



ANNEX R – FLOOD WARNING PLAN

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* Mapping was developed prior to FEMA's latest available mapping, while every attempt was made to be correct, plan users are encourage to reference official FEMA Flood Insurance Rate Maps (FIRMs) for decision making purposes.

ANNEX R – FLOOD WARNING PLAN

Primary Agencies:	Jefferson County Homeland Security & Emergency Management
Support Agencies:	Jefferson County Emergency Communications Center Jefferson County Sheriff and Law Enforcement Departments Jefferson County Fire Companies Jefferson County GIS Department West Virginia Division of Homeland Security & Emergency Management National Oceanic and Atmospheric Administration National Weather Service United State Army Corps of Engineers United States Geological Survey
Related Federal ESFs:	ESF #2: Communications ESF #7: Logistics Management and Resource Support
West Virginia Code:	Chapter 8A, Article 5, Section 7 Chapter 8A, Article 7, Section 2 Chapter 15, Article 5, Section 20

I. INTRODUCTION

A. PURPOSE

The purpose of this support annex is to assist the County in the protection of public health and safety prior to, and during flooding events, utilizing training, equipment, experience, and technology.

II. PLANNING ASSUMPTIONS AND CONSIDERATIONS

A. SITUATIONS

1. Flash floods have doubled their destructiveness over the past 20 years, and now rank first among weather-related disasters in the United States. Each year, floods cause more property damage than any other type of natural disaster, killing an average of 150 people a year.
2. There have been 29 flood events in Jefferson County since 1993, 18 of which were river floods, and 11 that were considered flash flood events.
3. Historically, West Virginia has had a high frequency of flash floods. Narrow valleys, flanked by steep hillsides, produce fast overflows from heavy rain events. The increase in development within these valleys has caused a dramatic upsurge in damage. The lure of these usually peaceful flood plains is likely to continue, and with it, the continued rise in the potential loss of life and property. The increase of impervious road surfaces and development within the county floodplains has increased the risk of damage from floods within the county.
4. Thunderstorms can produce intermittent rainfall with varying intensity; therefore, it is difficult to determine when the highest rates of runoff will occur, and when the flood

crest might reach an area. There is also the possibility of having two (2) or more crests during a single flash flood event.

5. Stream flows during a flash flood are unpredictable, a blocked bridge or culvert can divert or change water flow both upstream and down.
6. Past experience strongly indicates that all local media outlets or venues in Jefferson County will give priority to the public's need for Emergency Public Information (EPI) over the need for news coverage, particularly during the initial stages of an emergency when EPI can prove quite critical to the public's safety and welfare.
7. The principal means through which EPI may be disseminated in Jefferson County includes radio, television, Internet, and newspaper. Please refer to Annex C – Public Information and Warning for additional information concerning warnings and public information.

B. ASSUMPTIONS

1. A Flood Warning System has been developed that will substantially reduce the threat to life and property from intense localized rainstorms with the cooperation of Jefferson County Homeland Security and Emergency Management (JCHSEM), the National Weather Service (NWS), and the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM). This system is known as the Integrated Flood Observation and Warning System (IFLOWS).
2. Meteorology is effective in forecasting heavy rain events over large areas; however, it may not be accurate enough for small stream forecasting.
3. Special needs groups such as the hearing impaired, sight impaired, and/or physically disabled require special attention efforts to ensure that they receive emergency notifications and warning.
4. According to figures from 2009 Census estimates, 4.2 percent (4.2 %) or approximately 2,215 people of the population of Jefferson County speaks a language other than English at home.
5. Most of the public will respond positively to recommendations from public officials, especially when those orders and requests are easily understood and presented in a timely and proper manner.

III. CONCEPT OF OPERATIONS

A. MITIGATION

1. Mitigation is the County's first flood defense. The Engineering Department is the lead agency in regulating the National Flood Insurance Program (NFIP) guidelines to

include regulating home improvements, and new construction to property owners within the flood plain and special flood hazard zones.

2. Jefferson County has been designated as a StormReady Community since 2004. StormReady is a program offered through the National Weather Service (NWS). To be designated, a community must participate in activities including communications, NWS information reception, hydro-meteorological monitoring, local warning dissemination, community preparedness, and administration.
3. Each year Jefferson County Homeland Security and Emergency Management (JCHSEM) staff visits the NWS offices in Sterling, Virginia, and staff from the NWS tour the Jefferson County Emergency Communications Center (JCECC) and Emergency Operations Center (EOC). Additionally, each year the NWS offers some type of Skywarn Stormspotter training in Jefferson County.
4. JCHSEM conducted the following tasks to achieve the designation as a StormReady Community.
 - a. The Jefferson County Emergency Communications Center serves as a 24-hour warning point.
 - b. Maintained the required number of ways to receive severe weather warnings, and forecasts to alert the public.
 - c. Created a system that monitors weather conditions locally.
 - d. Promoted the importance of public readiness through community seminars.
 - e. Developed a hazardous weather program that includes training severe weather watchers.
5. Jefferson County has participated in the Community Rating System (CRS) since 2006. The CRS has the following components which must be completed each year in order to remain in the program, which grants discounts to residents on their flood insurance policies:
 - a. Maintain a public information program,
 - b. Development of elevation certificates,
 - c. Development of updated flood mapping information,
 - d. Conducting outreach projects,
 - e. Providing flood protection information and assistance,
 - f. Supplying updated or additional flood data,
 - g. Compliance with open space regulations,
 - h. Maintaining higher regulatory standards,
 - i. Conducting storm water management,



- j. Providing for flood damage reduction,
- k. Floodplain management planning,
- l. Conducting acquisition and relocation of structures in the floodplain,
- m. Drainage system maintenance,
- n. Maintaining a flood warning program,
- o. Levee safety, and dam safety,
- p. Additional information is also gathered on Repetitive Loss Properties and interest in potential mitigation projects.

B. WEATHER

1. The National Weather Service (NWS) – Sterling Office, will issue Flood Warnings, Watches, and Statements, and has authority to broadcast Emergency Alert System (EAS) messages across area radio and television stations upon request of the Director of Emergency Management. Emergency Operations Center (EOC) staff will monitor weather information via internet, cable, Integrated Flood Observation and Warning System (IFLOWS), and National Oceanic and Atmospheric Administration (NOAA) All-Hazard Radios.

C. PUBLIC INFORMATION

1. Dissemination of information may occur through the use of the EAS, Public Service Announcements (PSAs), press releases, or Public Address (PA) systems.
2. Flood warnings are disseminated in the same manner as other warnings, except the warning is restricted to the area to be affected. Information leading to warnings is received from the NWS located in Sterling Virginia via telephone, Internet, NOAA All-Hazard Radio and augmented by IFLOWS.
3. The County Public Information Officer (PIO), working with the EOC staff and as an advisor to the executive group, will have primary responsibility for informing the public of potential flooding through the utilization of all media communication systems.
4. All information released to the media will first be cleared by the JCHSEM Director.
5. JCHSEM utilizes the following information for each storm or flood event. All of this information must be considered to develop a flood forecast, and must be available in order to provide accurate flood warnings.
 - a. Precipitation (i.e., rainfall, snowfall, sleet, etc.) as measured by rain gauges to include total amounts during a storm, intensity or rate of accumulation, snow cover and the rate of melting.
 - b. Precipitation runoff.
 - c. Stream height as measured at stream gauges.

- d. Time of travel of flood crests.
- e. Time of crest in hours following a heavy rain event.

D. FLOOD HISTORY

1. According to records from the NOAA Event Record database, the months when the most flooding occurs are March, with five (5) reported floods from 1950 to present, September, with four (4) reported floods and January and February both with three (3) reported floods. There have been 29 flood events in Jefferson County since 1993, 18 of which were river floods, and 11 that were considered flash flood events.
2. The worst hazard events experienced in Jefferson County were incidences of flooding resulting from heavy rains and snow melt. The earliest flood on record occurred in 1870 when the Shenandoah River was recorded at 12.9 feet above flood stage in the community of Millville. The most damaging floods in Jefferson County have all occurred within the last decade. The following are brief descriptions of historical floods that have occurred in Jefferson County.
 - a. October 1962 – Flooding of the Shenandoah River at Millville resulted in estimated damages to over 40 homes and mobile homes. The river crested at 32.45 feet.
 - b. April 22, 1992 – Both the Shenandoah and the Potomac Rivers crested above flood stage after 4.5 inches of rainfall. A car and a mobile home were destroyed by the high waters.
 - c. March 25-28, 1993 – Flash flooding occurred after snow melted throughout the county. Several people were evacuated and approximately \$5,000 in damages to public facilities was reported.
 - d. January 19-21, 1996 – A three-day period of flooding resulted from snow melting after the Blizzard of 1996. Several roads were closed and many structures were affected or damaged by high water. This flooding resulted in approximately \$593,000 in damages to public and private facilities.
 - e. September 6, 1996 – Heavy rain and flooding was experienced as a result of Hurricane Fran. Damage was sustained by many residential structures throughout the county. Harpers Ferry was especially hard hit with the flooding of park exhibition buildings and clean-up costs of over \$2.8 million. Transportation was also impacted with roadways closed and washed out, as well as severe damage to some CSX railroad tracks.
 - f. November 7-10, 1997 – Flooding on the Potomac River, Opequon Creek, and the Shenandoah River resulted in the inundation of roadways and other minor damages.

