



Private Water Crossing Report

FEMA-4219-DR-WV

July 7, 2015



FEMA

This report was developed by Allen Graybill, FEMA Reservist, who was deployed as a Hazard Mitigation Program Support Manager to the Joint Field Office in Charleston, West Virginia during the response and recovery of FEMA-4219-DR-WV in May 2015.

The publication *"Private Water Crossings, Considerations before you build or rebuild"*, FEMA P-778 / June 2009 was created and developed by Allen Graybill. Contributing artist: Howard Vaughan, FEMA Reservist, Graphic Design: Gail Rowbotham and Rosanne Walker, FEMA Reservists, who were deployed to the Joint Field Office in South Charleston, West Virginia, FEMA-1838-DR-WV in 2009. The link to this publication as of 7/1/2015 is: <https://www.fema.gov/media-library/assets/documents/17542>.

(Cover Photographs - by Allen Graybill - May 2015 flood damage and private water crossings in Boone, Lincoln & Logan Counties, WV.)

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1. Introduction

Due to the topography of West Virginia, there are many private water crossings located throughout the more mountainous areas of the State. Because of this, the damage they suffer from flooding, and a lack of any codes and standards, a publication was developed called “Private Water Crossings, Considerations before you build or rebuild, FEMA P-778 / June 2009”. What this publication addresses, the continual problem, recent conditions of damage and need of assistance laid the foundation of and prompted the development of this Report. The conclusions and recommendations of this Report are intended to provide decision-makers information and initial guidance that can be used to reduce future damage and have an impact on methods of funding the repair and replacement of private water crossings.

Hazard Mitigation Strategies were developed with the WV State Hazard Mitigation Officer to identify and implement mitigation opportunities for declared disaster events FEMA-4210/4219/4220/4221-DR-WV. The proposed Strategies for 4219/4220/4221 contain the objective to “Develop a methodology for the application of private bridges under the HMGP” and the signed Strategy for 4210 states to “Assist West Virginia Voluntary Organizations Active in Disaster (WVVOAD) develop a policy regarding the repair and/or replacement of “Private Water Crossings” including bridges and culverts”. This report addresses these goals and objectives.

There was also a Private Water Crossing Board organized comprised of FEMA, WV State and VOAD personnel who had a vested interest in the repair of private water crossings. Their objective is to find solutions to address unmet needs to repair private water crossing damage when federal assistance is not available. A Power Point on Private Water Crossings with a focus on Procedures for WV VOAD is ‘Appendix B’ in this Report and was presented to this board and other JFO personnel to complement the publication “*Private Water Crossings, Considerations before you build or rebuild*”, FEMA P-778 / June 2009 and to complement the involvement of volunteer agencies in the repair and rebuilding of private water crossing damage that occurred on FEMA-4219-DR-WV and that occurs elsewhere and in the future. Legal as well as procedural steps were a focus and also addressed.

2. Purpose

In the wake of devastating damages caused by the flash flooding on May 2, 2015 and in response to FEMA-4219-DR-WV and the amount of damage to private water crossings without damage to the residential structures themselves, a focus developed on how to address the damage with a lack of FEMA Individual Assistance. A need for a more detailed evaluation and assessment of damage to private water crossings in the designated counties from the flood and landslides was needed. The task was to provide observations, conclusions, and recommendations on the status and performance of the crossings impacted by the flood forces and ways to repair, replace and mitigate with alternative and previously unused sources of funding.

3. Spring 2015 Events

3.1 FEMA-4219-DR-WV

From April 3, 2015 to April 5, 2015, severe storms, flooding, landslides, and mudslides impacted the southwestern area of West Virginia. There was considerable damage to public property in Boone, Cabell, Lincoln, Logan, Mingo, and Wayne Counties and resulted in a Presidential Disaster Declaration on May 14, 2015.

3.2 FEMA-4210-DR-WV

The damage from FEMA-4219-DR-WV came on the heels of another event that covered a larger area with an additional 27 more counties as well as those designated in FEMA-4219-DR-WV to receive Public Assistance. This earlier event resulted in a Presidential Disaster Declaration on March 31, 2015.

3.3 FEMA-4220 & 4221-DR-WV

On May 18, 2015 federal disaster aid was made for Public Assistance being made available to the State of West Virginia to supplement state and local recovery efforts in the 12 counties affected by severe storms, flooding, landslides, and mudslides during the period of April 8-11, 2015.

On May 22, 2015 federal disaster aid was made for Public Assistance being made available to the State of West Virginia to supplement state and local recovery efforts in the 8 counties affected by severe storms, flooding, landslides, and mudslides during the period of April 13-15, 2015.

For all four declarations, all jurisdictions in West Virginia are eligible to apply for assistance under the Hazard Mitigation Grant Program.

4. Background

Flooding has been a frequent event in these six counties in FEMA-4219-DR-WV, with a major disaster declaration having occurred in one or more of these counties 16 times in the last twelve years. Of those, three flooding events occurred in each of the years of 2003, 2004 and 2012. The loss of property and lives has been devastating. The repetitiveness of these floods tells us that it is just a matter of time before this happens again.

The total annual precipitation in this region is between 44 and 48 inches. Of this, about 29 inches, or 62 percent, usually falls in April through October. Over 4 inches of rain fell during the incident period of FEMA-4210-DR-WV and over 3 inches fell during the incident period of FEMA-4219-DR-WV in the 6 county region focus of this Report.

The topography of the region generally consists of steep slopes with narrow valleys. The floodplains are narrow along streams with steep ridgetops or crests separated by long steep side slopes. Flash flooding is a recurring event. Areas on the bottom land are often the only suitable building sites in the survey area, and most of the population is crowded into these areas. Many homes and access to these homes are built within the floodplain boundaries. Flood warnings are usually less than ten minutes, giving people little time to remove themselves from harm's way. Damaging landslides oftentimes accompany many of the flood events due to the erosion-prone unconsolidated shale and sandstone soils.

Some flood events spare some of the homes from damage, only to have access to their homes cut off by the destruction to their bridge or culvert water crossing. A very large number of homes in West Virginia

and this region of the state require and have existing water crossings of one sort or another. They include low water crossings, corrugated metal culverts, corrugated plastic culverts, box culverts, wooden bridges, metal grate deck bridges, concrete deck bridges, and an abundance of old metal storage tanks adapted to use as culverts. The structural means of support for the bridges can include wooden beams, logs, various kinds of metal pipes, steel structural beams, railroad rails, and even used flatbed truck structures. Some of these crossings should be for temporary short term or intermittent use only and not for permanent access to homes.

The following chart covers some pertinent statistics from various sources in the six counties included in Presidential Disaster Declaration on May 14, 2015 and the focus area of this Report.

	Average of Persons Below Poverty Level*	Median Household Income*	Percent Civilian Labor Force, Total*	Percent Elderly*	Percent Disabled**	Percent Pre-Disaster Unemployment***
National Average	15.4%	\$53,046	63.8%	14.1%	12.1%	5.5%
WV State Average	17.9%	\$41,043	54.5%	17.3%	18.6%	7.0%
Boone County	20.7%	\$42,156	46.6%	15.8%	N/A	10.0%
Lincoln County	27.3%	\$35,487	44.9%	16.6%	N/A	10.2%
Logan County	19.8%	\$36,999	43.3%	16.5%	N/A	11.8%
Wayne County	20.0%	\$36,964	50.3%	17.9%	N/A	7.3%
Cabell County	23.4%	\$38,374	55.6%	16.7%	N/A	5.9%
Mingo County	24.9%	\$35,955	44.7%	15.1%	N/A	13.4%

*United States Census Bureau Quick Facts

** American Community Survey 2012 Statewide Percentage

*** United States Bureau of Labor Statistics

5. Flood Mitigation History for Private Water Crossings

Mitigation efforts for private water crossings have been addressed mainly by the individual property owner and or Individual Assistance (IA) on FEMA IA declarations. As is the case with this event, many declarations that are not declared for assistance to individuals and households still may have damage to private water crossings without damaging the homes the crossings provide access to and from.

In such cases, the State of West Virginia has put a loan program into effect to assist owners in repairing their water crossings. This is similar to the United States Department of Agriculture's loan program. When IA is declared, financial assistance for the access route is limited to the cost to repair the disaster-related damages, including the water crossing, up to the primary residence. This is after FEMA verifies whether the State and/or local government has taken, or plans to take, any emergency actions to repair

the route to provide access for emergency services providers or to remove immediate threats to public health and safety. Other assistance guidelines established for private water crossings and access routes can be found in Recovery Policy 9445.1.

In the event of any major disaster declaration, all jurisdictions in the State are eligible to apply for assistance under the Hazard Mitigation Grant Program (HMGP). The history of funding private water crossing installations because of damage is non-existent in West Virginia and the country. This issue is addressed in the next section.

6. Private Water Crossing HMGP Considerations

HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem and a project's potential savings must be more than the cost of implementing the project. It is questionable that a Benefit Cost Analysis (BCA) will meet the required level for reduction of future flood losses when considering private water crossings. **Based upon feedback received from Hazard Mitigation Region III, HMGP is not an eligible funding source for private water crossings.** Some specific considerations:

6.1 Possible Benefits and Justifications

- Homeowners insurance requirement
- Fire/emergency event access
- Displacement and no access to home/homes
- Replace several crossings with one bridge for multi-family access
- Wing wall installations to direct water flow, preventing erosion
- Increase adequate clearances created to prevent blockage
- Bridge replacing culvert for less blockage and damage
- Piers removed from waterway
- Bank stabilization
- Repetitive loss and damage avoided

6.2 Possible Costs and Drawbacks

- Determination is made that bridges do not qualify as a Mitigation Grant Project
- Requested type of project is not identified as a mitigation activity in the designated county plan
- Excessive engineering and construction costs
- No actual flood loss reduction created
- Site limitations prohibit incorporating mitigation techniques needed or required
- Environmental considerations
- No repetitive losses or previous damage to water crossing

7. Sample Private Water Crossing Projects

These 3 projects are submitted as examples of different ways to achieve good construction standards to access homes because of the necessity of utilizing water crossings. The scopes of work and costs vary according to each site condition and the first two also by property owner preference. The third sample is only a proposal and hypothetical and was only created for purposes of this Report. Bridges are preferred to culverts and box culverts are preferred over metal culverts. Least desirable is low water crossings. Details on all types of private water crossings and design considerations are covered in *"Private Water Crossings, Considerations before you build or rebuild", FEMA P-778 / June2009.*

7.1 Existing Actual Project - Sample Private Water Crossing

Standard Project: Bridge crossing over private Ford Crossing

Reason for Project: Access to new home and holders of homeowners insurance require bridge to continue coverage for possible fire event access

Topo Location: Hyndman Quadrangle, Bedford County, PA

Latitude: 39.868740 N; Longitude: -78.683266 W

Property: 10.2 acres with project engaging less than ¼ acre

Buildings: Two bldgs. less than 30 years old (one is a new house)

Stream or Body of Water: Mill Run/Creek;

- **Size:** 1.3 acres
- **Flow:** runs south east to north west about 6 months a year

Permits: Joint Application for U.S. Corps of Engineers Section 404 Permit, PA Water Obstruction and Encroachment Permit (PA DEP) and Cultural Resource Notice (PA Historical and Museum Commission)

Permit Cost: Bridges and other water obstructions and encroachments \$200.00

Environmental Wetland Delineation: Included field reconnaissance, analysis and data reports of technician and hydro geologist; Cost: \$1,000.00

Bridge Specifications: 12' x 24', (4) 14" x 8" x 24'-0" I beams, (4) 3'-0" x 6'-0" concrete abutments of 5000 psi concrete w/ rebar, 3" oak decking w/ curb @ each side, rip rap and stone wing walls, 35 ton weight limit

