



APPENDIX B: FLOOD WARNING SYSTEM

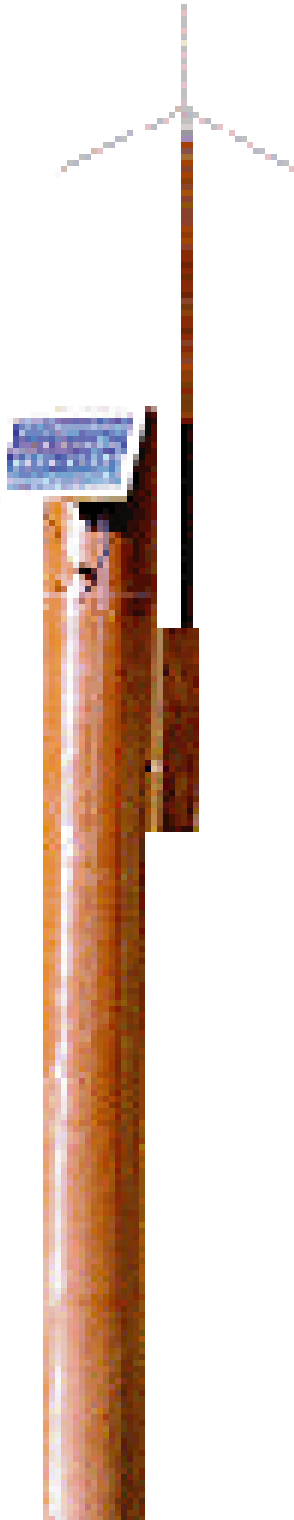
THE WEST VIRGINIA FLOOD WARNING SYSTEM

Flood Watches and Flood Warnings in West Virginia are issued by the National Weather Service (NWS) based on information obtained from rain and stream gauges scattered around the state and local weather radar systems.

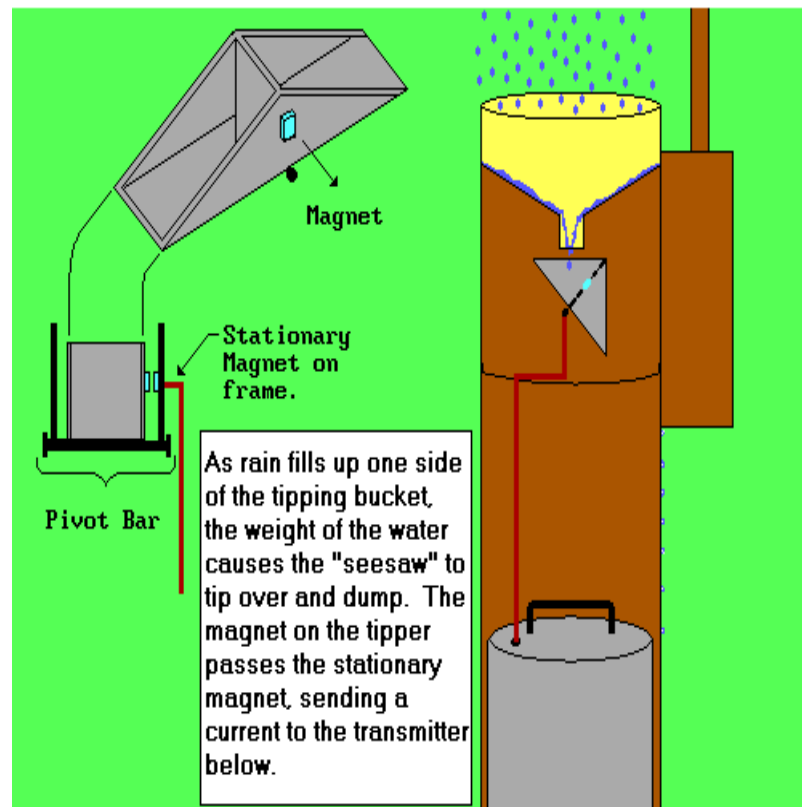
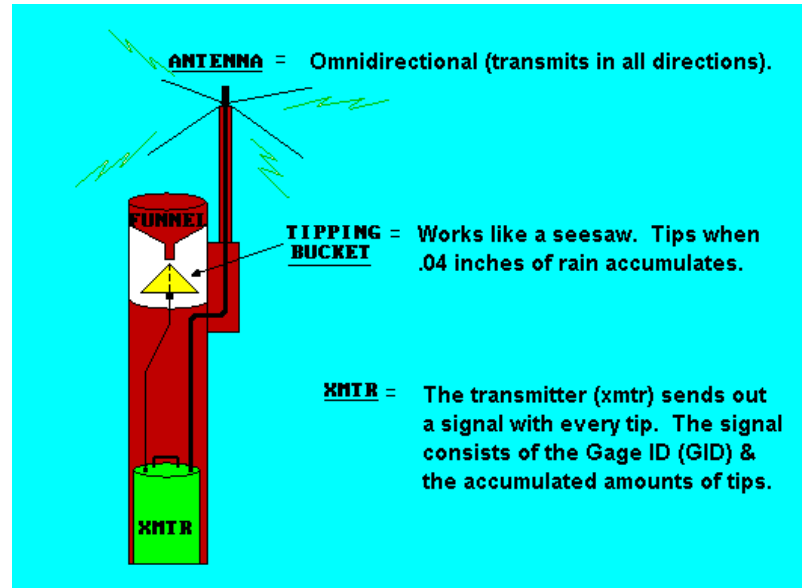
RAIN GAUGES