- g. January 8-10, 1998 – Roadways flooded with minor damages reported. The Opequon Creek crested .75 inches above flood stage; Potomac River crested 1/2 foot under flood stage; and the Shenandoah River crested 1.8 feet over flood stage at Millville.
- h. January 28-29, 1998 – Flooding occurred along the banks of the Shenandoah and Potomac Rivers and Opequon Creek during a Winter Storm Warning issued by the NWS.
- i. May 26, 2002 – Scattered thunderstorms with large hail and very heavy downpours moved through the Eastern Panhandle between 3 and 7 PM. Basements and yards were flooded. Water collected on Route 480 near Shepherdstown.
- j. January 2, 2003 – Heavy rainfall on the 1st caused minor flooding on rivers and creeks in Berkeley and Jefferson counties. In Shepherdstown, the Potomac River reached a stage of 16.57 feet. Flood stage is 15 feet. The road to a housing development was flooded and several other low lying areas along the river were inundated by water.
- k. February 23, 2003 – A combination of 1.5 to 3 inches of rain that fell between the evening of the 21st and the morning of the 23rd, and snow melt from the massive snowstorm of the 14-18 of February led to widespread flooding. In Jefferson County, drivers had to be rescued when their vehicles stalled in high water on Bloomery Road. Avon Bend Road was flooded by the Shenandoah River and a motorist had to be rescued when his car became stalled in flood waters.
- l. May 16, 2003 – A large area of showers and thunderstorms containing heavy downpours moved through the region between the afternoon of the 15th and the morning of the 16th. The system dropped between 1.5 and 3 inches of rain across the extreme northeast portion of the Eastern Panhandle, resulting in minor flooding. In Jefferson County, Route 230 was closed by high water. Roads were also flooded in the Ranson and Millville areas. In addition, flooding was reported along Route 340 near the confluence of the Shenandoah and Potomac Rivers near Harpers Ferry.
- m. September 18-20, 2003 – Heavy rain and flooding was experienced as a result of Hurricane Isabel. At Shepherdstown, there was moderate flooding with the river cresting at 19.83 feet on September 20. Flood stage is 15 feet. The Opequon Creek at Martinsburg had minor flooding. Millville on the Shenandoah River had moderate flooding reaching a crest of 17.31 feet at 8 pm on September 20. Flood stage is 13.5 feet. Harpers Ferry at the confluence of the two (2) rivers saw minor flooding.

- n. September 28, 2004: The remnants of Hurricane Jeanne brought widespread flooding to Eastern West Virginia on the 28th. The flooding lasted from mid morning at some sites through late evening. Many secondary and primary roads, including US Routes 51 and 11, were under water.
- o. November 29, 2005 – Vehicles were flooded out in water across the county. A large low pressure system moved from the Ohio Valley into the Middle Appalachians on November 29. Southerly winds brought moisture into the region. Prolonged heavy rainfall occurred in the Eastern Panhandle of West Virginia. These heavy rainfalls lead to flooding in some areas. On the evening of the 29th, some thunderstorms produced flash flooding in Jefferson and Berkeley counties.
- p. June 26, 2006 – Scattered areas of flash flooding began late on June 27 and continued into June 28. High water caused a vehicle accident on Highway 230 near Covenant Baptist Church, Spruce Street was flooded, water went into the Bolivar-Harpers Ferry Public Library, basement flooding occurred in homes in Bolivar, and numerous road closures and several water rescues were reported across the Eastern Panhandle of West Virginia.
- q. March 2, 2007 – On Saturday, March 3rd, two (2) people became stranded in the flood waters when they drove past the "Road Closed" and "High Water" signs on River Road. The South Branch of the Potomac River at Shepherdstown crested at 15 feet after midnight on March 2nd. Total property damage reported was \$15,000.

E. EVALUATION OF THE FLOOD THREAT

- 1. Flood threat recognition for the Jefferson County area depends on the issuance of warnings by the NWS and an Automated Flood Warning System, which consist of a network of stream and rain gauges, and is known by its acronym as IFLOWS (Integrated Flood Observing and Warning System). Appendix 3 describes the locations of the field equipment.
- 2. The Jefferson County GIS department has developed accurate, detailed mapping of identified flood-prone areas in Jefferson County, as well as the number and types of structures, and the number of people that are located in these areas. This mapping was developed utilizing FEMA Flood Insurance Rate Maps (FIRMs).
- 3. Flood Hazard Mapping is contained in the Jefferson County Multi-Jurisdictional All-Hazards Mitigation Plan.
- 4. There are 20 "repetitive loss" properties in Jefferson County according to representatives with the FEMA, Natural Hazards Program. The following table indicates the type of structure, the number of losses suffered, and the approximate

location of the property. This information is legally privileged and confidential. Its use is protected under the privacy act of 1974, 5 U.S.C. Section 552(a). Use of this information should be restricted to applicable routine use.

JEFFERSON COUNTY REPETITIVE LOSS DETAILS			
Type of Structure	# of Losses	Location	Mitigated
Residential – Single Family	2	Shepherdstown	Yes
Residential – Single Family	2	Shepherdstown	Yes
Residential – Single Family	5	Harpers Ferry	No
Residential – Single Family	2	Harpers Ferry	No
Residential – Single Family	3	Charles Town	No
Residential – Single Family	3	Charles Town	No
Residential – Single Family	3	Harpers Ferry	No
Residential – Single Family	3	Harpers Ferry	No
Residential – Single Family	3	Shepherdstown	No
Residential – Single Family	2	Harpers Ferry	No
Residential – Single Family	2	Harpers Ferry	No
Residential – Single Family	2	Harpers Ferry	No
Residential – Single Family	2	Charles Town	No
Residential – Single Family	2	Harpers Ferry	No
Residential – Single Family	2	Charles Town	No
Residential – Single Family	2	Shepherdstown	No
Residential – Single Family	2	Harpers Ferry	No
Residential – Single Family	2	Charles Town	No
Residential – Single Family	2	Shepherdstown	No
Residential – Single Family	2	Harpers Ferry	No

F. HAZARD IMPACT

1. Flooding continues to be a frequent and damaging natural disaster as a result of the Potomac and Shenandoah Rivers, and their many tributaries. Flooding is the most costly natural hazard in Jefferson County, and has resulted in approximately \$21 million in property damage over the past 57 years.
2. Flooding impacts to the community include injuries to citizens and public safety officials, damage to property, lost revenue and economic damages, and increased demand on public safety and infrastructure related services. Response activities include unanticipated overtime for EOC activations, evacuations, sheltering of displaced people, rerouting traffic destined for impassible roads, bridge and road damage repairs, and rescue or medical missions related to motorists and isolated families. Private property damages to homes and vehicles as well as land erosion, river channel changes, agricultural damages and livestock losses resulting in significant rural economic impacts to local residents.