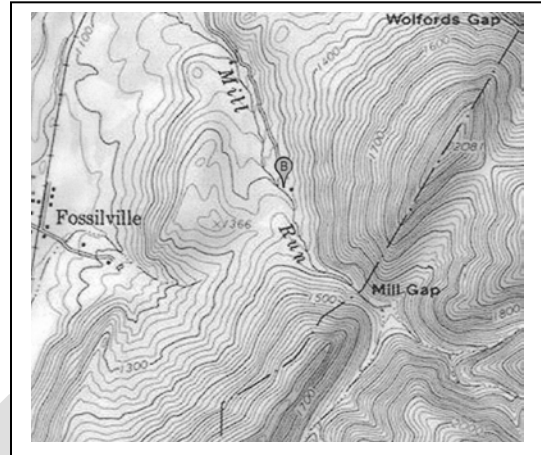
Construction Cost: \$12,000.00

Photographs:

Before:



After:



B: Bridge Crossing Site

7.2 Existing Actual Project - Sample Private Water Crossing

Standard Project: New larger 5'-0" dia. metal culvert replacing smaller blown out metal culvert

Reason for Project: Existing 3'-0" diameter metal culvert washed out and collapsed by flood water and debris in spring of 2015

Topo Location: Henlawson Quadrangle, Logan County, WV

Latitude: 37.96724 N; **Longitude:** -81.92696 W

Property Location: 361 Old Dairy Road (7/02), Chapmanville, WV, elevation of 843 feet

Mailing Address: 126 Barker Fork Rd, Chapmanville, WV 25504

Buildings: one residential building

Stream or Body of Water: Curry Fork;

- **Size:** unknown
- **Flow:** runs north east to south west

Permits: Logan County Floodplain Manager and WV Division of Natural Resources (DNR), Office of Land and Streams for an application to access waterway (no fee for homeowners and non-profits)

Permit Cost: unknown

Environmental Wetland Delineation: Included field reconnaissance, analysis and data reports of technician and hydro geologist; **Cost:** unknown

Crossing Specifications: 5'-0" diameter x 20'-0" long corrugated metal pipe, rock and concrete slab blocks for headwalls and wing walls at inlet and outlet, dirt fill with gravel overlay

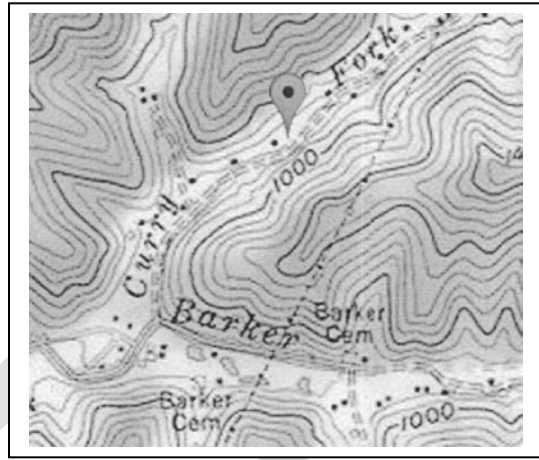
Construction Cost: \$4,500.00

Photographs:

Inlet:



Outlet:



Water Crossing Site

7.3 Proposed Project Study: Sample Private Water Crossing

Standard Project: Proposed new box culvert replacing washed out steel culvert crossing

Reason for Project: Existing 5'-0" diameter metal culvert washed out by flood water and debris in spring of 2015

Topo Location: Julian Quadrangle, Boone County, WV

Latitude: 38.127767 N ; **Longitude:** -81.791321 W

Property Location: 984 Easter Hollow Rd, Ridgeview, WV 25169, elevation of 769'

Buildings: one residential building

Stream or Body of Water: Lefthand Fork of Camp Creek;

- **Size:** unknown
- **Flow:** runs from north east to south west

Permits: Boone County Floodplain Manager and WV Division of Natural Resources (DNR), Office of Land and Streams for an application to access waterway (no fee for homeowners and non-profits)

Permit Cost: unknown

Environmental Wetland Delineation: Included field reconnaissance, analysis and data reports of technician and hydro geologist; **Estimated Cost:** \$1,000.00

Crossing Specifications: With a rented crane, install 4' x 12' box culvert sections for 12' wide crossing with 8 sections of wing walls 2' x 2.5' x 6', two sections per wing with grout. Use back fill and riprap to stabilize banks, repair scoured areas and re-establish approaches.

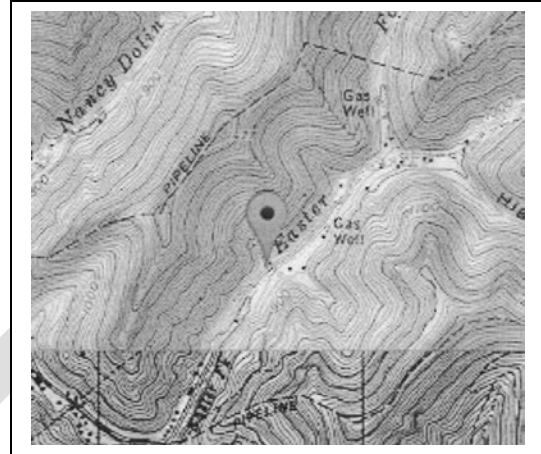
Estimated Construction Cost: \$24,000.00

Photographs:

Existing Damage:



Proposed Construction:



Water Crossing Site

8. Site Visit Information

A sampling and good cross section of private water crossing information, including photographs, coordinates, address, damages, site conditions and any repairs was collected and recorded on location post declaration. Preliminary information was gleaned from Preliminary Damage Assessments collected by WV VOAD, County, State and FEMA teams.

The following photographs and accompanying information presents a clear understanding of the typical site conditions, damages and types of private water crossings that exist in southwest West Virginia. The spread sheets and maps for the three counties visited and showing the location of each visited property is located in 'Appendix A'.

8.1 Water Crossings - Logan County - WV Site Visits - May & June 2015



1. Existing culvert was washed out and has been replaced with a new 5'-0" x 20'-0" long metal culvert with head walls, fill and gravel overlay. It is located along Curry Fork. The crossing is for one house. Coordinates: 37.96724°, -81.92696°, elevation: 843'. The listing from the damage assessment sheet is 126 Barker Fork Rd, Chapmanville, WV 25508. That is the mailing address. The physical location is 361 Old Dairy Rd, Chapmanville, WV 25508, Logan County.



2. This culvert water crossing suffered some erosion. The crossing is for one house as listed on the Damage Assessment Sheet. Coordinates: 37.90733°, -82.13045°, elevation: 893'. Address: 925 Harts Creek Rd, Harts, WV 25524, Logan County.

8.2 Water Crossings - Boone County - WV Site Visits - May & June 2015



1. This existing metal culvert water crossing was undersized, causing washout, erosion and berm/roadway damage along Little Horse Creek. This crossing services one home. Coordinates: 38.14030°, -81.85508°. Address: 2548 Little Horse Creek Road, Julian, WV 25529, Boone County.



2. This bridge collapsed at one end, concrete deck end broke off, erosion, scouring, and loss of bridge approach along Little Horse Creek. Bridge jacked up with temporary supports while new concrete supports, decking, approach and wing walls are poured. Bridge services one home. Coordinates: 38.15130, -81.86170°. Address: 690 Little Horse Creek Road, Julian, WV 25529, Boone County.



3. This water crossing has been repaired and culvert replaced along White Oak Branch of Big Coal River. The crossing is for one house, not three as listed. Coordinates: 38.17849°, -81.72768°, elevation: 665'. Address: The listing from the damage assessment sheet is 1776 Lower White Oak Rd, Ashford, WV 25009. It is actually located at 1526 Lower White Oak Rd., Boone County.



4. This shows erosion around a corrugated metal culvert along Sugar Camp Branch of Camp Creek. This crossing services one home.

Coordinates: 38.11201°, -81.77470°, elevation: 769'. Address: Herman Hollow Road (at the end near gate), Julian, WV 25529, Boone County.



5. This washed out corrugated metal culvert replaced with new corrugated 4'-0" pipe by homeowner with concrete and soil bank stabilization and grading along Sugar Camp Branch of Camp Creek. This crossing services one home. Coordinates: 38.11523°, -81.77533°, elevation: 769'. Address: 64 Herman Hollow Road, Julian, WV 25529, Boone County.



6. This existing metal culvert water crossing was severely washed out along Lefthand Fork of Camp Creek. This crossing services one home. This washed out corrugated metal culvert could be replaced by a bridge with site space permitting wing walls and structure clear of waterway.

Coordinates: 38.12784°, -81.79137°, elevation: 769'. Address: 984 Easter Hollow Road, Ridgeview, WV 25169, Boone County.



7. This damaged water crossing has been repaired with steel beams, concrete decking and concrete block along Lefthand Fork of Camp Creek. This crossing services one home. Coordinates: 38.13049°, -81.78834°, elevation: 900'. Address: 1442 Easter Hollow Road, Ridgeview, WV 25169, Boone County.



8. This damaged water crossing has been repaired with inlet and outlet headwalls composed of stacked concrete bags, new metal culvert and gravel with grading and stream bank stabilization along Lefthand Fork of Camp Creek. This crossing services two homes. Coordinates: 38.12823°, -81.79046°, elevation: 836'. Address: 1094 & 1054 Easter Hollow Road, Ridgeview, WV 25169, Boone County.



9. This bridge suffered severe damage along Brush Creek with collapse at one end, scouring, partial loss of bridge approach and bank erosion. Bridge services two homes. This site is not listed on the Damage Assessment Sheet. Coordinates: 38.12725°, -81.75713°, elevation: 882'. Address: Ridgeview Nellis Road (Rt. 1), Ridgeview, WV 25169, Boone County.



10. This culvert crossing had some erosion problems along tributary to Brush Creek. The crossing is for one home. Coordinates: 38.13757°, -81.76521°, elevation: 779'. Address: The listing from the damage assessment sheet is 726 Ridgeview Hollow Rd, Ridgeview, WV 25169, Boone County.



11. This washed out corrugated metal culvert replaced with new corrugated pipe along Toney Fork of Drawdy Creek. Coordinates: 38.10643°, -81.73255°, elevation: 904'. Address: 86 Knight Lane, Peytona, WV 25154, Boone County.



12. This washed out corrugated metal culvert replaced with new 4' corrugated culvert along feeder to Big Coal River. Coordinates: 38.11144°, -81.620057°, elevation: 767'. Address: 197 Oakdale Lane, Seth, WV 25181, Boone County.



13. This culvert crossing had no obvious problems upon inspection. Debris needs cleaned out with regular maintenance provided. The crossing is for one home. Coordinates: 38.11811°, -81.59311°, elevation: 743'. Address: 3329 Joes Creek Road, Comfort, WV 25049, Boone County.



14. This property had another connecting culvert that washed out with yard and fence along Toney's Creek. Bridge crossing where cars are parked was constructed post event. The crossing is for one home. Coordinates: 38.14989°, -81.62437°, elevation: 717'. Address: 1485 Toney's Branch Road, Comfort, WV 25049, Boone County.



15. This bridge suffered damage along Lick Creek with erosion, scouring, abutment instability and collapse. Bridge services two homes and is owned by one person. This site is a dangerous crossing now. Coordinates: 38.08321°, -82.86253°, elevation: 690'. Owners address: 85 Wiseman Lane (along Lick Creek Rd), Danville, WV 25524, Boone County. Owner at 147 Wiseman Lane temporarily also uses the bridge.