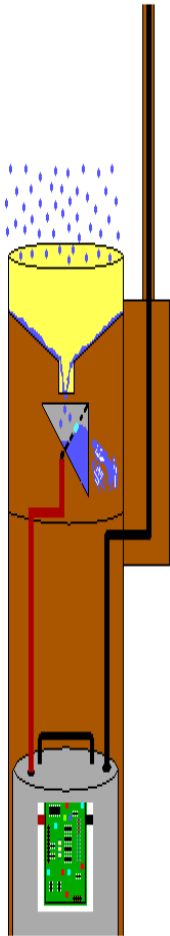
The concept of the Integrated Flood Observing and Warning System (IFLOWS) has expanded since the creation of the National Flash Flood Program Development Plan in 1978. The goals of the IFLOWS Program are to reduce the loss of life from flash floods, reduce property damage, and reduce disruption of commerce and human activities. The National Weather Service (NWS) began a joint effort with selected states in the Appalachian Region of the United States to develop a flash flood warning system to improve flood warning capabilities in that Region.

The rain gauge portion of the IFLOWS network, which covers 47 counties in West Virginia, is maintained by the WV Office of Emergency Services (WVOES). These gages report rain and stream data via radio transmission to various mountain top receivers and repeaters throughout the state. These receivers and repeaters then relay the information to the Office of Emergency Services (OES) and the NWS computers in Charleston. The information is then processed and transmitted to various Federal, State and County agencies via Internet and Microwave from the OES computers. The NWS computer is the primary source of IFLOWS information to other NWS offices and the primary backup to the OES computers.



An external view of a typical rain gauge is to the left. A solar panel provides power to the sensors and transmitters concealed by the shell. These images and more information can be found at www.afws.net.

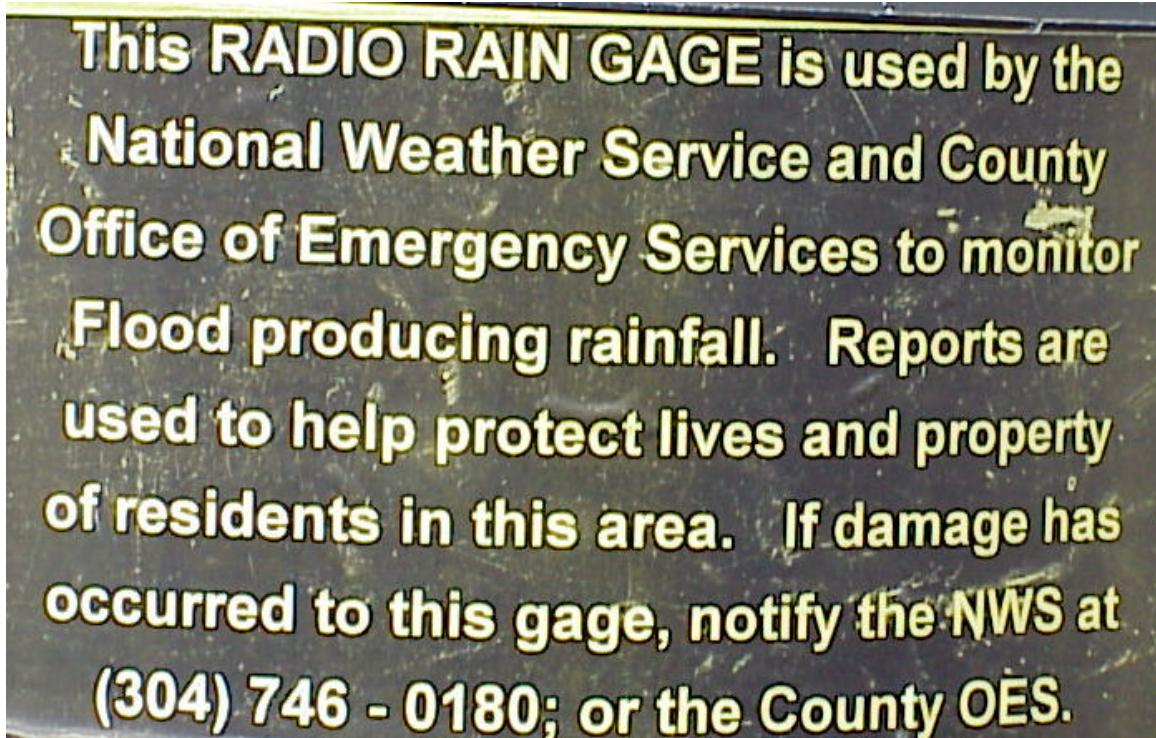




The current from the tipping bucket causes the transmitter to send a message out through the antenna. This coded message consists of a gage ID and a counter value corresponding to each tip of the bucket.