3. The table below summarizes the asset inventory for properties in the floodplain across Jefferson County.

Use Type	Charles Town	Ranson	Harpers Ferry	Shepherdstown	County	Total
Commercial	2	0	0	22	3	27
Residential	12	61	0	25	237	335
Other	1	0	3	7	9	20
Total	15	61	3	54	249	382

4. Ranson has the greatest number of properties within the floodplain in Jefferson County. An estimated 61 residential properties located in the southwest portion of the municipality, primarily to the west of George Street, all fall within the identified flood hazard areas.
5. Shepherdstown has 54 properties at risk from flooding. These are properties that are alongside Town Run, a creek that runs through the center of the town from north to south. High Street to the north, New Street to the south, Church Street to the west, and Mill Street to the east bound the area most impacted by this flood plain. Shepherdstown has a mix of both residential and commercial properties at risk from flooding as well as other buildings such as properties belonging to the town and Shepherd University.
6. Charles Town has the third highest amount of properties in the floodplain at 15. Of these, two (2) are commercial and 12 are residential. These structures are primarily located along Evitts Run, a creek that crosses through the southwestern portion of the town, and the majority is in the area surrounding the Evitts Run Park. Charles Town is also the only municipality within Jefferson County to have a critical facility located within the floodplain, the Charles Town Waste Water Treatment Plant.
7. According to information collected by the National Park Service, the lower town of Harpers Ferry has reached, or surpassed the flood stage of 18.5 feet over 36 times. The highest river crest of record for the Harpers Ferry area was 36.5 feet on March 19, 1936. Based on the procedures detailed in the Emergency Response Plan for Harpers Ferry National Historical Park a variety of park and town facilities are at risk when the river crests above flood stage:
- 16-18 feet – Pedestrian Bridge over Potomac River.
 - 18.5-20 feet – Shenandoah Street and Harpers Ferry/Bolivar Public Service District.
 - 20-27 feet – Lower town.

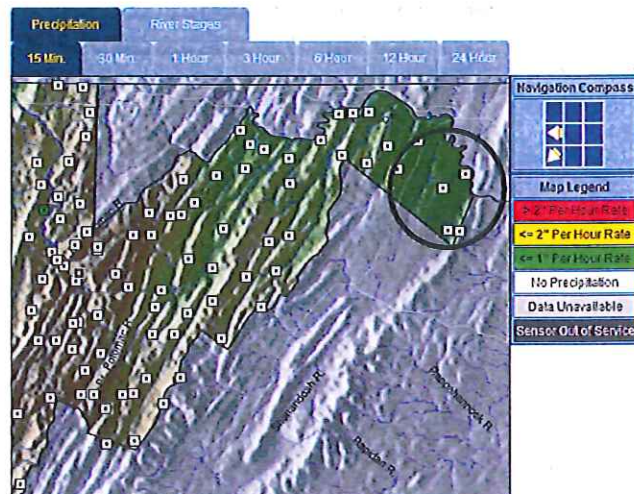
8. Approximately 29 miles of transportation infrastructure and utilities are located in flood hazard areas. The table below illustrates the number of miles of transportation infrastructure and utilities that are located in flood hazard areas.

Type	Number of Miles
Roads	4.47
Utilities	3.38
Railroads	21.39
Total	29.24

G. DATA COLLECTION & FLOOD THREAT DETECTION

1. Rain Gauges – The goals of the IFLOWS Program are to reduce the loss of life from flash flood, reduce property damage, and reduce disruption of commerce and human activities. The 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.
2. The rain gauge portion of the IFLOWS network is maintained by the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM).
3. There are currently four (4) rainfall gauges located in Jefferson County which are connected to the IFLOWS. Their locations are as follows:

- a. Bardane (ID7962)
- b. Shannondale (ID6150)
- c. Shepherdstown (ID7972)
- d. Summit Point (ID6176)



4. The NWS in cooperation with the Appalachia Regional Commission, the Tennessee Valley Authority, and the States of Kentucky, Virginia, Pennsylvania, West Virginia, and Tennessee has implemented a prototype IFLOWS. This system combines event-reporting sensors, data and voice communications, and minicomputer technology to each county in a 100-county region. Data, forecasts, and warning products are distributed to state and county authorities responsible for the provision of emergency services to people in flood-threatened areas. NWS offices are directly linked to IFLOWS.
5. The sensors trigger the transmission of radio signals that include the station identifiers and values of the monitored parameters. The sensors and transmitters are powered by batteries and are independent of commercial power sources.

6. Radio transmissions from the sensors are line-of-sight to strategically located receivers. Data are then relayed by microwave radio to the dedicated, central processing minicomputer. The counties/communities can receive data, forecasts, and warning products over this same communication system from the minicomputer. IFLOWS operates continuously to monitor local conditions for the counties and for NWS offices in the IFLOWS region.
 7. The NWS has access to the following data collection equipment:
 - a. Satellite imagery display equipment which enables meteorologists to see approaching weather systems and estimate local arrival times.
 - b. Automated weather stations used to forecast flood potentials and predict storm development and movement.
 - c. Radar product display equipment enabling meteorologists to evaluate current weather conditions; update heavy precipitation forecasts; estimate rainfall amounts at specific locations; predict storm movement, duration, and areal coverage; refine flood predictions; and anticipate specific flood problems.
- H. FLOOD WARNINGS WILL BE DISSEMINATED AND FOLLOW-UP INFORMATION FURNISHED BY A COMBINATION OF THE FOLLOWING:
1. NOAA weather radio stations which continuously broadcast weather and river forecasts.
 2. Local AM and FM commercial radio stations.
 3. Cable, satellite and nearby commercial television stations, as well as Internet websites.
 4. Activation of the local Emergency Alert System (EAS) WXVA (98.3 FM), WLTF (97.5 FM).
 5. National Warning System (NAWAS).
 6. West Virginia Automated Police Network (WEAPON).
 7. Siren and PA-equipped emergency vehicles.
 8. Three (3) basic types of flood warnings are disseminated to the public:
 - a. Advisory – meaning that nuisance flooding or flooding of a “less serious” nature is either possible or occurring.
 - b. Watch – meaning that weather conditions are such that a hazardous flood may occur.
 - c. Warning – meaning that a flood which poses a significant threat to life or property is either occurring, is imminent, or has a very high probability of occurrence.

9. Advance Notice/Warning – for slow developing situations should be given as soon as it is clear that evacuation may be required, and should address preparedness actions.
10. Evacuation Warning – immediate notification should be made to affected areas using all means available.
11. Emergency Public Information (EPI) – during times of elevated awareness (e.g., forecasted events or season), the PIO will ensure essential information is disseminated to the media on a timely basis.

I. FLOOD WARNINGS FOR SPECIAL NEEDS GROUPS

1. Flood warnings for the hearing impaired will be by television crawler, originated through local cable television stations.
2. Flood warnings to nursing homes are transmitted over NOAA radios, and/or the local radio stations, WXVA (98.3 FM), WLTF (97.5 FM).

J. EVACUATION/SHELTERING/RE-ENTRY

1. Evacuation and re-entry into evacuated areas will be conducted according to Annex D – Evacuation and Re-Entry of the Emergency Operations Plan (EOP).
2. Shelters have been identified across the County and are detailed in Annex E – Mass Care, Housing, and Human Services of this EOP.
3. Sudden or unexpected flooding may result in the need to establish an emergency shelter at an established location. The Eastern Panhandle Chapter of the American Red Cross (ARC) may decide if the number of evacuees is small, to provide shelter at a pre-identified hotel, motel, or other pre-arranged temporary housing. All mass care will be conducted according to Annex E – Mass Care, Housing, and Humans Services of this EOP.

IV. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

A. ORGANIZATION

1. The Jefferson County Homeland Security and Emergency Management (JCHSEM) Director coordinates flood warning, along with the Public Information Officer (PIO) and other agencies.
2. The JCHSEM Director will coordinate with the PIO and all participating local media outlets to disseminate flood warnings to the public.

B. ROLES AND RESPONSIBILITIES

Primary Agencies

1. JCHSEM

- a. Coordinate with the Jefferson County GIS Department, local floodplain managers, and the NWS, to identify and map the locations of historical flooding, and sites of possible future flooding.
- b. Assist the local first response sector in the issuance of evacuation orders as necessary.
- c. Activate the Emergency Alert System (EAS) as necessary.
- d. Work with the County PIO to distribute necessary flood warning information to the public.
- e. Advise the President of the County Commission of Jefferson County and/or PIO when to disseminate emergency instruction to the public.
- f. Cancel all warning activities when the threat of flooding has subsided.
- g. Disseminate flood warning information to neighboring counties as necessary.

Support Agencies

2. National Weather Service

- a. Observe, analyze and forecast weather conditions.
- d. Disseminate weather advisories, statements, watches, and warnings through state warning systems.

3. Jefferson County Public Information Officer (PIO)

- a. Serve as lead contact with news media, handle media and public inquiries, Emergency Public Information (EPI) and warnings, rumor monitoring and response, and media monitoring.
- b. Develop and maintain a public information and education program that includes prepackaged information kits specific for flooding.
- c. Coordinate EPI releases with the JCHSEM Director.
- d. Collect accurate information regarding the flooding threat and authenticate all sources of information being received and verify for accuracy.
- e. Maintain a chronological record of emergency/disaster related events and the EPI corresponding to them.
- f. Provide for at least one bi-lingual (English/Spanish) person to volunteer to support EPI operations.