16. The yard washed out at this property along Toney's Creek. Erosion and scouring took place around this culvert pipe. The crossing below was not affected and is for one home. Coordinates: 38.07480°, -81.87540°, elevation: 746'. Address: 234 Left Fork Lick Creek Rd, Danville, WV 25053, Boone County.



17. This washed out crossing has been replaced with a plastic pipe and poured, formed concrete head and wing walls. This site is still under construction along Trace Branch of Big Ugly Creek. The crossing is for two homes. Coordinates: 38.07370°, -81.87553°, elevation: 714'. Address: 384 Left Fork Lick Creek Rd, Danville, WV 25053, Boone County.

8.3 Water Crossings - Lincoln County - WV Site Visits - May & June 2015



1. This washed out corrugated metal culvert replaced with new corrugated 5'-0" pipe by homeowner with bank stabilization and gravel, grading along Big Ugly Creek. No obvious mitigation. Destroyed pipe visually located nearby. This crossing services one home. The coordinates: 38.03064°, -81.93813°; elevation: 983'. Address is 2107 Big Ugly Creek Road, Harts, WV 25524, Lincoln County.



2. This existing metal culvert, an altered fuel storage tank suffered bank erosion and is need of repairs along East Fork of Fourteenmile Creek. This crossing services one home. The coordinates are: 38.08443°, -82.16602°; elevation: 710'. Address interpolated from Damage Assessment Sheet as 2313 McClellan Highway (RT 10), Ranger, WV 25557, Lincoln County.



3. This culvert water crossing, an altered fuel storage tank, suffered bank erosion that has been partially addressed along the Laurel Fork of Little Harts Creek. The crossing is for three houses as listed on the Damage Assessment Sheet. Coordinates: 38.01767°, -82.17582°; elevation: 749'. Addresses: 4, 8 and 12 Daddy's Acres (68/1), Harts, WV 25524, Lincoln County.



4. Bridge damage along Little Harts Creek with abutment collapse, scouring, partial loss of bridge approach and erosion. Bridge services three homes and four families, one child with special needs. Flood in 1996 destroyed wooden bridge and FEMA IA provided \$1,500.00 towards replacing bridge. The coordinates: 38.04232°, -82.15228°; elevation: 604'. Address: 11, 15 and 24 Bradley Drive (Rt. 68), Harts, WV 25524, Lincoln County.



5. Bridge damage along Fourteenmile Creek with abutment collapse at road end, partial loss of bridge approach, deck damage and erosion. Owner completed repairs with new abutment and decking. Existing stone abutment is of questionable structural integrity. Bridge services one home. Coordinates: 38.09179°, -82.19294°; elevation: 628'. Address: 315 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



6. This site along Fourteenmile Creek had a washed out bridge with unknown erosion and scouring. Complete new bridge constructed with new wood decking and concrete approaches and abutments with wing walls adequately set back from water course. Bridge services three homes. Coordinates: 38.09075°, -82.19310°; elevation: 671'. Address: 325 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



7. This site along Fourteenmile Creek reportedly had a washed out bridge with unknown erosion and scouring. Existing bridge constructed with new wood decking, including plywood and concrete approach. Existing metal pipe beams reused. Bridge services one home. The coordinates are: 38.08751°, -82.20121°; elevation: 690'. Address: 463 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



8. This site along Fourteenmile Creek had lots of erosion and scouring around and near bridge on the upstream side. Debris consisting of large trees and other dam creating substances in creek need removed. Bridge services one home. Coordinates: 38.08920°, -82.21335°; elevation: 744'. Address: 616 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



9. This bridge suffered damage along Fourteenmile Creek with severe damage, erosion and maintenance issues. Owner completed repairs with new abutment and decking. Bridge services one home. Coordinates: 38.08850°, -82.20808°; elevation: 686'. Address: 551 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



10. This bridge suffered damage along Fourteenmile Creek with erosion, scouring, abutment instability and maintenance issues. Minimally, new abutments and bank stabilization required. Bridge services one home. Coordinates: 38.08792°, -82.19865°; elevation: 655'. Address: 441 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



11. This bridge suffered damage along Fourteenmile Creek with erosion, scouring, abutment instability and maintenance issues. The bridge is no longer passable and a low water crossing was established alongside the bridge. Minimally, new abutments and bank stabilization required. Bridge services one home. Coordinates: 38.08808°, -82.19587°; elevation: 655'. Address: 427 East Lynn Road (Rt. 37), Ranger, WV 25557, Lincoln County.



12. This culvert crossing has been repaired along Trace Branch of Big Ugly Creek. This culvert damage is a reoccurring problem. The crossing is for at least five residences, seven families are listed on original assessment sheet. Coordinates: 38.03089°, -81.95580°; elevation: 929'. Address: The listing from the damage assessment sheet is 67 Estep Drive Branch, Harts, WV 25524, Lincoln County.



13. This bridge suffered damage along East Fork of Big Harts Creek. Abutments and Bank stabilization required. Bridge services one home. Coordinates: 38.00678°, -82.10885°; elevation: 606'. Address: 424 East Fork Road (Rt 70), Harts, WV 25524, Lincoln County.



14. This water crossing was completely washed out along Big Ugly Creek. Temporary walking bridge has been installed. This crossing services one home. The coordinates are: 38.01494°, -82.15054°; elevation: 795'. Address: 1158 Big Branch Road, Harts, WV 25524, Lincoln County.



15. This bridge suffered damage along Gartin Fork. Access and approaches on both sides of bridge washed out and repaired. Bridge services one home. Coordinates: 38.17297°, -82.16717°; elevation: 445'. Address: 28 Jacquelyn Lane, Midkiff, WV 25540, Lincoln County.



16. This culvert water crossing, an altered fuel storage tank, was washed out along Coal Branch of Big Harts Creek. This crossing services one home. Coordinates: 38.00984°, -82.12967°; elevation: 602'. Address: 37 Coal Branch Road (19/1), Harts, WV 25524, Lincoln County.



17. This culvert water crossing, an altered fuel storage tank, and private dirt roadway was washed out along Big Harts Creek. This crossing services one home. The coordinates are: 38.01096°, -82.13244°; elevation: 594'. Address: 45 Coal Branch Road (19/1), Harts, WV 25524, Lincoln County.



18. This bridge suffered erosion damage at abutments along Big Harts Creek. Bridge services three homes. Coordinates: 38.17297°, -82.16717°; elevation: 445'. Address: 35, 49 and 59 Caney Branch Road, Harts, WV 25524, Lincoln County.



19. This gang culvert water crossing and private dirt roadway was washed out along Mudlick Branch. Culverts and fill were replaced with some rock head wall placement completed. This crossing services one home. Coordinates: 38.03699°, -82.18686°; elevation: 755'. Address: 85 Mudlick Road, Harts, WV 25524, Lincoln County.



20. This culvert water crossing and private dirt roadway was washed out along Gartin Fork of Mudlick Branch. This crossing services one home. Coordinates: 38.02739°, -82.18564°; elevation: 750'. Address: 85 Gartin Fork Road, Harts, WV 25524, Lincoln County.



21. This bridge suffered damage along Steer Fork. Abutments and Bank stabilization required. Bridge services one home. The coordinates: 38.08659°, -82.20468°; elevation: 666'. Address: 3 & 7 Steer Fork Road, Ranger, WV 25557, Lincoln County.



22. This metal culvert suffered erosion damage along Steer Fork. Repairs needed to head walls. Crossing services one home. The coordinates: 38.08320°, -82.20692°; elevation: 714'. Address: 70 Steer Fork Road, Ranger, WV 25557, Lincoln County.



23. This water crossing washed away along Aarons Creek. Replacement needed. Crossing services one home. Coordinates: 38.11480°, -82.15367°; elevation: 639'. Address: 120 Aaron's Creek Road, Ranger, WV 25557, Lincoln County.



24. This metal culvert was washed out and replaced along Aarons Creek. Crossing services two homes. Coordinates: 38.11484°, -82.15316°; elevation: 644'. Address: 130 & 140 Aaron's Creek Road, Ranger, WV 25557, Lincoln County.



25. This metal culvert was washed out and replaced along the Big Branch of the Big Ugly Creek. Crossing services one home. The coordinates are: 38.080232°, -82.08422°; elevation: 662'. Address: 9 Sperry Hollow Road, Ranger, WV 25557, Lincoln County.



26. This bridge partially collapsed and suffered scouring and erosion damage at abutments along Big Ugly Creek. Bridge was reused with new abutments constructed and rock added. Bridge services four homes. Coordinates: 38.03704°, -82.04849°; elevation: 650'. Address: 9, 13, 17 and 21 Hillclimb Road, Harts, WV 25524, Lincoln County.



27. This bridge suffered scouring and erosion damage at abutments along Kiah Creek. Bank erosion and scouring around abutments needs repaired. Bridge services three homes. Coordinates: 38.00372°, -82.23414°; elevation: 789'. Address: 18, 21 and 25 Witcher Road, Harts, WV 25524, Lincoln County.



28. This metal culvert was washed out and replaced with a new metal culvert and stone headwalls along Witcher Fork of Kiah Creek. Crossing services one home. The coordinates are: 38.00372°, -82.23479°; elevation: 787'. Address: 25 Witcher Road, Harts, WV 25524, Lincoln County.



29. This bridge crossing was washed away by log/debris and flood water leaving behind concrete block abutments/wing walls along Fourmile Creek. Bridge services four homes. Families now use a low water crossing for access. New bridge decking secured to existing abutments needed. Coordinates: 38.173279°, -82.236829°. Address: 21, 32, 74 and 76 Watts Family Ct, Branchland, WV 25506, Lincoln County.



30. This wood bridge crossing has collapsed and was destroyed along Barkcamp Branch. Bridge services one home. The coordinates are: 38.16291°, -82.92474°; elevation: 746'. Address: 97 Bulger Rd, Alkol, WV 25501, Lincoln County.



31. This metal grate bridge crossing was damaged along Laurel Creek. Bridge services one home. Coordinates: 38.07250°, -82.06892°; elevation: 635'. Address: 120 Laurel Creek Rd, Harts, WV 25524, Lincoln County.



32. This wood deck bridge crossing was damaged along the Jim Branch of Francis Creek. Scouring and erosion of creek banks around abutments occurred. Bridge services one home. Coordinates: 38.07250°, -82.06892°; elevation: 817'. Address: 165 Jim Branch Rd, Harts, WV 25524, Lincoln County.



33. This culvert water crossing suffered erosion along the Laurel Fork of Canoe Creek Fork. The crossing is for one house. The coordinates are: 38.02670°, -82.07320°; elevation: 816'. Addresses: 213 Green Shoals Road, Harts, WV 25524, Lincoln County.



34. This culvert water crossing suffered erosion along the Laurel Fork of Canoe Creek Fork. The crossing is for one house. The coordinates are: 38.02735°, -82.07278°; elevation: 769'. Addresses: 229 Green Shoals Road, Harts, WV 25524, Lincoln County.



35. This site's bridge crossing was damaged along Little Harts Creek. There was bank erosion and scouring around abutments. Bridge services one home. The coordinates: 38.03841°, -82.15703°. Address: 238 Little Harts Creek Road, Harts, WV 25524, Lincoln County.



36. This site's bridge crossing was damaged along Little Harts Creek. There is washed out wing walls, bank erosion and scouring around abutments. Bridge services one home. The coordinates are: 38.03398°, -82.16962°; elevation: 731'. Address: 415 Little Harts Creek Road, Harts, WV 25524, Lincoln County.



37. This site's bridge crossing was damaged along Little Harts Creek. There is washed out wing walls, bank erosion and scouring around abutments. Bridge services one home. The coordinates are: 38.07967°, -82.08877°; elevation: 593'. Address: 539 Guyan River Road, Ranger, WV 25557, Lincoln County.