This coded message (raw rain gage data) is processed by the IFLAWS software and stored in the IFLAWS database, which can be displayed by the user.

While most counties have some rain gauges and a few have numerous gauges, all counties do not have a sufficient number of them and some are not installed in the most advantageous location. The locations of rain gauges change on a regular basis due to efforts to improve the system and as a result of vandalism. WVOES has established a policy of relocating any rain gauge destroyed by vandalism twice within one year.



Some rain gauges are installed with stream gauges. While this simplifies the operation and maintenance, it is not always the best meteorological location for the rain gauge. It is an established fact that there are different patterns of rainfall on mountaintops and streamsides.

STREAM GAUGES

Before 1930, neither floods nor stream flow in West Virginia were systematically documented. Since then, data on flooding has been collected as part of the statewide stream-gauging network supported by State and Federal funds. The United States Geological Survey office (USGS), the Army Corps of Engineers (USACE), or the West Virginia Office of Emergency Services, may own stream gauges in West Virginia. Most stream gauges are maintained in cooperation with the USGS.

Some stream gauges transmit their data over the ALERT communication system. Data from other stream gauges can only be accessed via satellites, telephone modems or by physically visiting the site and reading the data off of charts. It may take four hours to four days to obtain data from gauges that are not part of the ALERT communication system.

Delays in receipt of information or geographic gaps in the system can delay identification of conditions that contribute to flooding. Gauges that do not transmit over the ALERT system can delay the information. Malfunctioning or vandalized gauges or areas where gauges were never installed may cause geographic gaps. In addition it must be recognized that, regardless of the number of gauges, it is always possible for a storm system to “park” between gauges and not be identified as a major storm.

Once the National Weather Service recognizes conditions that contribute to flooding, they disseminate a Flood Watch or Flood Warning via various networks and the appropriate county warning points. Unless someone at the warning point receives, understands and disseminates the Flood Watch or Flood Warning to their specific county or counties, it is as ineffective as shouting fire in an empty theater.

IMPROVEMENTS TO THE STATEWIDE FLOOD WARNING SYSTEM

- e. Adding ALERT and GOES transmission equipment at 118 stream gages.
- f. Install an additional 60 rain gages,
- g. Install an additional 28 stream gages with ALERT and GOES communications,
- h. Install an additional 9 radio repeaters for the ALERT communication system.

These statewide recommendations would require \$2,183,000 the purchase and installation of the new equipment and an increase in the annual allocation of state funds for operations and maintenance to a total of \$851,000 in the fifth year.

RATING TABLES

A rating table is a table of stage verses flow. Rating tables are constructed by site survey and analysis work. An example of a rating table is provided below.

River forecast models used by the National Weather Service are driven by the amount of water flowing past the gauge location measured as cubic feet per second (cfs) of flow not stage or river height. The rating table is used to convert data for input into the model. The rating table along with other factors such as rainfall, runoff, unit hydrographs and soil conditions enable the National Weather Service to determine the height and time of a river’s crest at that point.

		.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
S T A G E	0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	1	1.0	1.1	1.3	1.5	1.6	1.7	1.9	2.0	2.1	2.2
	2	2.3	2.5	2.6	2.7	2.9	3.1	3.3	3.5	3.8	4.0
	3	4.2	4.5	4.7	5.0	5.3	5.7	6.0	6.4	6.8	7.2
	4	7.6	8.0	8.4	8.8	9.1	9.3	9.8	10.2	10.7	11.0
	5	11.4	11.8	12.2	12.6	13.0	13.4	13.8	14.2	14.7	15.2

I F E E T	6	15.7	16.2	16.6	17.0	17.4	18.2	18.6	19.0	20.2	20.6
	7	21.1	21.6	22.1	22.5	22.9	23.3	23.6	23.9	24.2	24.5
	8	24.9	25.4	25.8	26.2	26.6	27.0	27.5	28.0	28.4	28.8
	9	29.2	29.5	29.8	30.2	30.4	30.6	30.8	31.0	31.2	31.4
	10	31.6	31.8	32.0	32.2	32.4	32.6	32.8	33.0	33.2	33.3

Each river point must have a rating table to allow forecasting.

Gauges that only provide the stage are needed to quickly determine the change in stream conditions on small streams or at headwater points. Due to the rapid rise and fall of water levels at these locations, they do not necessarily need to have ratings calculated for them. The National Weather Service can use the stage to determine whether or not to issue a warning based on:

- rate of rise,
- caution or warning stage,
- rainfall and soil conditions, and
- other factors.