4. Local Media Organizations

- a. Disseminate flood warning messages provided by authorized sources to the general public as rapidly as possible in the event of impending or actual flooding, including dissemination to non-English speaking groups.
- b. Train staff to handle emergency announcements (especially designated EAS radio stations).

5. Jefferson County Sheriff

- a. Upon notification of potential flooding as a result of the Flood Warning System, conduct stream and road patrols in affected areas, and begin evacuation procedures if necessary in accordance with Annex E: Evacuation and Re-Entry when necessary.
- b. Make determinations as to when, and which roads to close as a result of high water.

6. WVDHSEM

- a. When state action or assistance is required to deal with a large-scale flooding event in Jefferson County, the WVDHSEM will assume primary responsibility for coordinating EPI.

V. DIRECTION AND CONTROL

A. CENTRAL WARNING POINT

1. The Jefferson County warning point is located in the Jefferson County Emergency Communication Center (JCECC) in Kearneysville, West Virginia. It is staffed 24-hours a day and has sufficient communications and warning equipment available to provide the communications necessary for most emergencies. The JCECC will serve as the facility where all rainfall reports will be initially received.
2. The West Virginia State Police (WVSP) – Troop 2 Communications Center will serve as the alternate county warning point and is manned on a 24/7 basis.
3. In as much as is possible, public schools, hospitals, assisted living facilities, and other populated governmental facilities and institutions will receive notification and flood warnings from the county warning point, or if activated the County Emergency Operations Center (EOC).

VI. ADMINISTRATION AND LOGISTICS

A. ADMINISTRATION

1. This support annex does not replace National Weather Service (NWS) flood warnings for the general area, or for rivers and major tributary waterways, it is intended as a supplement.

VII. CONTINUITY OF GOVERNMENT

A. SUCCESSION OF COMMAND

1. The line of succession for the JCHSEM Director is as follows:
 - a. JCHSEM Deputy Director
 - b. Jefferson County Administrator
 - c. Jefferson County Sheriff
2. The line of succession for the Jefferson County PIO is as follows:
 - a. Jefferson County PIO
 - b. Designated Alternate

VIII. ANNEX DEVELOPMENT, MAINTENANCE AND TRAINING

- A. All organizations, agencies, offices, and volunteers that participate in this annex are responsible for reviewing this support annex on an annual basis, or immediately following any flood event, and submitting new or updated information to the Jefferson County Homeland Security and Emergency Management (JCHSEM) Director.
- B. the Jefferson County Flood Warning System, to include communication equipment, will be inspected and tested on an annual basis. This system will be thoroughly evaluated following each flood event, and revisions will be made and tested as necessary.

IX. LIST OF APPENDICES

Appendix 1 – Flood Hazard Mapping

Appendix 2 – Flooding Information for the Shenandoah and Potomac Rivers, and Opequon Creek

Appendix 3 – Rainfall and Stream Gauge Information

X. AUTHENTICATION

Date

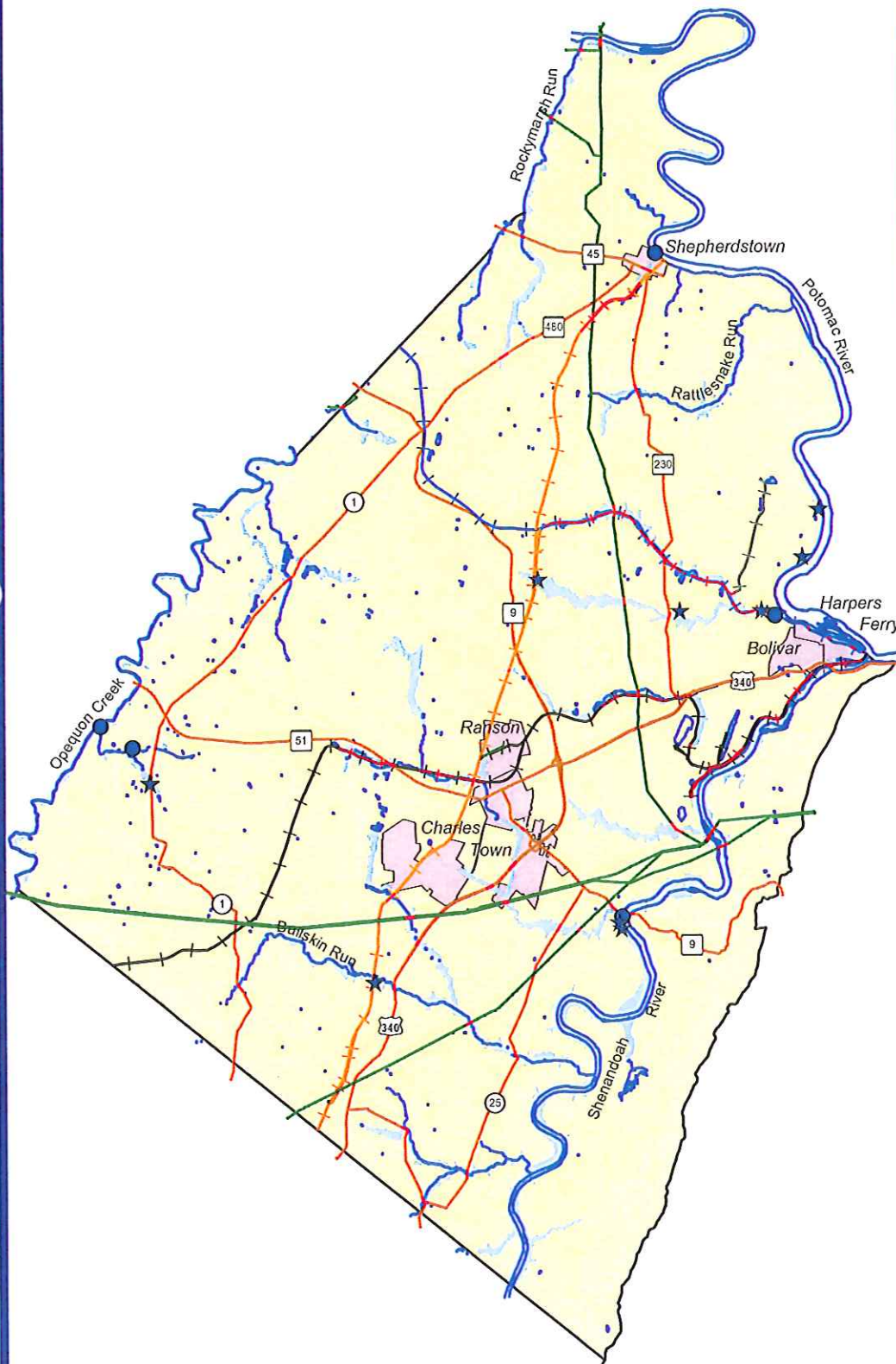
JCHSEM Director

Infrastructures in Flood Hazard Areas

Map #6E



Jefferson County, WV



Legend

- ★ At Risk Ground Water Intakes
- At Risk Surface Water Intakes
- At Risk Utilities
- At Risk Major Roads
- Utilities
- Major Roads
- Streams
- Municipal Boundaries
- 100-Year Floodplain

Railroads

- + At Risk Areas

Rail Owner	Track1	Track2
CSXT		
CSXT	AMTK	MARC
NS		
NS	CSXT	
+	Abandoned	

At Risk Infrastructures

Miles	Type	Loss
21.39	Railroads	\$17,111,340
3.38	Utilities	\$1,213,580
4.47	Roads	\$9,384,312

Total Loss \$ 27,709,232

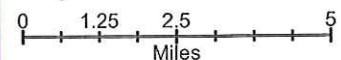
Count	Type	Loss
5	S*	Not Available
11	G*	Not Available

*S Surface Water Intakes

*G Ground Water Intakes



1:190,000 Scale



Project Impact maps are an advisory tool for general awareness and are not legal documents to be used when making specific hazard determinations.

Municipal boundaries depicted on the maps do not include any newly incorporated lands.