38. This site's metal grate bridge crossing was damaged along Mud River. There is bank erosion and scouring around abutments. Bank stabilization with rocks around abutments is needed. This bridge services three homes. Coordinates: 38.31169°, -82.108156°; elevation: 610'. Address: 736 Lower Mud River Road, West Hamlin, WV 25571, Lincoln County.



39. This site's water crossing was completely washed out along the Rockhouse Branch of Big Ugly Creek. A new metal culvert with fill and gravel topping has been installed. The crossing services two homes. Coordinates: 38.05299°, -82.06999°; elevation: 442'. Address: 1018 Rockhouse Branch Road, Harts, WV 25524, Lincoln County.



40. This site's water crossing suffered some erosion along the Peter's Cave Fork. Rock and gravel fill has been done. Bridge services one home. Coordinates: 38.16063°, -81.90105°; elevation: 685'. Address: 1921 Straight Fork Road, Alkol, WV 25501, Lincoln County.



41. This new bridge replaces washed out water crossing along the Peter's Cave Fork. Site work, approaches, with new concrete abutments and decking has been completed. This bridge services one home.

Coordinates: 38.16421°, -81.91744°; elevation: 726'. Address: 2521 Straight Fork Road, Alkol, WV 25501, Lincoln County.



42. This bridge crossing was severely damaged and removed along the Peter's Cave Fork. Site work, approaches, with new abutments, wing walls and decking is needed along with necessary bank stabilization. This bridge services one home. The coordinates are:

38.12879°, -82.00741°; elevation: 762'. Address: 2529 Bulger Road, Alkol, WV 25501, Lincoln County.

9. Recommendations

- The West Virginia Fire Commission has adopted statewide the IBC, IRC, IMC, IFGC, IPC, IPMC and IEBC for any jurisdiction that chooses to enforce codes. The State itself has not adopted any building codes for water crossings or buildings. A few counties and municipalities have building codes and permitting that can address private water crossings. The State is encouraged to adopt not only building codes, but a permitting process that address and includes a means to establish a standard for the safe and sound construction and repair of private water crossings.
 - Provide transition coordination utilizing existing Floodplain Management Considerations for inspection/permitting procedures
 - Investigate development of regional inspection permitting services – public or privately contracted
 - Review policy on responsibility for maintenance and repairs of any Federally Funded private water crossings
 - Develop plan for addressing existing substandard structures – risk assessment in local HM Plan
 - Study existing water crossing codes in other states/counties

- Entertain separate water crossing codes and permitting from building codes and structures beyond existing special flood hazard area permitting procedures under Floodplain Management
- Volunteer agencies and VOAD should find ways to assist in the repair, replacement and mitigation of damaged private water crossings. Help is needed for low income, disabled, elderly and incapacitated water crossing owners that do not have the physical or financial means to resolve their damaged water crossings, especially when assistance is not available by other means during the designated event.
- For possible consideration of Hazard Mitigation Grant Program funding, private water crossing mitigation needs must be outlined in local Mitigation Plans. Project sites must comply with Federal regulations and environmental laws and regulations. It must be proven that long-term hazard mitigation measures are to be achieved in a cost effective, technically feasible manner. The best case scenario would be to substantiate benefits to be achieved and avoiding site limitations that prohibit incorporating mitigation techniques needed or required. This includes:
 - Replacing many inadequate crossings with one adequate crossing that incorporates all desired design characteristics for multi-family access
 - Eliminating a repetitively damaged water crossing
 - Installing head walls and wing walls where none existed
 - Replacing metal pipe culverts with a box culvert or bridge
 - Removing any crossing structure that is located within the waterway with a bridge structure that has improved clearance and will not impede water flow
 - Eliminate low water crossings with adequately designed bridge or box culvert
 - Include guide or hand rails where none existed
 - Existing piers removed from waterway in new crossing design
 - Provide proof that a secondary access does not exist
 - Provide a “no-rise” comparison between existing and proposed new crossing design
- Consider fact that homeowner’s insurance is canceled by many insurance companies when there is a loss of safe access to residences for emergencies or fire. Crossings that are too narrow or have limited weight capacity are also reasons for policy denial or cancellation
- Residents may be eligible to receive Community Development Block Grant- Disaster Recovery (CDBG-DR) funds (or other HUD Funding) for private water crossing repair or replacement
- Utilize availability of low interest loans from SBA to finance low water crossing disaster-related repairs and rebuilding
- Approach WV Division of Highways to consider utilizing Transportation Funds as a source of funding private water crossing repairs
- Investigate possible use of incentives for mitigation measures to be incorporated into water crossing design and construction through loan companies/organizations and insurance companies
- The Counties and State should coordinate activities to conduct an inventory and collect data on existing private water crossings to include how many crossings are in floodplains and what zones
- Expand or complement the Private Water Crossing Board established during these recent events with FEMA Region III/State meetings to explore options to address the unmet needs of repairing the damaged private water crossings and improving the possibility that they will withstand the next flood

10. Conclusions

The loan program the State of West Virginia has put into effect in the past in lieu of FEMA Individual Assistance to aid owners in repairing their water crossings is not viewed as a success by the State. They feel this effort has not been successful for lack of interest in acquiring more debt by those in need.

The State feels that the only sufficient means of restoring access over damaged water crossings is the financial assistance made available through the Stafford Act's Individuals and Households Program. The State feels that without this funding, restored access is likely to be poorly constructed and a danger to emergency responders and those who need to travel on these crossings. Poor construction leads to further damage and water crossing failure as a result of future high water events.

It is this 2015 Report's position that hand in hand with adequate funding to achieve good construction is the need for statewide building codes and permitting procedures in place and enforced for private water crossings.

In 1999, the West Virginia Conservation Agency, the Corps of Engineers and the Natural Resources Conservation Service created a statewide plan that expressed the need for a Joint Task Force. This group would address the complex flooding issues in West Virginia. That Task Force was composed of 20 Federal, State, regional and local agencies and quasi-public organizations and developed a comprehensive strategic plan that addressed reduction of flood damages and saving lives. At the time, representatives from the Governor and Senator Byrd's offices attended the Task Force meetings.

That Statewide Flood Protection Plan states: "The Task Force recommends that the State create a technical assistance program that includes funding and resources for a State agency to provide assistance in the design, installation, and maintenance of public and private stream crossings. The WV Division of Highways may be the appropriate State agency for this program given their extensive experience in stream crossing design and construction. The program could be deployed through the various Highway District offices."

This 2015 Report concludes that an investigation of existing West Virginia State and Federal programs and the possible development of new programs and policies from private, public and volunteer agencies/organizations are needed to address the needs in repairing, rebuilding and construction of private water crossings. There are unmet needs in financing/funding and a lack of construction regulations which reduce opportunities to mitigate substandard private water crossings.

Appendix

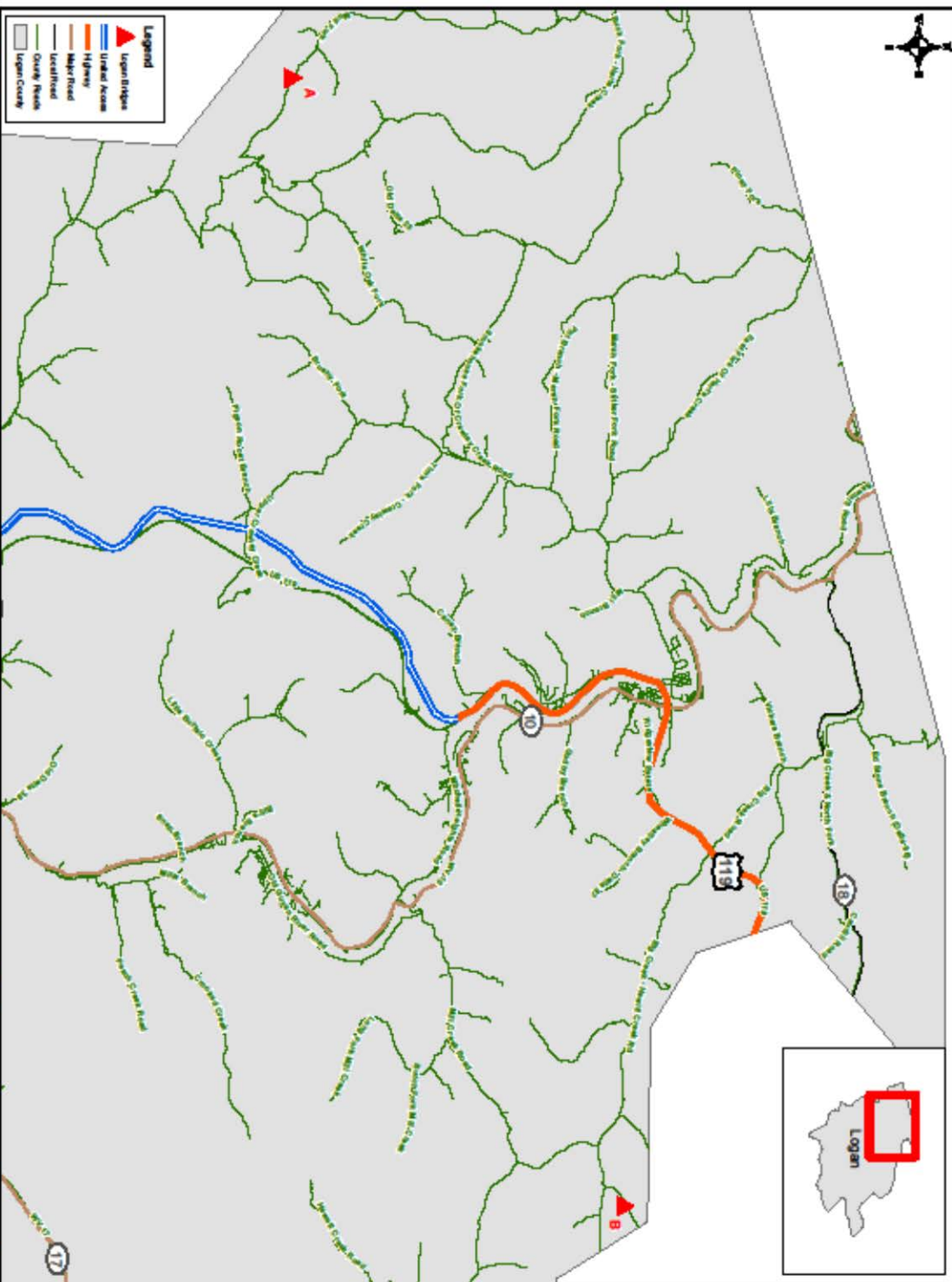
A. WV April Storm Damage Listings & Maps