After a review of the stream gauges in the state it was determined that only one existing stream gauge needs a rating table developed. It is recommended that funds (\$7,000) be allocated for developing this rating table. This amount is included in the total for operations and maintenance listed in the statewide amount above.

Details of the existing gauge networks and the proposed changes to them are provided in two tables at the end of this appendix. Table B-2 is a compilation of both rain and stream gauges statewide.



OPERATIONS AND MAINTENANCE OF THE FLOOD WARNING SYSTEM

There is limited routine maintenance of the IFLOWS system at this time. Rain gauges are serviced once per year and when the state knows the gauge is inoperative. After a careful analysis of the operations and maintenance (O & M) of the existing flood warning system and the proposed additions, it has been determined that existing funding for routine preventive O & M is inadequate.

West Virginia should allocate \$851,000 annually for O & M of the statewide flood warning system. This will match \$810,500 in federal and other funds for a total of \$1,661,500 for O & M of the 319 rain gauges and 144 stream gauges necessary for an effective flood warning system in West Virginia.

PUBLIC NOTIFICATION OF FLOOD WARNINGS

For a flood warning to be effective it must be received and understood by the local agencies and the residents of the

impacted area. There are three systems designed to assist in this process. The Storm Watch system is a software package that conveys information to local warning points. The StormReady program, operated by the National Weather Service, is designed to improve the weather related knowledge and skills of local officials.

In addition the National Weather Service and The WV OES jointly maintain a web page showing all fifteen minute data on the rain and stream gauges using the ALERT system. Finally, the US Geological Survey has established a web page showing all of the stream gauges they maintain in West Virginia and recent stream levels.
(<http://water.usgs.gov/wv/nwis/current/?type=flow>)

In addition, the Specific Area Message Encoding (S.A.M.E.) system operated by the National Weather Service allows residents to receive warnings for just their own county via radio. Most S.A.M.E. radio receivers can be programmed to receive information for up to fifteen (15) different counties. Use of S.A.M.E. radios encourages residents to keep the radios turned on for local warnings and eliminates warnings for distant areas.

STORM WATCH SOFTWARE

One computer dedicated to the Storm Watch system should be located in every county warning point statewide. The Storm Watch system is similar to IFLOWS software but has significant differences. Storm Watch is more graphic and requires users to interact with the software to silence alarms and react to warnings.

Computers dedicated to the Storm Watch Program are sized so that only the Storm Watch software will run on them. This prevents their being used for other activities which would interfere with operation of the warning system. Appropriate funds should be designated for the purchase and distribution of these computers and training of warning point personnel in use of the software. Each computer would cost approximately \$600. This project has been started and approximately one half of the funding was obtained through a grant, the balance of the funding could be covered with the O & M funds that have been requested.

STORMREADY

The StormReady program is conducted by the National Weather Service and gives communities the skills and education to survive severe weather. StormReady helps communities strengthen their local hazardous weather operations. StormReady communities are better prepared to save lives and reduce property damage by better planning, education and awareness.

We encourage all local communities to participate in the StormReady program conducted by the National Weather Service. Communities become StormReady by:

- Establishing a 24-hour warning point and an emergency operations center.
- Having more than one way to receive severe weather warnings and forecasts.

- Having more than one way to notify the public of severe weather warnings and forecasts.
- Creating a system to monitor local weather conditions.
- Promoting the importance of public readiness through community seminars.
- Developing a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

To assist local communities in becoming StormReady we recommend the regional and statewide flood warning system be improved by installing three Specific Area Message Encoding (S.A.M.E.) radio transmitters to broadcast disaster warnings. This would cost approximately \$90,000 for purchase and installation of the transmitters. WV OES would maintain these as part of the ALERT system. Funds from the proposed O & M funding could be matched with federal grants to complete this project.

Local communities could improve reception disaster warnings by requiring all public facilities to purchase and use S.A.M.E. radios to receive warnings of disasters that apply to their local area. These receivers cost between \$40 and \$90 each. While this study is concentrating on flood related disasters, S.A.M.E. radios are part of the Emergency Alert System and are used to notify residents of other emergencies such as road closings, water restrictions, chemical leaks, and terrorist incidents. Occasionally, grants and matching funds are available to help defray the costs of these radio receivers. We encourage all local facilities to purchase and use these radios in all public buildings.

Private individuals can improve their reception of disaster warnings by purchasing and using S.A.M.E. radios to receive warnings of disasters that apply to their local area. We encourage all residents to obtain and use these radios.



Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes

NOTES:

Gage Name indicates location of gage

Changes indicates what will be done to the gage

Service Desired is what type of information will be required after all modifications are complete

Capital Costs are the cost to make the modifications

O&M Costs are for annual maintenance

WV State funds are what the state will contribute towards the maintaining of each gage

Other funds are what is required for O&M from other sources

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Barbour	Elk Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Barbour	Azzen Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Barbour	Tygart River at Belington	Stream	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Barbour	Middle Fork River at Audra	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Barbour	Buckhannon River at Hall	Stream	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Barbour	Pleasure Valley	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Barbour	Sand Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Barbour	Tygart Valley River at Philippi	Stream	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Barbour	Glade Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Berkeley	Round Top	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Berkeley	Opequon Creek near Martinsburg	Stream	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Berkeley	Sleepy Creek East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Boone	Piney Knob Tower	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Boone	Elk Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Boone	Williams Hill	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Boone	Ballard Fork	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Boone	Little Coal River at Danville	Stream	add new Gage	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Boone	Rock Creek near Danville	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Boone	Big Coal River at Ashford	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Boone	Between Little Coal River and Spruce Fork	Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Braxton	Bug Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Braxton	Dingy South East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Braxton	Elk River at Sutton	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Braxton	Flatwoods North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Braxton	Little Kanawha River near Wildcat	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Braxton	Lake Lane	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Braxton		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Braxton	Elk River near Frametown	Stream	Add ALERT	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Braxton	Granny Creek at Sutton	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Braxton	Little Kanawha River below Burnsville Dam	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Braxton	Little Kanawha River at Burnsville	Stream	Add ALERT/GOES	stage	\$10,000	\$6,000	\$1,000	\$5,000
Brooke		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	

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COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Brooke		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Brooke	Ohio River at Wellsburg	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Brooke	Buffalo Creek at Bethany	Stream	Add stream Gage with ALERT	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Cabell	Salt Rock	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Cabell		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Cabell		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Cabell	Mud River near Milton	Stream	Add stream Gage with ALERT/GOES	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Cabell	Fourpole Creek near Huntington	Combined	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Cabell - Lawrence, OH	Ohio River at Huntington	Stream	Add ALERT	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Calhoun	Beech Fork	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Calhoun	Walnut West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Calhoun	Sand Ridge North East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Calhoun	Mt. Zion West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Calhoun	North of Mt. Zion	Rain	Add New Rain	Rain	\$7,000	\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	Ridge		Gage					
Calhoun	Rocksdale	Rain	Add Repeater	Rain	\$10,000			
Calhoun	West Fork Little Kanawha River at Rocksdale	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Calhoun	Little Kanawha River at Grantsville	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Clay		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Clay		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Clay		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Clay		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Clay		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Clay	Elk River at Clay	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Doddridge	Zinna South	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Doddridge	West Union 3 South	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Doddridge	Doak South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Doddridge			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Doddridge			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Doddridge	Buck Run near Leopold	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Fayette	Mann Lookout Tower	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Fayette	Lick Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Fayette	Gauley Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Fayette	New River at Thurmond	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Fayette	Wolf Creek near Fayetteville	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Fayette	Kanawha River at Kanawha Falls	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Gilmer	Cedarville North East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Gilmer	Normantown North East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Gilmer	Canfield Cemetery	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Gilmer	Little Kanawha River at Glenville	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Gilmer	Newberne South East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Gilmer	Spurgeon South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Gilmer		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Grant	Cave Mountain	Rain	Existing - no	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
			modification					
Grant	North Fork South Branch Potomac River at Cabins	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Grant	Red Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Grant	Huck	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Grant	Pigeon Roost Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Grant	Walker Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Grant	Knobly	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Grant	Mt. Storm	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Grant	Stony River near Mount Storm	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Grant	South Branch Potomac River near Petersburg	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Grant – Garrett, MD	North Branch Potomac River at Steyer	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Greenbrier	Brushy Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Greenbrier	Greenbrier River at Alderson	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Greenbrier	Meadow Bluff	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