March 13, 2003

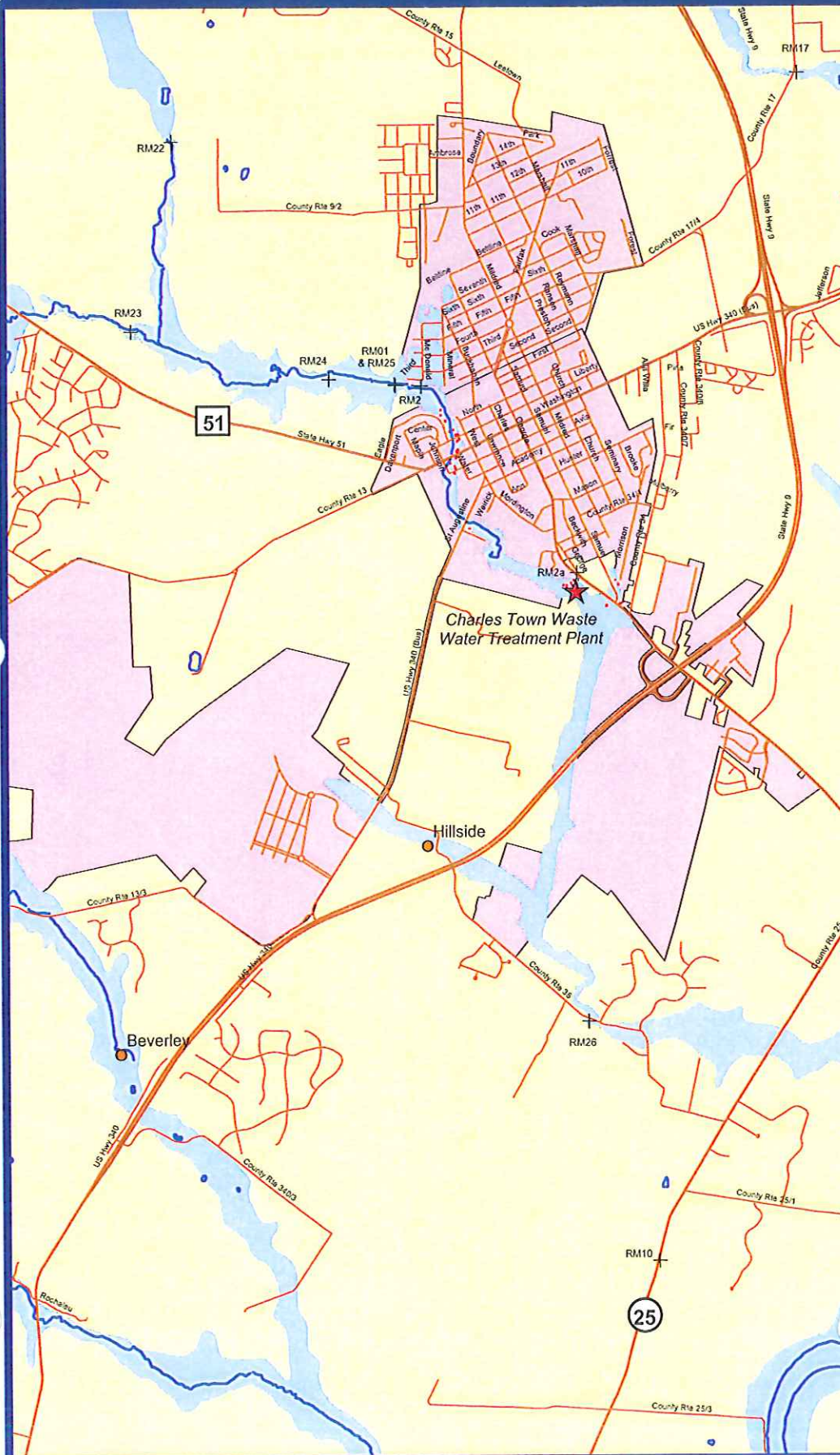
Edwards
Kelcey

Charles Town Structures in Flood Hazard Areas

Map #6A



Jefferson County, WV



Legend

- At Risk Structures
- ★ At Risk Critical Facilities
- At Risk Historical Sites
- + Benchmarks
- Major Roads
- Streams
- Municipal Boundaries
- 100-Year Floodplain

At Risk Properties

Count	Type	Loss
2	Commercial	\$ 317,500
12	Residential	\$ 355,500
1	Critical*	\$ 1,600,000
	Total Loss	\$ 2,273,000

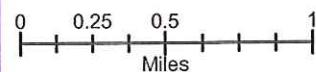
*Charles Town Waste Water Treatment Plant

Benchmark Elevation Levels

Reference Mark	Feet
RM01	497.95
RM02	503.09
RM02a	481.38
RM10	430.815
RM17	448.22
RM22	519.64
RM23	512.15
RM24	500.9
RM25	497.95
RM26	429.65



1:40,000 Scale











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March 13, 2003

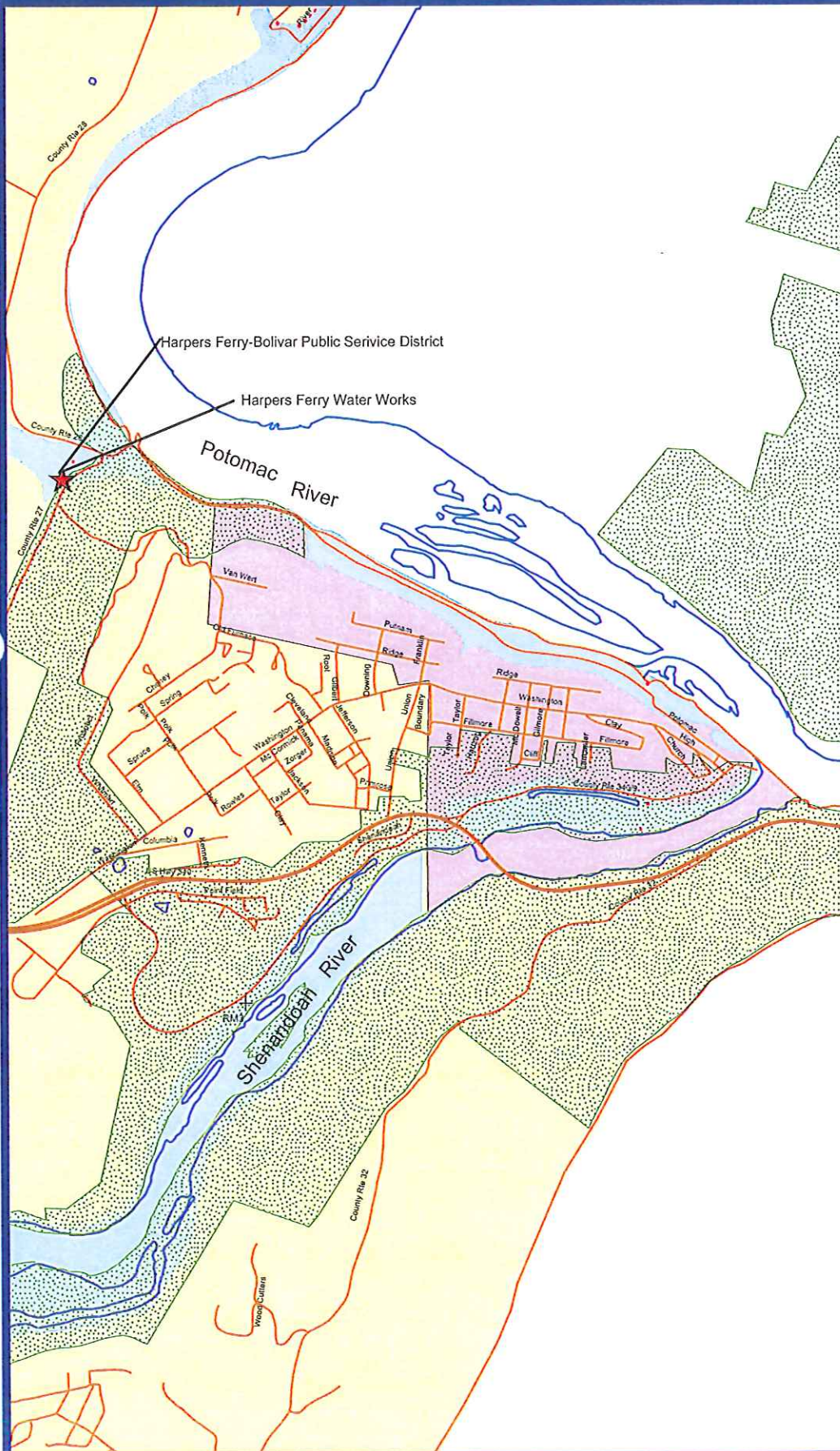
Edwards
Kelcey

Legend

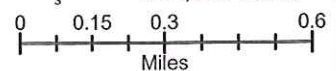
-  At Risk Structures
-  At Risk Critical Facilities
-  Benchmarks
-  Major Roads
-  Streams
-  Public Lands
-  Municipal Boundaries
-  100-Year Floodplain