A.1 Logan County

Cells that contain grey fill were visited for the Private Water Crossing Study and bright red font coloring signify information entered after original PDA										
Id	County	Area Of County	Latitude Coordinate	Longitude Coordinate	Address	Level of Damage	Inaccessible	A Brief Description of Damage	Assistance Needed/Unmet Needs	Specific Direction To The Residence and flood source
	Logan	Lake Community			56 Lake Community 25121	Affected	Yes	culvert damaged; unsafe		
	Logan	Margret Dr.			38 Margret Dr., Chapmanville, WV, 25508	Affected	Yes	Culvert damaged - only access; same culvert as Selina Isaacs	Damage Assessment Needed	
	Logan	Smokehouse Farm			1919 Smokehouse Farm Rd. Chapmanville, WV 25508	Affected	Yes	culvert out; property inaccessible; bank erosion	Damage Assessment Needed	
A	Logan	Main Big Heart	37.90733	-82.13045	4925 Main Big Harts, Harts, WV 25524	Affected		Bridge is temporarily fixed but it could be broken if anything drives across it	Bridge Repair	
	Logan				HC 74 Box 3153-1, Chapmanville, WV 25504	Affected		Road washed out and damaged bridge.	Bridge Repair	
B	Logan	Barkers Fork	37.96724	-81.92696	126 Barkers Fork rd / 361 Old Dairy Rd. Chapmanville WV 2008	Affected	yes	Bridge washed out, parking in neighbors driveway		Curry Fork
	Logan	Margret Dr.			26 Margret Dr., Chapmanville, WV, 25508	Affected	Yes	Culvert damaged - 3 families that use this only access	Damage Assessment Needed	
	Logan	Buckfork			3332 Buckfork Rd., Harts, WV 25524	Affected		Concrete bridge damaged- pillars knocked out- no access (Shares w/ Curtis Mullins)	Repairs to bridge	
	Logan	Buckfork			3356 Buckfork Rd., Harts, WV 25524	Affected		Concrete bridge damaged- pillars knocked out- no access (Shares w/ DwayneMullins)	Repairs to bridge	
	Logan	Wrenway			43 Wrenway, Harts, WV 25524	Affected		Culvert washed out - no access	Repairs to bridge	



FEMA-4219-DR-WV Logan Bridges



Map Data: Bureau of
Map Data: 2010, Logandepot.com

Data Source:
Map Data: 2010, Logandepot.com

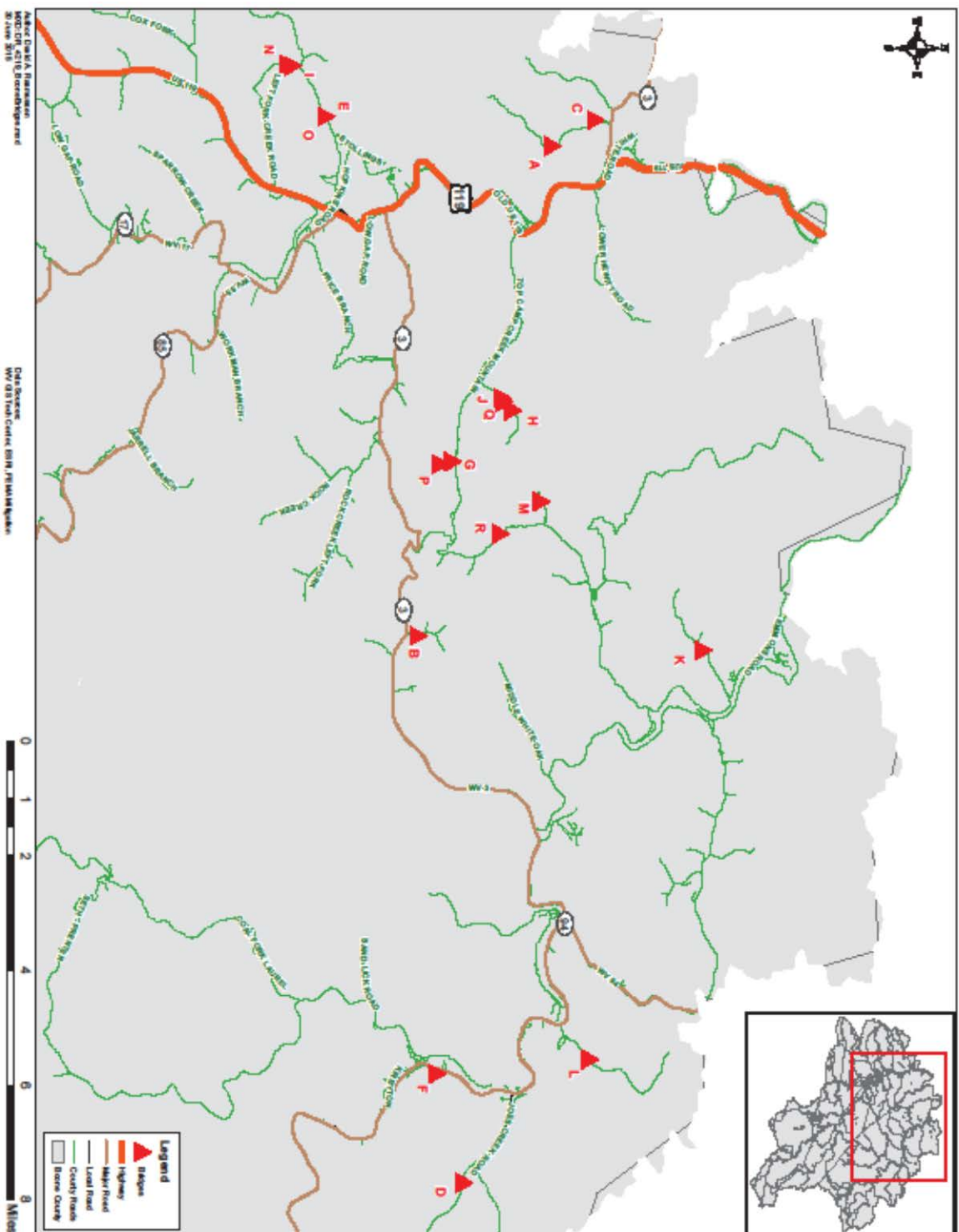
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A.2 Boone County

Cells that contain grey fill were visited for the Private Water Crossing Study and bright red font coloring signify information entered after original PDA										
Map Id	County	Area Of County	Lat. Coord.	Long. Coord.	Address	Level of Damage	Inaccessible	A Brief Description of Damage	Assistance Needed/ Unmet Needs	Specific Direction To The Residence
A	Boone	Little Horse Creek	38.1403	-81.85508	2548 Little Horse Cr Rd	Affected	Yes- only foot bridge now	Bridge washed out; no home damage		Little Horse Creek
	Boone	Six Mile			600 Arthur Ln Danville, WV 25053	Affected		Bridge collapsed		off Mud Fork Road off 119/23 (Stringer Branch Rd) near Rt 3 - Toney Fork of Drawdy Creek
B	Boone	Stringers Branch	38.106483	-81.73135	86 Knight Ln Drawdy Peytons, WV 25154	Affected		Culvert Washed out		3227 Lower Whiteoak Rd, Ashford, WV 25009
	Boone	Ridgeview			33 Stirling Lane Ridgeview	Affected		Red Bridge washed out		119/13 Spars Creek Rd.
C	Boone	Mud River			548 Lucas Lane- Mud River Danville, 25053	Affected		Culvert washed out, DOH is supposed to maintain culvert	Heart Patient	
	Boone	Little Horse Creek	38.1513	-81.8617	690 Little Horse Cr Rd	Affected		Bridge Repair		Little Horse Creek
D	Boone	Doddson Fork			1835 Doddson Fork Rd. Morrisvale, WV 25865 could be 8/01, Dodson Fork Rd, Spurlockville, WV	Minor	Yes	8" water in basement; 8" water in yard; underpinning pulled out; mud and water underneath; damaged bridge can't drive over; damaged landscape;	help with clean up	
	Boone	Joes Creek	38.11811	-81.59311	3329 Joes Creek Rd Joes-Creek Comfort, WV	Affected		Culvert stopped up		
E	Boone	Big Branch of Greenview			4600-1156 Big Branch Rd Danville, WV 25053	Affected		Bridge washed out		119/10 Madison
	Boone	Keith	public road	public road	84 Nicholas Ln Keith-Orgas, WV 25114	Affected		Part of the Bridge washed out & land		off rt 3 & 3/10 Big Coal River
F	Boone	Lick Creek	38.08321	-81.86253	147 Wiseman Ln, Danville, WV 25053	Major		Bridge washed out/ garage got flooded		
F	Boone	Seth	38.111291	-81.620695	197 Oakdale Ln Seth, WV 25181	Affected		Washed out culvert		off Coal River Rd. Rt. 3
	Boone	Uneeda - Jarrells Branch			565 Jarrells Branch Rd Madison, WV 25130	Affected		Bridge was washed out		Jarrells Branch
G	Boone	Camp Creek	38.11523	-81.77533	64 Herman DeLeon Hollow Rd. Julian, Wv 25529	Affected		3" water in yard; bridge/culvert damaged; no home damage		Sugar Camp Branch of Camp Creek
	Boone	Camp Creek			8030 Camp Creek Rd. Ridgeview, WV 25169	Affected		6" water in yard; bridge out; water been out for 3 days; no home damage		Camp Creek
H	Boone	Andrew			416 Laurel Branch Rd Peytons, WV	Affected		Bridge washed out at the mouth of the hollow		119/22 off Rt 3 Laurel Branch of Drawdy Creek
	Boone	Six Mile			7504 Six mile Rd Danville, wv 25053	Affected		Bridge Fell in		
I	Boone	Madison			287 Griffiths Branch Uneeda, WV 25205	Affected		Road and Culvert Washed out		Griffith Branch of Pond Fork
	Boone	Camp Creek	38.13049	-81.78834	1442 Easter Hollow Rd. Ridgeview, WV 25169	Affected		bridge damage; bank erosion; bridge sank 6' down; no home damage		Lefthand Fork of Camp Creek
J	Boone	Mud River			7334 Mud River Rd Danville, 25053	Affected		Bridge washed out/ drain pipe washed down creek		Rt 10
	Boone	Lick Creek	38.0748	-81.8754	234 Left Fork Lick Creek Rd Danville, WV 25053	Affected		culvert washed out, damage to front yard, fence took out		Rt 7/03
K	Boone	Camp Creek	38.12784	-81.79137	984 Easter Hollow Rd. Ridgeview, WV 25169	Affected		12' flooded yard; bridge washed out; bank erosion; no access to home;no home damage		Lefthand Fork of Camp Creek
	Boone	Prenter Rd.	public road	public road	1512 School House Rd Seth, WV	Affected		Bridge washed out near 662 School House Rd off prenter Rd there are 4 houses affected		
L	Boone	South Rt 119			223 Kinser Drive Julian, WV 25529	Affected		bridge and landscape; no home damage		near Little Hewett Creek Rd.
	Boone	Whiteoak of Orgas	38.17849	-81.72768	4776-1526 Lower White Oak Rd, Ashford, WV, 25009	Affected		Bridge washed out; 3 families use bridge to get home, they have another access to home; brothers tried to put wooden ties up to keep support	Needs damage assesment	White Oak Branch of Big Coal River
M	Boone	Madison			391 Griffith Branch Rd Madison, WV	Affected	YES	Washed out culvert		
	Boone	Middle Horse Creek			1315 Middle Horse Creek Rd. Julian, WV 25529	Affected	Yes	bridge damage; bank erosion; no home damage		Rt 3/17
N	Boone	Camp Creek	vacant lot	vacant lot	290 Herman Hollow DeLeon Rd Julian, Wv 25529	Affected		Washed out culvert		Sugar Camp Branch of Camp Creek
	Boone	Ridgeview			33 Sterling Ln Ridgeview, 25169	Affected		Bridge washed out		same as Lisa Belcher
O	Boone	Mud River			2014 Mud River Rd Danville, WV 25053	Affected		Driveway washed out culvert damaged		Rt 10
	Boone	Andrew			107 Baisden Ln Peytons, 25154	Affected		Bridge washed out disabled families		
P	Boone	Six Mile			4874 Six Mile Rd Danville, WV 25053	Affected	YES	Damage to bridge and Road in front of residence, Bridge not crossable		Rt 20
	Boone	Toney's Branch	38.14989	-81.62437	1485 Toney's Branch Rd Bloomingrose, WV 25024	Affected		Culvert washed out yard washed out		Toneys Creek
Q	Boone	Ridgeview	38.13757	-81.76521	726 Ridgeview Hollow Rd Ridgeview, WV 25169	Affected		Damage to driveway, culvert washed out		off Rt 1 Brush Creek
	Boone				928 Spurs Creek Madison, 25130	Minor		Bridge Foundation, Water Under Home & Bank Erosion		Spruce Creek, not Spurs Creek