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COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Greenbrier	Alvon 3 North North West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Greenbrier	Blue Bend	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Greenbrier	Rucker Gap	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Greenbrier	Mikes Knob Tower	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Greenbrier	Greenbrier River at Renick	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Greenbrier	Anthony Creek at Blue Bend	Stream	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Greenbrier	Greenbrier River at Ronceverte	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Hampshire	Delray South East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hampshire	Thrasher Knob South East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hampshire	Little Cacapon Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hampshire	Slate Lick Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hampshire	Points	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hampshire	Greenwood Hollow	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hampshire	Little Cacapon River at Frenchburg	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Hampshire	South Branch Potomac River	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	near Springfield							
Hampshire	Cacapon River near Capon Bridge	Stream	Add stream Gage with ALERT/GOES	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Hancock	Chester		Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Hancock	Weirton		Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Hancock			Add Repeater	Rain	\$10,000			
Hancock	Ohio River at New Cumberland	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Hardy	Bald Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	South Fork Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	Elkhorn Rock	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	Devils Hole	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	South Branch Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	South Fork South Branch Potomac River near Moorefield	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Hardy	High Rocks	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	Squirrel Gap	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Hardy	South Branch Potomac River	Combined	upgrade	stage	\$10,000	\$6,000	\$6,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	near Moorefield							
Hardy	Defiance	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Harrison	Johnstown	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Harrison	Big Issac West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Harrison	West Fork River near Mount Clare	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Harrison	Lake Floyd North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Harrison	Clarksburg Airport	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Harrison	Brown	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Harrison	West Fork River at Enterprise	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Jackson	Foster Chapel	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Jackson	Drift Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Jackson	Mill Creek 13		Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Jackson			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Jackson			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Jefferson	Summit Point North North West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Jefferson	Shenandoah	Stream	Add	Discharge	\$10,000	\$14,000	\$1,000	\$13,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	River at Millville		ALERT/GOES					
Jefferson	Bardane North East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Jefferson			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Jefferson			Add Repeater	Rain	\$10,000			
Jefferson - Frederick, MD	Potomac River at Point of Rocks	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Kanawha	Slaughter Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	RLX Weather	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Polly Hollow	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Hunt	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Mt Desert Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Coal River at Tornado	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Kanawha	Latuna	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Kanawha River at Charleston (Lock Six)	Stream	Add ALERT/GOES	Discharge	\$10,000	\$17,000	\$10,000	\$7,000
Kanawha	Elk River at Queen Shoals	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Kanawha	Aaron's Fork	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Kanawha	Little Blue Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Pocatalico River at Sissonville	Stream	add new Gage	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Kanawha	Leatherwood Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Kanawha	Kanawha River at South Side Bridge	Combined	upgrade	Stage	\$20,000	\$6,000	\$6,000	
Lewis	Bee Knob South	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lewis	Vandalia South	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lewis	Oak Grove Church	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lewis	Camden South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lewis	Churchville West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lewis			Add Repeater	Rain	\$10,000			
Lewis	West Fork River at Walkersville	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Lewis	West Fork River at Butcherville	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Lewis	Weston	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Lincoln	Hager Cemetery	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lincoln	Buck Knob Tower	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Lincoln	Flowers Cemetery	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Lincoln			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Lincoln			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Lincoln	Guyandotte River at Branchland	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Logan	Cow Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Holden 22	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Lorado	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Stone Coal	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Lomi	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Boardinghouse Hollow	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Dark Hollow	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Logan	Guyandotte River at Man	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Logan	Guyandotte River at Logan	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Logan	Spruce Fork at Sharples	Stream	Project Gage - State will need to provide replacement	Stage	\$20,000	\$6,000	\$6,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
			equipment					
Logan	Island Creek	Stream	Add stream gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Marion	Glady Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marion	Tygart Valley River at Colfax	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Marion	Buffalo Creek at Barrackville	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Marion	Mannington South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marion	Metz 2 North West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marion	Fairview South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marshall	Belton South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marshall	Lynn Camp North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marshall	Rock Lick	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marshall	Dallas	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Marshall	Moundsville	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Marshall	Grave Creek at Glen Easton	Stream	Add stream Gage with ALERT	Discharge	\$25,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Marshall	Fish Creek at Lynn Camp	Stream	Add stream Gage with ALERT	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Mason	Hambrick Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mason	Ohio River at Point Pleasant	Stream	Add ALERT/GOES	Stage	\$20,000	\$6,000	\$1,000	\$5,000
Mason		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mason		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mason		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mason		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mason		Rain	Add Repeater	Rain	\$10,000			
Mason	RC Byrd Lock and Dam	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Mason	Pomeroy Bridge	Stream	Add stream gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
McDowell	Sandlick Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Jenkin Jones	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Big Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Jackson Flats	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Olga #2 Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
McDowell	Dry Fork at Beartown (Bradshaw)	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
McDowell	Mudhole Branch	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Olga #3 Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Tug Fork at Welch	Combined	Existing - no modification	Discharge		\$14,000	\$8,000	\$6,000
McDowell	Mitchem Cemetery	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
McDowell	Tug Fork at Litmar	Stream	upgrade	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
McDowell	laeger	Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mercer	Stony Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mercer	Payne Branch near Oakvale	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Mercer		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mercer	Bluestone River at Spanishburg	Stream	Add stream Gage with ALERT/GOES	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Mercer		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mercer		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Mercer - Virginia	New River at Glen Lynn, VA	Stream	Add ALERT	Discharge	\$10,000	\$14,000	\$1,000	\$13,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Mineral	Hilkey Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mineral	Pinnacle Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mineral	Fountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mineral	North Branch Potomac River at Luke	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Mineral	Knobly Tunnel	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mineral	Patterson Creek near Headsville	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Mingo	Righthand East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Big Muncey	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Horsepen Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Sharon Heights	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Buffalo Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Sandy Gap	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Millstone	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Mingo	Guyandotte River below R D Bailey Dam	Stream	Add ALERT	Stage	\$10,000	\$6,000	\$6,000	
Mingo	Tug Fork at	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	Williamson							
Mingo	Tug Fork at Kermit	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Mingo - Kentucky	Tug Fork at Matewan	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Monongalia	Strawn Lake	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Monongalia	Deckers Creek at Morgantown	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Monongalia	Pleasant Hill Cemetery	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Monongalia	Crossroads South West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Monongalia	Dents Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Monongalia	Jakes Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Monongalia	Monongahela River at Opekiska Lock and Dam	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Monongalia	Monongahela River at Morgantown Lock and Dam	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Monroe		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Monroe		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Monroe		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Monroe		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Monroe		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Morgan	Luttrel	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Morgan	Cacapon	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Morgan	Cacapon River near Great Cacapon	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Morgan	Hospital	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Morgan - Allegany MD	Potomac River at Paw Paw	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Morgan - Washington, MD	Potomac River at Hancock	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$1,000	\$13,000