Count	Type	Loss
3	Park Building	Not Available

Benchmark Elevation Levels	
Reference Mark	Feet
RM03	290.77



1:24,000 Scale



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March 13, 2003

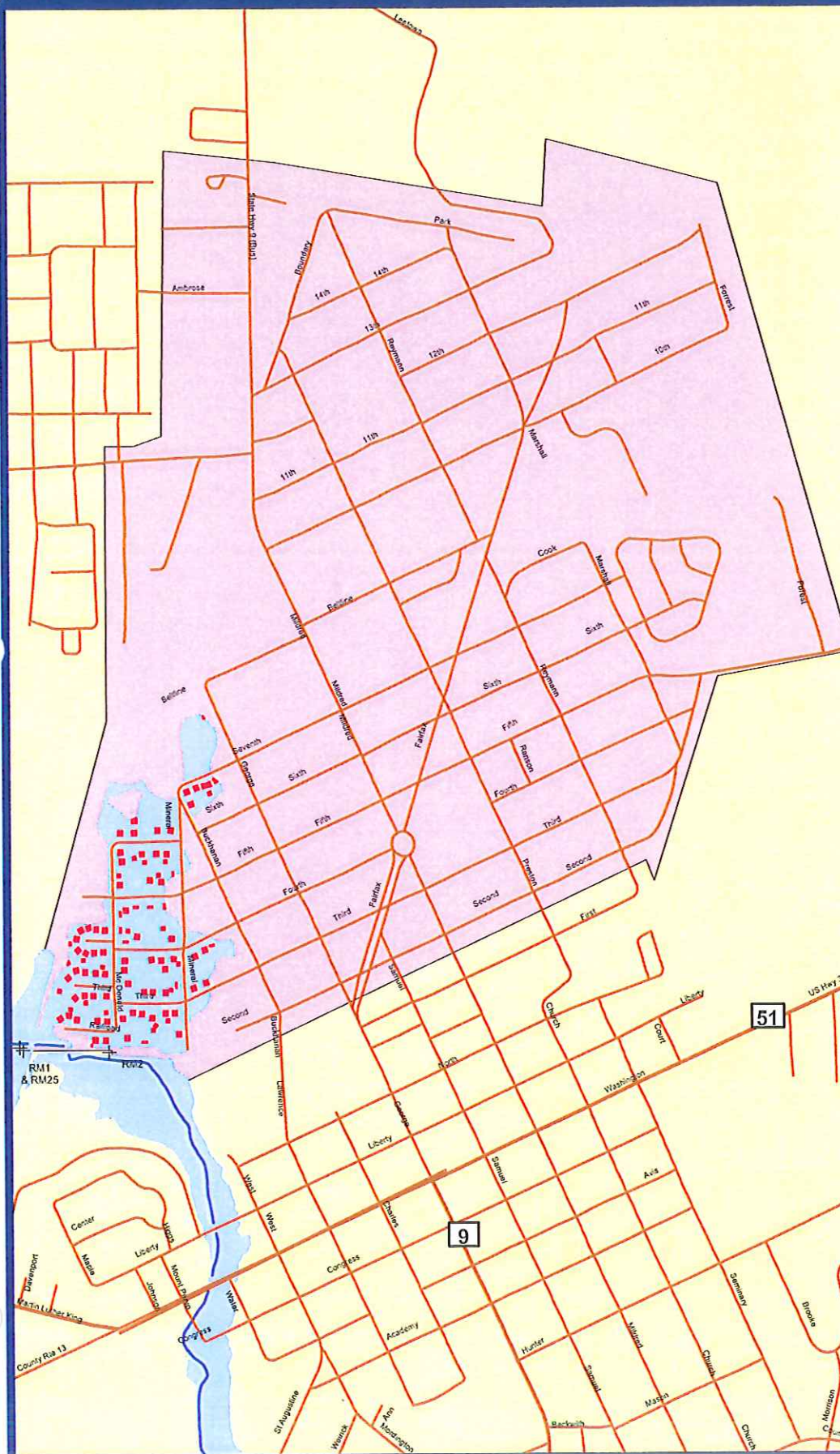
**Edwards
AND Kelren**

Ranson Structures in Flood Hazard Areas

Map #6C



Jefferson County, WV



Legend

- At Risk Structures
- + Benchmarks
- Major Roads
- Streams
- Municipal Boundaries
- 100-Year Floodplain

At Risk Properties

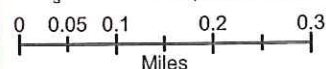
Count	Type	Loss
61	Residential	\$1,523,949

Benchmark Elevation Levels

Reference Mark	Feet
RM01	497.95
RM25	497.95
RM02	503.09



1:12,000 Scale



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March 13, 2003

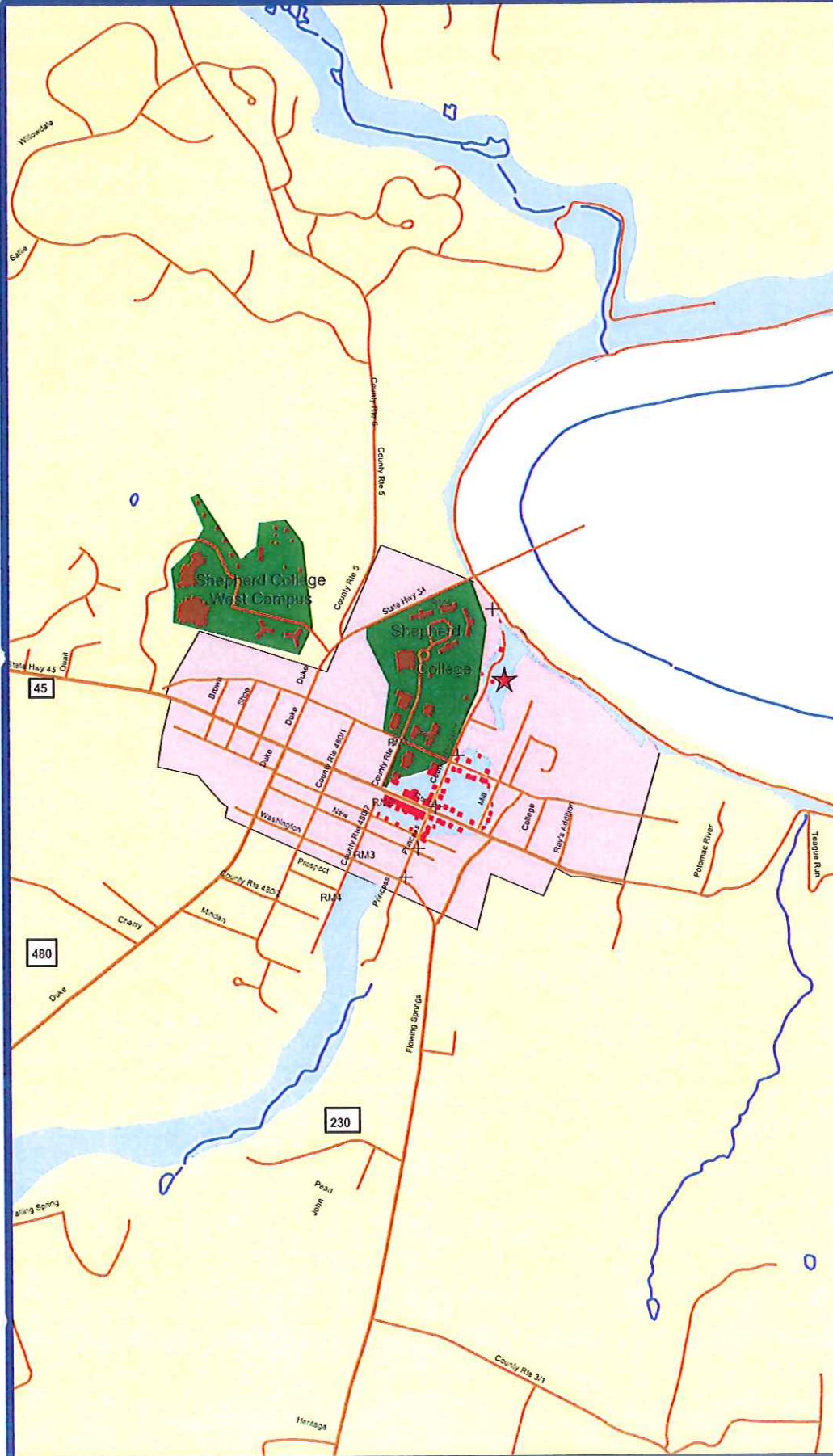
Edwards & Kelcey

Shepherdstown Structures in Flood Hazard Areas

Map #6D



Jefferson County, WV



Legend

- At Risk Structures
- ★ At Risk Critical Facilities
- + Benchmarks
- Major Roads
- Streams
- Municipal Boundaries
- 100-Year Floodplain

