submit a project review request to the West Virginia Field Office. To find out what information needs to be submitted with your project review request go to this link:
http://www.fws.gov/westvirginiafieldoffice/projectreview.html

Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you should submit to our office.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq*.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). For information on bald and golden eagles in your project area please contact the West Virginia Division of Natural Resources, Natural Heritage Program at P.O. Box 67 Elkins, WV 26241, or call 304-637-0245.

Additionally, wind energy projects should follow the Service's wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;
http://www.towerkill.com;
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html; and
http://www.fws.gov/westvirginiafieldoffice/PDF/Communication%20Tower%20Letter%20(1).pd

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the ESA.

Attachment

Official Species List

Provided by:

West Virginia Ecological Services Field Office
694 BEVERLY PIKE
ELKINS, WV 26241
(304) 636-6586
http://www.fws.gov/westvirginiafieldoffice/

Consultation Code: 05E2WV00-2017-SLI-0394
Event Code: 05E2WV00-2017-E-00757

Project Type: TRANSPORTATION

Project Name: WV ERFO 2016 Route 86 Repairs 3
Project Description: Repair damage resulting from 2016 storm event. Repairs include embankment reconstruction, drainage repair, and road construction.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:

Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Webster, WV

Endangered Species Act Species List

There are a total of 4 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Flowering Plants	Status	Has Critical Habitat	Condition(s)
Running Buffalo clover *(Trifolium stoloniferum)* Population: Wherever found	Endangered		
Virginia spiraea *(Spiraea virginiana)* Population: Wherever found	Threatened		
Mammals			
Indiana bat *(Myotis sodalis)* Population: Wherever found	Endangered		
Northern long-eared Bat *(Myotis septentrionalis)* Population: Wherever found	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
West Virginia Ecological Services Field Office
694 BEVERLY PIKE
ELKINS, WV 26241
PHONE: (304)636-6586 FAX: (304)636-7824
URL: www.fws.gov/westvirginiafieldoffice/

Consultation Code: 05E2WV00-2017-SLI-0395 March 10, 2017
Event Code: 05E2WV00-2017-E-00759
Project Name: WV ERFO 2016 Route 86 Repairs 4

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). This list can also be used to determine whether listed species may be present for projects without federal agency involvement.

If the official species list you receive identifies any listed, proposed, or candidate species as potentially occurring in the proposed project area, then further section 7 consultation under the ESA is required with the Fish and Wildlife Service. Please submit a project review request to the West Virginia Field Office. To find out what information needs to be submitted with your project review request go to this link:
http://www.fws.gov/westvirginiafieldoffice/projectreview.html

Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you should submit to our office.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq*.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). For information on bald and golden eagles in your project area please contact the West Virginia Division of Natural Resources, Natural Heritage Program at P.O. Box 67 Elkins, WV 26241, or call 304-637-0245.

Additionally, wind energy projects should follow the Service's wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;
http://www.towerkill.com;
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html; and
http://www.fws.gov/westvirginiafieldoffice/PDF/Communication%20Tower%20Letter%20(1).pd

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the ESA.

Attachment

Official Species List

Provided by:

West Virginia Ecological Services Field Office
694 BEVERLY PIKE
ELKINS, WV 26241
(304) 636-6586
http://www.fws.gov/westvirginiafieldoffice/

Consultation Code: 05E2WV00-2017-SLI-0395
Event Code: 05E2WV00-2017-E-00759

Project Type: TRANSPORTATION

Project Name: WV ERFO 2016 Route 86 Repairs 4
Project Description: Repair of damage resulting from 2016 storm event. Repairs include culvert replacement with a bridge, embankment and road reconstruction, slide repairs, and drainage repairs.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:

Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Webster, WV

United States Department of Interior
Fish and Wildlife Service

Project name: WV ERFO 2016 Route 86 Repairs 4

Endangered Species Act Species List

There are a total of 4 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Flowering Plants	**Status**	**Has Critical Habitat**	**Condition(s)**
Running Buffalo clover *(Trifolium stoloniferum)* Population: Wherever found	Endangered		
Virginia spiraea *(Spiraea virginiana)* Population: Wherever found	Threatened		
Mammals			
Indiana bat *(Myotis sodalis)* Population: Wherever found	Endangered		
Northern long-eared Bat *(Myotis septentrionalis)* Population: Wherever found	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.