Nicholas	Poe North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Nicholas	Fenwick 2 North East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Nicholas	Beach Fork Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Nicholas	Muddlety Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Nicholas	Birch River North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Nicholas	Meadow River near Mt Lookout	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Nicholas	Gauley River below Summersville Dam	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Nicholas	Gauley River above Belva	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Nicholas	Gauley River near Craigsville	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Nicholas	Cranberry River near Richwood	Stream	Add ALERT/GOES	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Ohio	Wheeling Creek at Elm Grove	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Ohio	Valley Grove 3 South East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Ohio	Oglebay East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Ohio			Add Repeater	Rain	\$10,000			
Ohio	Wheeling	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Pendleton	White Horn Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Flesher Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Cave	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Shenandoah Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Riverton 1 North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Kile Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Pendleton	Mitchell Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Dickerson Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Fisher Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Cow Knob Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Spruce Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Bennett Gap	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Middle Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	Onego	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pendleton	South Branch Potomac River at Brandywine	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Pendleton	South Branch Potomac River at Franklin	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Pleasants		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Pleasants	Willow Island	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Pocahontas	Calvin Price State Forest	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Brushy Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Sugar Tree	Rain	Existing - no	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	Bench		modification					
Pocahontas	Minnehaha	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Black Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Jacobs Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Buckeye 1 SW	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Paddy Knob 2 West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Edray 3 North East	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Woodrow	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Mace	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Sharps Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Durbin 1 W	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Thornwood 4 North West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Pocahontas	Greenbrier River at Buckeye	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Pocahontas	Greenbrier River at Durbin	Stream	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Pocahontas	Greenbrier River at Cloverlick	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Pocahontas	Knapps Creek	Stream	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	near Minnehaha Springs							
Preston	Mount Sarah	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Stemple Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Eby	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Mountain View	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Howesville	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Caddell Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Afton	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Mountain Dale	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Glade Farms	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Big Sandy Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Preston	Cheat River at Highway 50 near Rowlesburg	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Preston	Big Sandy Creek at Rockville	Stream	Add ALERT	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Preston	Cheat River at Albright	Stream	Add ALERT	Stage	\$6,000	\$6,000	\$1,000	\$5,000
Putnam	Martin Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Putnam	Clear Fork	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Putnam	Cross Creek Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Putnam	Jim Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Putnam			Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Putnam	Hurricane Creek at Hurricane	Stream	Add ALERT/GOES	Discharge	\$6,000	\$14,000	\$1,000	\$13,000
Raleigh	Huff Knob Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Raleigh	Tams Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Raleigh	Spruce Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Raleigh		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Raleigh	Clear Fork at Whitesville	Stream	Add ALERT/GOES	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Randolph	Elk Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Ware Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Shavers Fork at Cheat Bridge	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Randolph	Parting Springs	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Fort Millroy	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Randolph	Hamilton Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Whitmeadow Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Blue Rock	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Gatewood Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Sugar Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Files Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Three Forks	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Laurel Fork	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Tygart Valley River near Dailey	Stream	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Randolph	Shavers Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Rich Mountain Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Haines Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Dry Fork at Job	Combined	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Randolph	Pumpkin Town	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Glady Fork at Evenwood	Combined	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Randolph	Shavers Fork Below Bowden	Combined	upgrade	Stage	\$6,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Randolph	Tygart Valley River near Elkins	Stream	upgrade	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Randolph	Flatbrush Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Randolph	Tygart Valley River at Valley Head	Combined	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Randolph	Tygart Valley River at Mill Creek	Combined	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Randolph	Shavers Fork at Bemis	Combined	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Ritchie		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Ritchie		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Ritchie		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Ritchie		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Ritchie		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Ritchie			Add Repeater	Rain	\$10,000			
Roane	Walton VFD	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Roane	Spencer	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Roane		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Roane		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Roane		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Roane			Add Repeater	Rain	\$10,000			
Summers	Pipestem Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Summers	Ellison Ridge North	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Summers	Keeney Knob Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Summers		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Summers		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Summers	Bluestone River near Pipestem	Stream	Add ALERT	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Summers	Greenbrier River at Hilldale	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Summers	New River at Hinton	Stream	Add ALERT	Stage	\$10,000	\$6,000	\$6,000	
Taylor	Three Fork Creek near Grafton	Stream	Add ALERT	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Taylor	Laurel Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Taylor		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Taylor		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Taylor	Tygart Valley River below dam near Grafton	Stream	Add ALERT	Stage	\$10,000	\$6,000	\$1,000	\$5,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Tucker	Dry Fork at Gladwin	Combined	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Tucker	Yokum Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	Mozark Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	Dry Fork at Hendricks	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Tucker	Olson Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	Cheat River near Parsons	Combined	upgrade	Discharge	\$6,000	\$14,000	\$8,000	\$6,000
Tucker	Blackwater River at Davis	Combined	upgrade	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Tucker	Davis Radio Tower	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	Clover Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	Beaver Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	Forty Three	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tucker	White Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tyler	Wilber Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tyler	Bearsville	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tyler	Alvy	Rain	Existing - no modification	Rain		\$1,000	\$1,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Tyler	Starkey Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Tyler	Buffalo Run near Little	Stream	Add stream Gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Tyler	Middle Island Creek above Middlebourne	Combined	Add stream Gage with ALERT/GOES	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Upshur	Pleasant Dale	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Hemlock	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Heaston Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	French Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Beaver Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Ellamore Radio Tower	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Spruce Fork	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Kesling Mill	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Turkey Run	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Upshur	Sand Run at Buckhannon	Stream	Add ALERT	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Upshur	Buckhannon River at Alton	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Upshur	Buckhannon	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	River at Ellamore							
Upshur	Middle Fork River at Adolph	Stream	upgrade	Stage	\$6,000	\$6,000	\$6,000	
Upshur	Buckhannon River at Buckhannon	Stream	upgrade	Stage	\$6,000	\$6,000	\$1,000	\$5,000
Wayne	Tick Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Wayne	Mill Creek	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Wayne		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wayne		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wayne		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wayne	East Fork Twelvepole Creek near Dunlow	Stream	Add ALERT/GOES	Stage	\$10,000	\$14,000	\$8,000	\$6,000
Wayne	East Fork Twelvepole Creek below East Lynn Dam	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$6,000	
Wayne	Twelvepole Creek below Wayne	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Wayne	Beech Fork below Beech Fork Dam	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Wayne	East Fork of Twelvepole Creek above dam at Dunlow	Stream	Add stream Gage with ALERT/GOES	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Webster	Cranberry River Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster	Cowen West	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster	Spring Ridge	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster	Red Oak Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster	Point Mountain Lookout	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster	Hodam Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster	Holly Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Webster			Add Repeater	Rain	\$10,000			
Webster	Gauley River at Camden-on-Gauley	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Webster	Williams River at Dyer	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Webster	Elk River below Webster Springs	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Wetzel	Hannibal Lock and Dam	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Wirt	Little Kanawha River at Palestine	Combined	Add ALERT	Discharge	\$10,000	\$14,000	\$8,000	\$6,000