At Risk Properties Shepherdstown

Count	Type	Loss
22	Commercial	\$ 1,786,848
25	Residential	\$ 2,136,760
2	Town	\$ 1,715,900
4	College	Not Available
1	Critical*	\$ 260,000
Total Loss		\$ 5,899,508

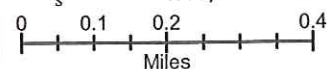
* Shepherdstown Waste Water Department

Benchmark Elevation Levels

Reference Mark	Feet
RM01	387.6
RM02	400.6
RM03	404.7
RM04	406.1
RM05	323.1



1:16,009 Scale



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March 13, 2003

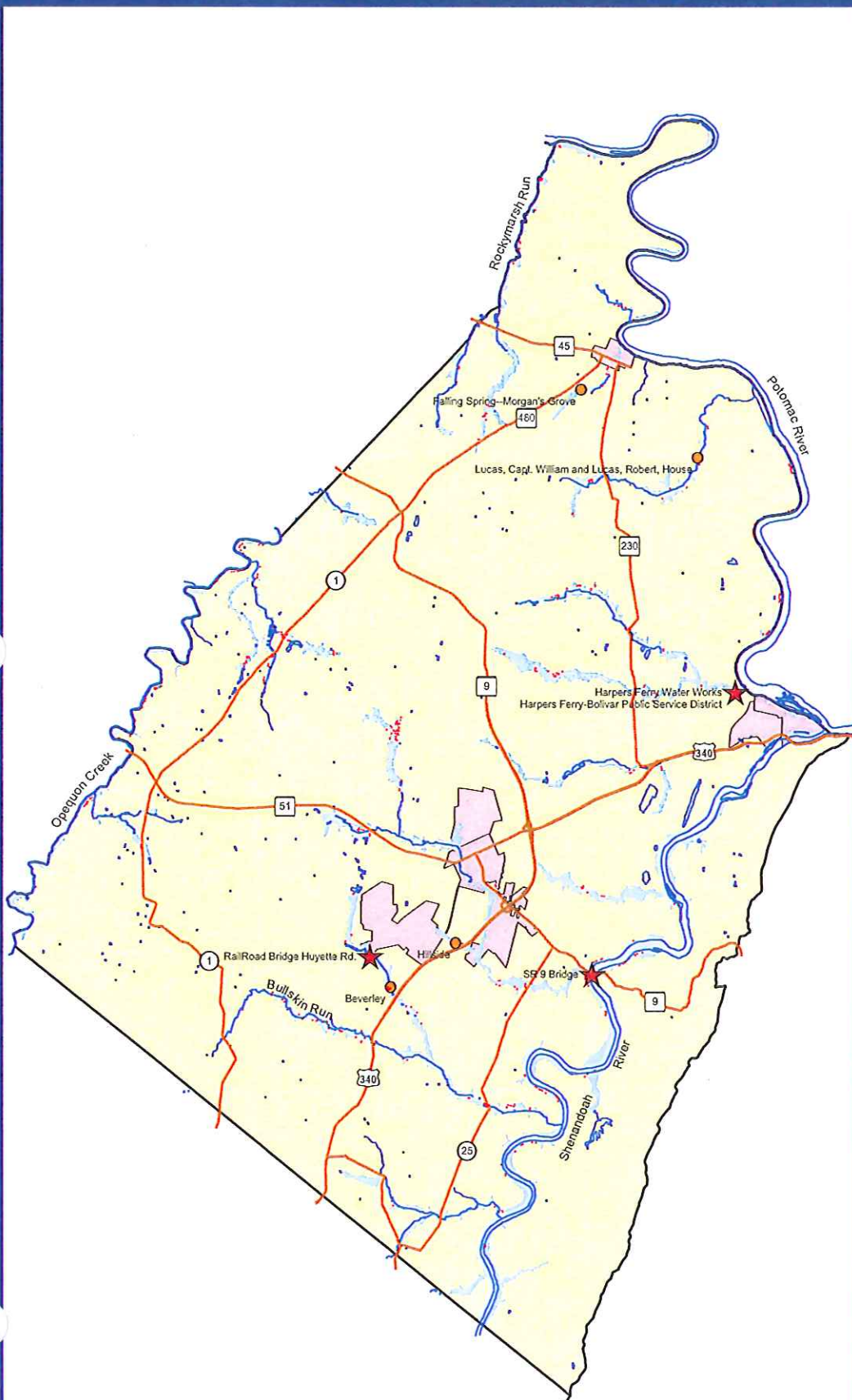
Edwards
Kelcey

Structures in Flood Hazard Areas

Map #6



Jefferson County, WV



Legend

- At Risk Structures
- ★ At Risk Critical Facilities
- At Risk Historical Sites
- Major Roads
- Streams
- Municipal Boundaries
- 100-Year Floodplain

At Risk Properties

Unincorporated Areas

Count	Type	Loss
3	Commercial	\$ 165,200
237	Residential	\$11,485,410
5	Other	N/A
4	Critical*	\$ 5,087,549
		Total Loss \$16,738,159

*Harpers Ferry Water Works

*Harpers Ferry-Bolivar Public Service Dist.

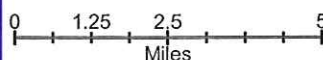
— Not included in loss estimate —

*Railroad Bridge Huyette Rd.

*Route 9 Bridge



1:190,000 Scale



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Municipal boundaries depicted on the maps do not include any newly incorporated lands.

March 13, 2003

Edwards
Kelcey

APPENDIX 2 TO ANNEX R

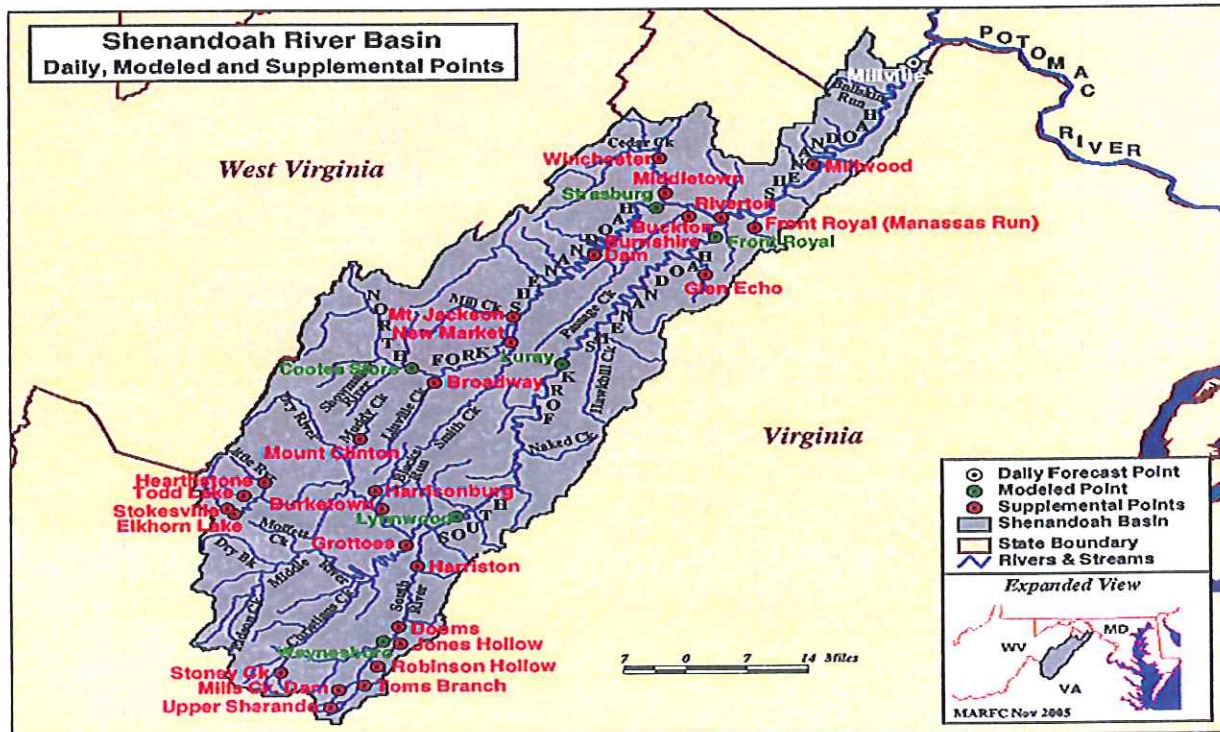
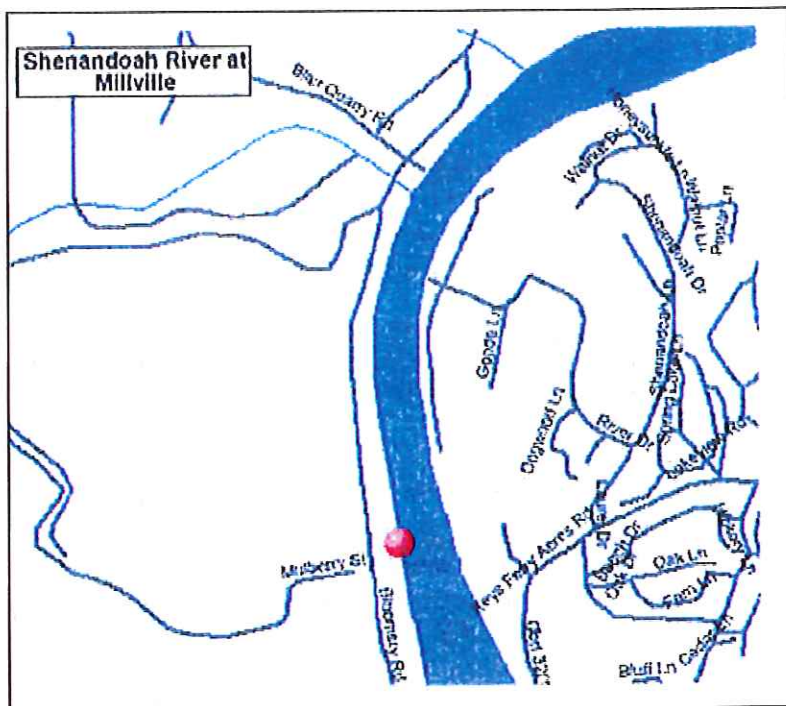
FLOODING INFORMATION FOR THE SHENANDOAH RIVER, POTOMAC RIVER & OPEQUON CREEK