A.2 Boone County – continue

	Boone	Camp Creek			4822 Camp Creek Julian, WV	Affected		bank by bridge washed		Rt 6 off 119
	Boone	Fosterville			151 Aleshire Walk Seth, WV 25181	Affected		Bridge has seperated from the concrete on the coal river road side of the bridge. Bridge is leaning, residents feel unsafe to walk across. Bridge has water & gas lines running beneath it. Only other access for these residents is to walk to Kirby		this is a walking bridge that is a state route and will be covered by public assistance. Cost of repair is about \$340,000.00
N	Boone	Lick Creek	38.0737	-81.87553	384 Left Fork Lick Creek Rd Danville, 25053	Affected		Culvert & drain barrel washed out, creek bed washed out		Rt 7/03
	Boone	Morrisvale			501 Cameo Rd. Morrisvale, WV 25565	Affected	Yes	bridge washed out completely; no access to home; must drive through neighbors yard to get out; no home damage		
O	Boone	Lick Creek	38.08321	-81.86253	85 Wiseman Ln, Danville, WV, 25524	Affected	Yes	Bridge washed out - damaged; landscape damage	Damage Assessment Needed	
	Boone	Lick Creek			46 Nomie Dr Lick Creek, WV	Affected		Bridge washed out, damage to road		off Lick Creek Rd
	Boone	Ridgeview			628 turner hollow ridgeview wv	major		advised there is no roadway left to get out of holler bridge has been washed out completely		off Rt 1
	Boone	City of Madison - West Madison			512 Estep Place West Madison, 25130	Affected		Damaged entire yard, culvert drain pipe completely stopped up, all water from the hill is now draining into their yard		
P	Boone	Julian	38.11201	-81.7747	Herman Hollow Road Julian, WV 25529	minor		Minor erosion around culvert		Sugar Camp Branch
Q	Boone	Easter Hollow	38.12823	-81.79046	1054 & 1094 Easter Hollow Rd, Ridgeview, WV 25169	major		culvert blown out		Lefthand Fork of Camp Creek
R	Boone	Brush Creek	38.12725	-81.75713	Ridgeview Nellis Rd, Ridgeview, WV 25169	major		wood bridge destroyed		Brush Creek on Rt 1



A.3 Lincoln County

Cells that contain grey fill were visited for the Private Water Crossing Study and bright red font coloring signify information entered after original PDA										
Id	County	Area Of County	Lat. Coord.	Long. Coord.	Address	Level of Damage	Inaccessible	A Brief Description of Damage	Assistance Needed/ Unmet Needs	Specific Direction To The Residence
A	Lincoln	Aarons Creek	38.1148	-82.15367	120 Aarons Crk Rd. Ranger, WV 25557	Affected		15ft of main section in yard washed away; bridge washed away; flood may have gotten into well		
	Lincoln	10 Mile			409 10 Mile Rd., Branchland, WV, 25506	Minor		Water under crawlspace and insulation, bridge eroded sot its twice as small as it was. Septic Tank backed up, lost some tools from out building	Damage Assessment Needed	
	Lincoln	Barberry Rd.			176 Barberry Rd. Ranger, WV 25557	Affected		2 ft flooded yard; bridge is gone-only exit, washed under pool deck and damaged pump, swept out gravel, knocked down small electric pole	Damage Assessment Needed	
B	Lincoln	East Lynn Rd.	38.08808	82.19587	427 East Lynn Rd. Ranger, WV 25557	Affected		3 ft flooded yard; furnace/hvac affected; both bridges gone; duct work gone; can't access vehicles; water under house		Fourteenmile Creek
C	Lincoln	Little Harts Creek	38.03398	-82.16962	415 Littl Harts Creek Rd Harts, WV 25524	Affected	Yes	Bridge damaged; road to sons house is out	Damage Assessment Needed	
	Lincoln	Guyan River			582 Guyan River Rd, Ranger, WV, 25557	Minor	Yes	Bridge accesible but very dangerous (only way in or out for 5 families: 84-yr old, 7 children, 10 & under) - some with heart, lungs, seizures		
D	Lincoln	Hillclimb Rd.	38.03704	-82.04849	Hillclimb Rd Hart, WV 25524	Affected		Yard flooded, bridge out, engress and egress affected		
E	Lincoln	Laurel Creek	38.069441	-82.07221	33 Laurel Creek Rd. Harts, WV 25524	Affected	Yes	damaged bridge, boulders washed onto property	Damage Assessment Needed	
F	Lincoln	Daddy's Acres	38.01767	-82.17582	4 Daddy's Acres, Harts, WV, 25524	Affected	Yes	Bridge/culvert washed out - 3 families share this bridge	Damage Assessment Needed	Laurel Fork of Little Harts Creek
G	Lincoln	Straight Fork	38.16421	-81.91744	2521 Straight Fork Rd. Alkol, WV 25501	Affected	Yes	Bank connected to bridge washed out and fence was destroyed	Damage Assessment Needed	
	Lincoln				11 Branch Dr. Harts, WV 25524	Minor	Yes	4 inches water in first floor; 5 ft flooded yard; frunace/hvac affected; floor damage; bridge is broken down; debris; mudslide against the house		
	Lincoln	Guyan River			467 Guyan River	Affected	Yes	bridge to 5 homes destroyed		Brown and Green Mobile home
H	Lincoln	East Lynn Rd.	38.078351	-82.193115	325 East Lynn Rd., Ranger, WV, 25557	Major	Yes	Bridge washed out, only way out for 3 families		Fourteenmile Creek
I	Lincoln	Sestep Branch	38.03089	-81.9558	67 Estep dr. Branch, Harts, WV 25521	Affected		Culvert washed out- 7 families use the culvert, temporarily fixed but it's a reocuring problem.		Trace Branch of Big Ugly Creek
	Lincoln	Paddies Branch			103 Paddies Branch, Branchland, WV, 25506	Affected	Yes	Potholes on road in front of home, both accessible bridges are damages; bridges are a concern if it breaks	Damage Assessment Needed	Near mothers home (25 Paddies Branch)
J	Lincoln	Big Ugly	38.03064	-81.93813	2107 Big Ugly Creek Rd. Harts, WV 25524	Minor		bridge completely wiped out; culver displaced; no access to home		Big Ugly Creek
	Lincoln	14 Mile			49 14 Mile Creek rd, Ranger, WV 25557	Affected	yes	Bridge is gone and cannot access		
K	Lincoln	Jacquelyn Ln	38.17297	-82.16717	28 Jacquelyn Ln. Midkiff, WV 25540	Affected	Yes	bridge washed out; side of bridge has sunk down; unsafe to cross; has fallen in creek; cement bridge - only access	Damage Assessment Needed	
L	Lincoln	Little Harts Creek	38.03841	-82.15703	238 Little Hart Creek Rd., Harts, WV 25524	Affected	Yes	Bank is out, hill slips, broken bridge (foundation ruined), stopped up pipes	Damage Assessment Needed	
	Lincoln	Little Harts Creek			249 Little Harts Creek, Harts, WV, 25524	Affected		Culvert damaged - Board of Education may fix culvert out build lost foundation from rushing flood water & 3-4 ft of water	Damage Assessment Needed	
M	Lincoln	Coal Branch	38.00984	-82.12967	37 Coal Branch Rd. Harts, WV 25524	Affected	Yes	Culvert/bridge damaged; washed all the gravel oss; unsafe to cross		
	Lincoln	10 Mile			10 Mile Rd. Ranger, WV 25557	Affected	Yes	bridge out		
N	Lincoln	Gartins Fork	38.02739	-82.18564	85 Garton Fort Rd. Harts	Affected		lost power; driveway & culvert damaged; washed out bank; took all of the gravel	Damage Assessment Needed	
	Lincoln	Upper Crawley	reported as Logan Cnty	reported as Logan Cnty	1295 Upper Crawley Rd. Chapmanville, WV	Affected	Yes	bridge is gone; no access to the home; health issue; emergency will not be able to get through	Damage Assessment Needed	
O	Lincoln	Steer Fork	38.08659	-82.20468	3 Steer Fork Rd. Ranger, WV 25557	Minor		sewer backed up; 2 ft water in yard; water tank affected; water under home; garage flooded; bridge affected		Steer Fork

A.3 Lincoln County – continue

	Lincoln	Big Ugly			1588 Big Ugly Creek Rd. Harts, WV 25524	Affected	Yes	bridge damaged/washed out;		
	Lincoln	Charles Farley			18 Charley Farley Buckfork Rd, Harts, WV, 25524	Affected		Culvert damage in front of home; debris washing into driveway; concerns of blockage of drains	Damage Assessment Needed	
P	Lincoln	Daddy's Acres	38.01767	-82.17582	8 Daddy's Acres, Harts, WV, 25524	Affected	Yes	Bridge/culvert washed out	*See Lois Barker's Application	Laurel Fork of Little Harts Creek
	Lincoln	McClellan Hwy			3338 McClellan Hwy Ranger, WV 25506	Affected		first floor has 2 inches of water; no appliances affected; bridge missing		
	Lincoln	Guyan River			459 Guyan River Rd. Ranger, WV 25557	Affected	Yes	bridge is damaged & unsafe - only access; 1 ft of water flooded yard & under trailer	damage assessment needed	
Q	Lincoln	Sperry Hollow	38.0819	-82.08422	9 Sperry Hollow	Affected	Yes	bridge washed out; drain pipe damaged; tore yard out; damaged farm equipment; got into barn		
R	Lincoln	Rockhouse Branch	38.05299	-82.06999	1018 Rock House branch rd harts 25524	Affected		Washed dirt out from under bridge and property bank washed away		
	Lincoln	McClellan Hwy			2547 McClellan Hwy Ranger, WV 25557	Affected		3 ft flooded yard; underpinning, heat pump, duct work, floor damage; bridge damaged; mailbox & satellite destroyed; chain link fence destroyed		
	Lincoln	Rockhouse Branch	public road	public road	20 Rockhouse Branch Rd. Harts, WV 25524	Affected	Yes	driving is washed out; flood yard and culvert beginning to come out; county drain stopped up their drain other drain is completely exposed		
S	Lincoln	Laurel Creek	38.0725	-82.06892	120 Laurel Creek, Harts, WV, 25524	Minor		Underpinning and insulation ripped; yard is muddy & under home; porches moved & sunk down. Bridge damages and dropped and big hole in bridge. Roof damaged. Heat Unit Damaged. Water Well	Damage Assessment Needed; needs something to clean up home with. Water well needs to be tested.	Laurel Creek
T	Lincoln	Aarons Creek	38.11484	-82.15316	130 Aarons Creek Rd. Ranger, WV 25557	Affected		1 ft flooded yard; culvert damaged; sides of culvert washed away;		
U	Lincoln	Aarons Creek	38.11484	-82.15316	140 Aarons Creek Rd. Ranger, WV 25557	Affected		culvert damage & sides washed away		
	Lincoln	McClellan Hwy			2571 McClellan Hwy Ranger, WV 25557	Affected	Yes	bridge unstable missing wings/sides; carhall pushed up against bank; only exit/entrance	damage assessment needed	
V	Lincoln	East Fork Rd	38.00678	-82.10885	424 East Fork Rd. Harts, WV 25524	Affected		bridge damaged - unsafe		East Fork of Big Harts Creek
W	Lincoln	East Lynn Rd.	38.09179	-82.19294	315 East Lynn Rd. Ranger, WV 25557	Major	Yes	Bridge washed out; 3 ft flooded yard; insulation and duct work damaged; furnace/hvac affected; house is physically moved; sink holes beneath home; 1 ft of mud; duct work filled with mud;		Fourteenmile Creek
X	Lincoln	East Lynn Rd.	38.0892	-82.21335	616 East Lynn Rd. Ranger, WV 25557	Affected	Yes	bank slipped into the creek; trees laying in creek & caused bank to slide by driveway; can't remove trees & caused creek to run behind driveway; eroded driveway and bridge		Fourteenmile Creek
	Lincoln	Big Ugly			450 Big Ugly Creek Rd. Ranger, WV 25557	Affected	Yes	bridge unstable only entrance/exit; flood water got into well, pump, bladder tanks, pool	damage assessment needed	
	Lincoln	9 Mile			696 9 Mile Creek rd, midkiff, WV	Affected	yes	Bridge impassible & washed out		
	Lincoln	McClellan Hwy			2389 McClellan Hwy Ranger, WV 25557	Affected		bridge damaged; can still enter and exit	Damage Assessment Needed	
Y	Lincoln	McClellan Hwy	38.08443	-82.16602	2313 McClellan Hwy Ranger, WV 25557	Affected	Yes	bridge is damaged	would like help fixing it	East Fork of Fourteenmile Creek
	Lincoln	Harvey Fork			41 Harvey Fork	Minor	No	Low bridge entrance flooded, insulation under house destroyed, leaking floor	help with clean-up	
Z	Lincoln	Harvey Fork	38.0373	-82.17274	53 Harvey Fork	Affected	Yes	culvert ripped out - cannot get out of driveway	help with clean-up	
	Lincoln	Little Harts Creek			168 Little Harts Creek Rd. Harts, WV 25524	Major	Yes	Bridge is out; no access(neighbors don't like them in yard); took out gas pipe (no heat or stove/oven) skirting damaged; landscape filled with debris & mud; damage to personal equipment; 6 ft water in yard; lost insulation; water under house	Damage Assessment Needed	
	Lincoln	McClellan Hwy			2547 McClellan Hwy Ranger, WV 25557	Affected		VOAD Assessed: 18" depth of water in the yard; outbuilding got flood water; bridge destroyed Self Assessed: bridge washed away-only entrance/exit; mailbox gone; fence broken; water in garage, satellite gone		