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
Wirt	Little Kanawha At Creston	Combined	Add combined Gage with ALERT	Rain/Stage	\$27,000	\$6,000	\$6,000	
Wirt		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wirt		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wirt		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wood		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wood		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wood		Rain	Add New Rain Gage	Rain	\$7,000	\$1,000	\$1,000	
Wood	Belleville	Stream	Add ALERT to Corps' Gage	Stage	\$10,000	\$1,000	\$1,000	
Wood - Washington OH	Ohio River near Marietta,OH	Stream	Add ALERT/GOES	Stage	\$10,000	\$6,000	\$1,000	\$5,000
Wyoming	Basin Rain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Wyoming	Burning Rock	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Wyoming	Polk Mountain	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Wyoming	Ivy Knob	Rain	Existing - no modification	Rain		\$1,000	\$1,000	
Wyoming	Guyandotte River at Pineville	Combined	upgrade	Discharge	\$25,000	\$14,000	\$8,000	\$6,000
Wyoming	Guyandotte	Stream	Add	Stage	\$10,000	\$6,000	\$6,000	

Table B-2: Rain And Stream Gauges For All Of West Virginia With Proposed Changes								
COUNTY	GAGE NAME	GAGE TYPE	CHANGES	SERVICE DESIRED	CAPITAL COSTS	COST OF O&M	WV STATE FUNDS	OTHER FUNDING
	River near Baileysville		ALERT/GOES					
Wyoming	Clear Fork at Clear Fork	Stream	Add ALERT/GOES	Discharge	\$10,000	\$14,000	\$8,000	\$6,000
Wyoming	Glen Fork above Oceana	Stream	Add stream gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
Wyoming	Guyandotte River at Mullens	Stream	Add stream gage with ALERT/GOES	Stage	\$20,000	\$6,000	\$6,000	
			Totals		\$2,183,000	\$ 1,771,000	\$1,093,000	\$ 678,000