A.3 Lincoln County – continue

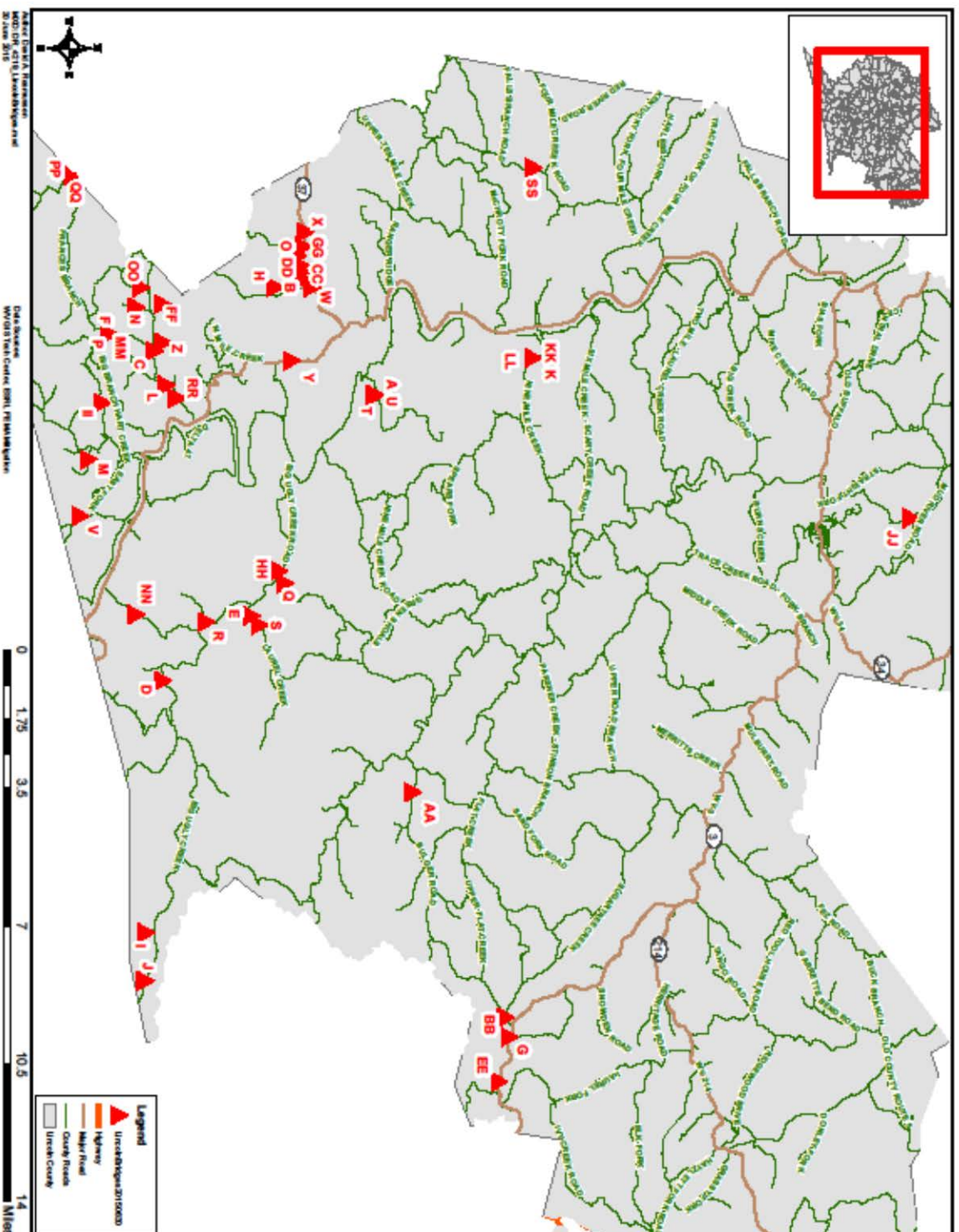
	Lincoln	Happy Hollow			18 Happy Hollow Alkol, WV 25501	Affected	Yes	Bridge washed out		
AA	Lincoln	Bulger Rd.	38.12879	-82.00741	2929 Bulger Rd. Alkol, WV 25501	Affected	Yes	Bridge foundaion is loose & able to use but unstable	Damage Assessment Needed	
	Lincoln	Big Ugly			2104 Big Ugly Creek Rd. Harts, WV 25524	Minor		bridge completely wiped out; there is no access to home; culvert		
	Lincoln	Barbour Hollow			44 Barbour Hallow Ranger, WV 25557	Affected		2 ft flooded yard; bridge out		
	Lincoln	McClellan Hwy			2430 McClellan Hwy Ranger, WV 25557	Affected		bridge support washed away; 10 ft of yard connecting the bridge is missing; unable to leave their home; second bridge completely destroyed		
	Lincoln	Mounts Ln.			1 Mounts Ln. Ranger, WV 25557	Affected		water damage to out building, mowers & weed eaters; bridge to main rd destroyed		
BB	Lincoln	Bulger Rd.	38.16291	-81.92474	97 Buldger Rd.	Affected	Yes	bridge destroyed, another flood will take out home		
	Lincoln	9 Mile Creek			747 9 Mile Creek Rd. Midkiff, WV	Destroyed		flooded under the trailer and soaked up into the floor, underpinning torn away, washed block out from under porch, causing it to drop, creek erosion, mudslide, log debris hit against home and vehicle, well water is contaminated, culvert is out	mucking and gutting	
	Lincoln	McClellan Hwy			1671 McClellan Hwy, Ranger, WV, 25557	Affected	Yes	Bridge damaged, large hole in bridge - unsafe - only access	Damage Assessment Needed	
CC	Lincoln	East Lynn Rd.	38.08792	-82.19865	441 East Lynn Rd. RT 37 Ranger, WV 25557	Affected	Yes	Bridge washed out, yard damaged, bank erosion, water in basement of home.	damage assessment needed	Fourteenmile Creek
	Lincoln	McClellan Hwy			2407 McClellan Hwy Ranger	Affected		yard flooded; bridge is damaged- both wings are gone		
	Lincoln	Steer Park			1189 Steer Park Rd. Ranger, 25557	Affected	Yes	Bridge got washed out and part of the garden was washed out		
DD	Lincoln	East Lynn Rd.	38.08751	-82.20121	463 East Lynn Rd. Ranger, WV 25557	Minor	Yes	Bridge washed out; garage flooded; water got in heat pump; bridge only entrance/exit	damage assessment needed	Fourteenmile Creek
	Lincoln	10 Mile			880 10 Mile Rd. Ranger, WV 25557	Affected	Yes	Bridge damaged; no access		
EE	Lincoln	Straight Fork	38.16063	-81.90105	1921 Straight Fork Rd. Alkol, WV 25501	Affected	Yes	bridge washed out; pier fell & the metal post that are holding the bridge are unstable	Damage Assessment Needed	
	Lincoln	Kiahsville			1611 Big Laurel Rd	Affected	yes	Bridge damage and dangerous to cross, only other exit point is through low water in creek		
	Lincoln	Little Harts Creek			671 Little Harts Creek Rd. Harts, WV 25524	Affected	Yes	8 inches flooded yard; culvert damaged; drainage problems		
FF	Lincoln		38.036828	-82.186817	85 Mudlick Rd, Harts, WV lives next to sister on 53 Mud Lick Harts, WV 25524;	Affected	Yes	damaged culvert		
	Lincoln	Little Harts Creek			16 Ramey Little harts, W WV 25524	Affected		Bridge- water washed around the side and took away wall/ unstable		
	Lincoln	Jim Branch			165 Jim Branch, Harts, WV, 25524	Affected	Yes	Bridge damaged, some of the bank washed away, telephone pole compromised and could pull wire connected to the house	Damage Assessment Needed	
GG	Lincoln	East Lynn Rd.	38.0885	-82.20808	551 East Lynn Rd (Rt. 37), Harts, WV, 25524	Affected	Yes	2 Bridges over creek washed out (2 houses next to each other)	Damage Assessment Needed	Fourteenmile Creek
HH	Lincoln	Guyan River	38.07967	-82.08877	539 Gyan River Rd. Ranger, 25557	Affected	Yes	bridge out - 65 ft completely taken out; transportation stuck on other side of the road		
II	Lincoln	Big Branch	38.01494	-82.15054				Bridge gone; no access, underpinning gone, TV & Phone line damage, yard damage - logs, debris against home; water under house	help with clean-up	
JJ	Lincoln	West Hamblin	38.31169	-82.108156				Swinging bridge 4 steel pillars losing stability - 3ft from complete erosion and coming unburied	Would like dirt or concrete to support bank erosion underneath bridge/ They can fill it themselves they just need dirt	
	Lincoln				736 Lower Mud River Rd	Affected				

A.3 Lincoln County – continue

	Lincoln	Big Ugly			1582 Big Ugly Creek Rd/ Skinned Poplar Rd. Bridge Hart, WV 25524	Minor		20 more people up road from downed bridge no way to leave. Borrowed car from friends. Bridge out.		
	Lincoln	Happy Hollow			18 Happy Hollow, Alkol, WV, 25501	Affected	Yes	Bridge got washed out & road to house got washed out	Needs damage assessment; needs help to fix bridge and clean road	
KK	Lincoln	Caney Branch	38.17297	-82.16717	35 Caney Branch, Harts, WV, 25524	Affected	Yes	Bridge is damaged, no way emergency vehicle can access, only way of getting out is 4-wheeler	Damage Assessment Needed	
LL	Lincoln	Caney Branch	38.17297	-82.16717	59 Caney Branch, Harts, WV, 25524	Affected	Yes	Creek is going to take out bridge eventually	Damage Assessment Needed	
MM	Lincoln	Daddy's Acres	38.01767	-82.17582	12 Daddy's Acres, Harts, WV, 25524	Affected	Yes	Bridge/culvert damaged	*See Lois Barker's Application	Laurel Fork of Little Harts Creek
	Lincoln	Frances Creek			665 Frances Creek Rd., Harts, WV, 25524	Affected	colvert was washed out	Bank erosion and bridge damaged; limited access	Repairs to bank and bridge	once you cross the hill on Frances Creek, live on the hill on the left by a bank, brown brick home
	Lincoln	McClellan Hwy			2571 McClellan Hwy Ranger, WV 25557	Affected		bridge unstable missing wings/sides; carhall pushed up against bank; only exit/entrance	damage assessment needed	
	Lincoln	McClellan Hwy			2595 McClellan Highway (24 Rt. 10), Ranger, WV, 25557	Affected	Yes	Bank eroded/bridge washed out, made out of steel and concrete		
	Lincoln	Frances Creek			246 Frances Creek Rd, Harts, WV, 25524	Affected	Yes	Bridge washed out x2	Damage Assessment Needed	
	Lincoln	Frances Creek			246 Frances Creek	Affected	Yes	Drain/Culvert washed out	help with clean-up	
NN	Lincoln	Green Shoals	38.02735	-82.07278	2259 Green Shoals Rd. Harts, WV 25524	Affected		culvert roled up to 10 ft in driveway		
	Lincoln	10 Mile			1373 10 Mile Rd. Ranger, WV 25557	Affected	Yes	garage is flooded; bridge washed over and support beams fell		
	Lincoln	Barberry Rd.			278 Barberry Rd. Ranger, WV 25557	Affected	Yes	Bridge and walking bridge washed out. No Access	Needs help with bridge repair	
OO	Lincoln	Mannsknob	38.02896	-82.19289	20 Manns Knob Dr, Harts, WV, 25524	Affected	Yes	Culvert damaged & driveway - only access, private road damaged	Damage Assessment Needed	
PP	Lincoln	Witcher Branch	38.00372	-82.23414	18 Witcher Branch Harts, WV 25524	Affected	Yes	bridge was washed out; fixed some of it but still unstable	help with bridge	
QQ	Lincoln	Witcher Branch	38.00372	-82.23414	21 Witcher Branch Harts, WV 25524	Affected	Yes	Bridge washed out shared with mother see notes		
RR	Lincoln	Bradley Dr	38.04232	-82.15228	24 Bradley Dr. Harts, WV 25524	Minor	Yes	water in the hallway, 1 bedroom, and utility room; bridge got washed out	damage assessment needed; supplies needed	
	Lincoln	Little Harts Creek			146 Little Harts Creek Rd. Harts, WV 25524	Affected	Yes	bridge unstable; 4 ft flooded yard; leak in back porch; landscape of front yard is gone	needs cleaning supplies	
	Lincoln	Little Harts Creek			490 Little Harts Creek Rd. Harts, WV 25524	Affected		drain pipe slipped; washed into creek; drain acts as bridge	Damage Assessment Needed	
SS	Lincoln	Watts Family Ct	38.173279	-82.236829	32 Watts Family Ct., Branchland, 25506	Affected	Yes	Log came and washed bridge out - 8 ft high; 4 families use bridge and they drive through creek to get out when its low	Damage Assessment Needed	
	Lincoln	Barberry Rd.			101 Barberry Rd. Ranger, WV 25557	Affected		2 ft flooded yard; bridge is gone-only exit; water under house		
	Lincoln	14 Mile			16 14 Mile Rd. Ranger, WV 25557	Affected	Yes	water damage around home; no water in home; culvert/drain almost completely washed out	damage assessment needed	
	Lincoln	Barberry Rd.			274 Barberry Rd, Ranger, WV, 25557	Affected	Yes	Bridge washed out; walk bridge is also out	Needs damage assesment	
	Lincoln	Harvey Fork			13 Harvey Fork, Harts, WV, 25524	Affected	Yes	Culvert damage, culvert totally exposed on one side & is sinking on other sides, part of the yard washed away, 2-3 ft of water in yard	Damage Assessment Needed	
	Lincoln	Guyan River			263 Gyan River Rd. Harts, WV 25524	Minor		flooded yard; damaged 60 ft bridge (10-15 ft and driveway destroyed)		
	Lincoln	Pinky Branch			57 Pinky Branch Road, Harts, WV 25524	Affected		Bridge is damaged & unsafe if there was an ambulance to pass through; drains stopped	Damage Assessment Needed	




FEMA-4219-DR-WV Lincoln Bridges



B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD)


THE RISK IS REAL

Mitigation Works



Private Water Crossings

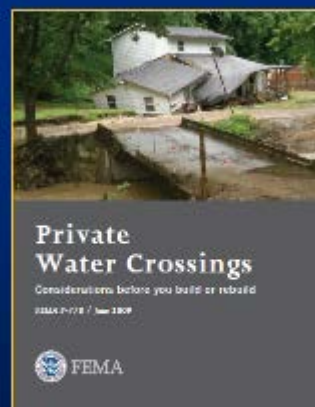
Considerations before you build or rebuild
FEMA P-778 / June 2009



FEMA

Design Considerations

- Construct during dry weather
- Design should be based on max. anticipated water depth and velocity
- Design should be based on intended use of crossing
- Maintain the overall integrity of waterway
- Coordinate design and construction with owner, engineer, contractor & governing agencies



<https://www.fema.gov/media-library/assets/documents/17542>



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Obtaining a Permit

- Check with local, state and federal agencies before design and construction
- Usually at least one if not more local, state and federal agency permits are required no matter where you live
- Perform hydrologic (volumetric flow rate of water) and hydraulic (depth of flow and velocity) (H & H) analysis as required
- Verify with Floodplain Manager that the flood carrying capacity of water course will be maintained
- Builder obtains necessary permits and follows all regulations, specifications and established construction guidelines



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Types of Water Crossings

- Bridges
- Culverts
 - Reinforced concrete
 - Corrugated steel
 - Polyethylene
- Low water crossings
 - Unvented ford
 - Vented ford



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Bridges

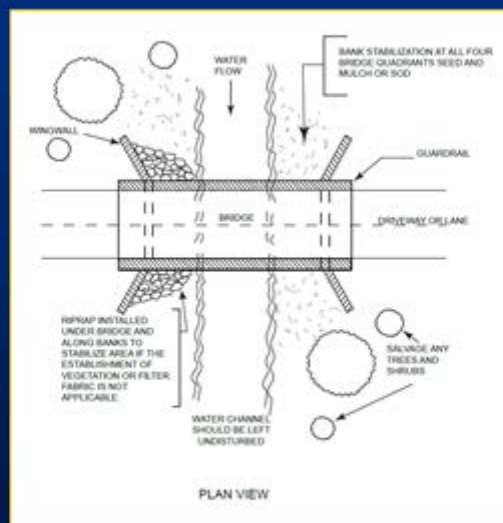
- If designed and constructed properly, bridges are preferred to culverts and low water crossings, since bridges can avoid altering the natural flow of the water
- Handrails or guardrails should be installed where necessary



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Bridges



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Bridges

- Install wing walls to direct the water flow into the bridge opening
- Wing walls help avoid potential erosion, scouring and structural failure
- Lack of wing walls can cause loss of bridge approach



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Bridge Crossing Problems

- Strive to avoid locating abutments and piers in the water channel
- Support piers located in a stream bed will create scouring and debris catch
- Causes a weakening of the structural integrity of the bridge



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Bridge Crossing Damage

- Bridge collapsed at property side with deck damage, scouring and loss of bridge approach
- Establish better water flow clearance if possible
- Bridge needs wing walls and new abutment or abutments
- Bank stabilization needed
- Add curbing and/or railing



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Bridge Crossing Repairs

- Bridge collapsed at road side with deck damage, scouring and loss of bridge approach
- Bridge end jacked up and supported temporarily
- Pour new supports and deck with rebar, wing walls
- Riprap/Gravel fill and bank stabilization



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Culverts

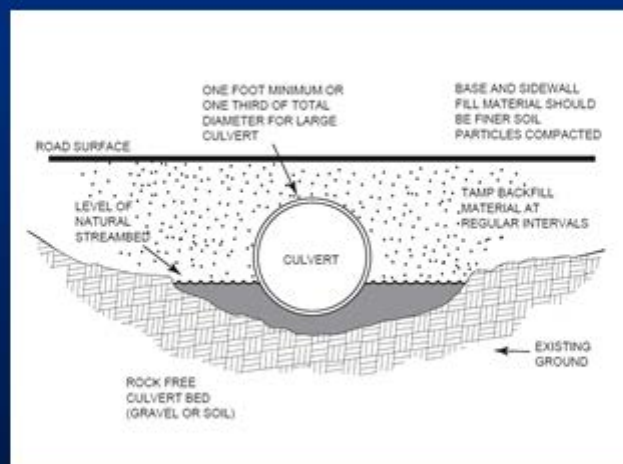
- Use where bridge installation is not feasible and impact on fish/aquatic life is minimal
- Use for access across drainage ditches, intermittent streams and small waterways
- Not for high water flows
- Avoid gang/multiple culvert installations
- Utilize headwalls and wing walls to aid in flow of water with natural alignment
- Always avoid any bends



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Culverts



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Culvert Repairs

- Repairs could involve installation of geo-tech fabric and riprap rock to stabilize bank and avoid future scouring and erosion
- Possible increase in culvert size to increase volume and velocity of flow will require an H & H study



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Culvert Repairs

- Repair to blown out culvert could involve replacing the undersized metal culvert with a bridge
- Bridge will maintain the original watercourse channel bed
- Bridge will provide better capacity to accommodate high water flow
- Site space permits avoiding stream bed encroachment



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Low water crossings

- Suitable for low volume roads and relatively low volume water flow
- Not for servicing occupied dwellings
- Install proper signage warning of the dangers of high water
- Utilize only with suitable stable streambed and banks
- Unvented fords should have water depth flow under 6 inches



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Procedures for WVVOAD

- Contact property owner and discuss their needs as it relates to the disaster damage and what can be addressed
- Prepare a written, signed agreement with all affected homeowners:
 - Grants access to property by Volunteer Agency, agents, employees, contracted individuals
 - Agreement to indemnify and hold harmless for agency
 - Owner acceptance of responsibility and liability for new construction and it's maintenance
 - Written affirmation that property owner is actual owner of the land where water crossing work is being done



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B. Private Water Crossings FEMA-4219-DR-WV (Power Point for WV VOAD) - continue

Procedures for WVVOAD

- Inspect site to determine existing conditions and needs
- Develop and determine a scope of work and costs
- Review scope of work with homeowner
- Contact the County Floodplain Manager to obtain any necessary permits (fee waved in designated counties)
- Contact the local municipality Code Enforcement Officer to comply with any building code requirements (if necessary, a small fee is charged)



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Procedures for WVVOAD cont.

- Contact WV Division of Natural Resources (DNR), Office of Land and Streams for an application to access waterway (no fee for homeowners and non-profits)
- The WV DNR biologist will contact the U.S. Fish and Wildlife for any endangered species or critical habitat issues
- Notify State Historic Preservation Office if there is expansion of footprint of project in previously undisturbed ground
- Coordinate and communicate throughout the project with all involved parties



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