SHENANDOAH RIVER AT MILLVILLE

TOP 5 HISTORICAL CRESTS	
Date of Flood	Crest
October 16 th , 1942	32.40 feet
September 8 th , 1996	26.84 feet
October 1 st , 1870	26.40 feet
March 18 th , 1936	26.36 feet
November 6 th , 1985	25.60 feet

IMPACTS

- 42.0 feet – Water overflows the old Molar Steel Mill dike.
- 17.0 feet – Water begins to flood the Town of Riverton, Virginia, upstream from Millville.
- 9.0 feet – Water will begin to Inundate parts of Bloomery Road near Bloomery, WV. Campers should move away from the river.

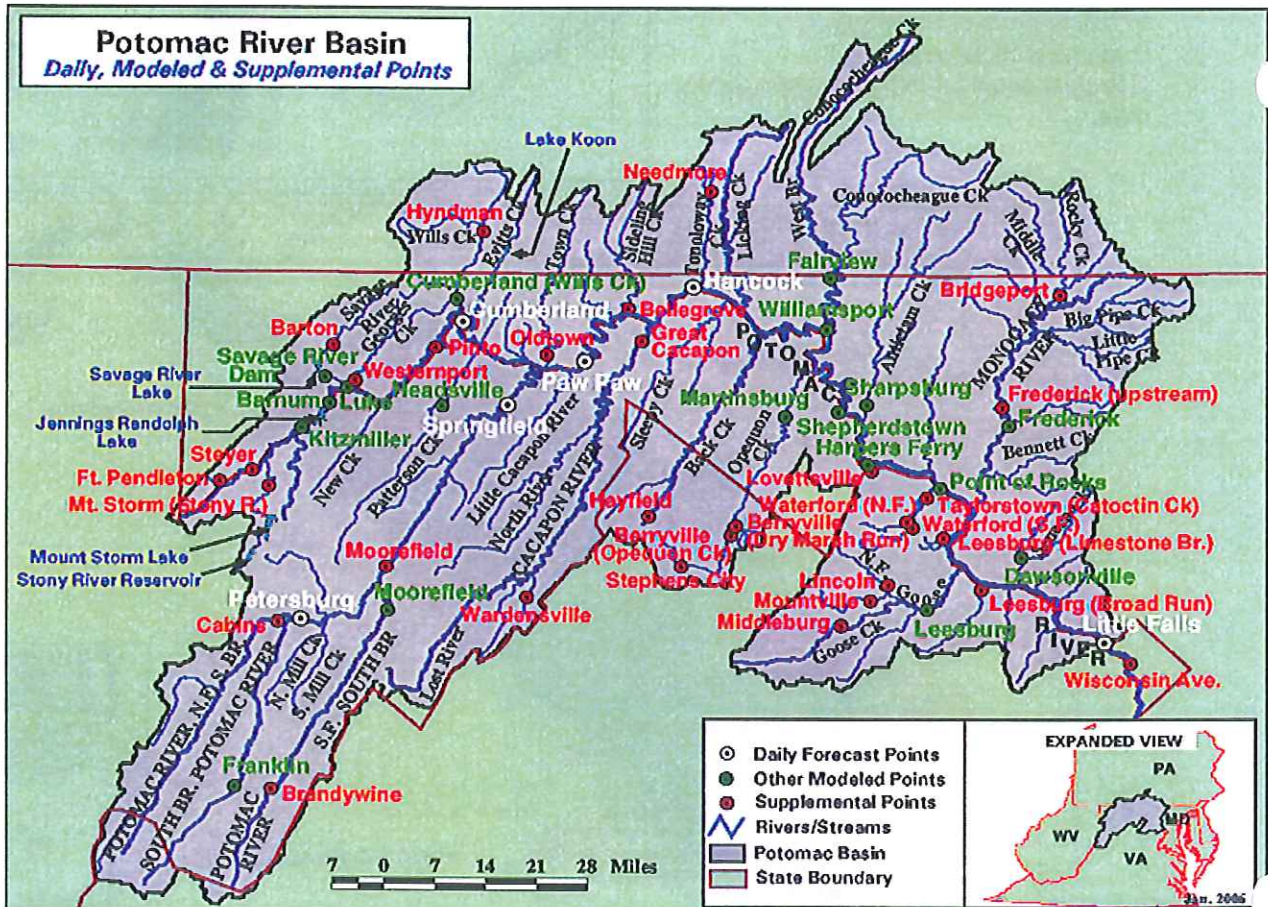
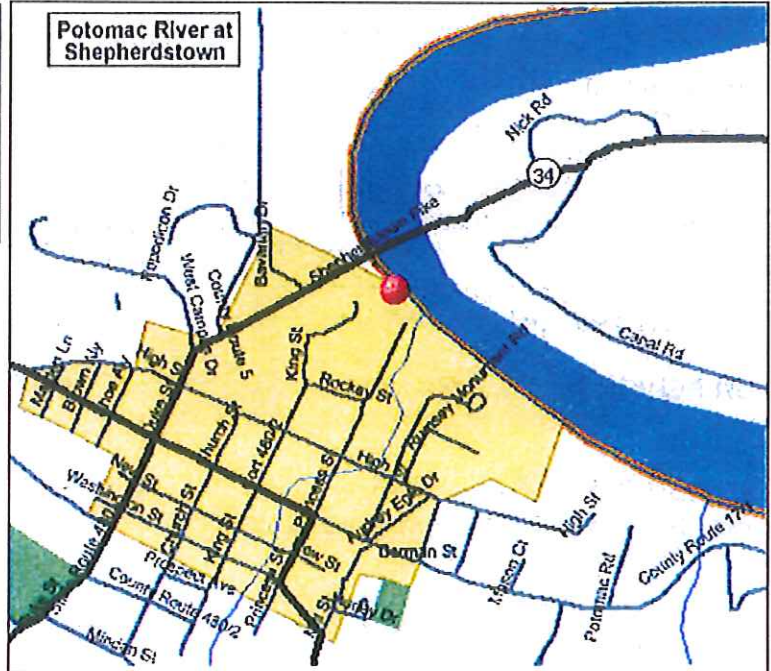


POTOMAC RIVER AT SHEPHERDSTOWN

TOP 5 HISTORICAL CRESTS	
Date of Flood	Crest
March 19 th , 1936	42.07 feet
June 1 st , 1889	39.20 feet
April 27 th , 1937	33.20 feet
October 16 th , 1942	32.68 feet
January 21 th , 1996	32.50 feet

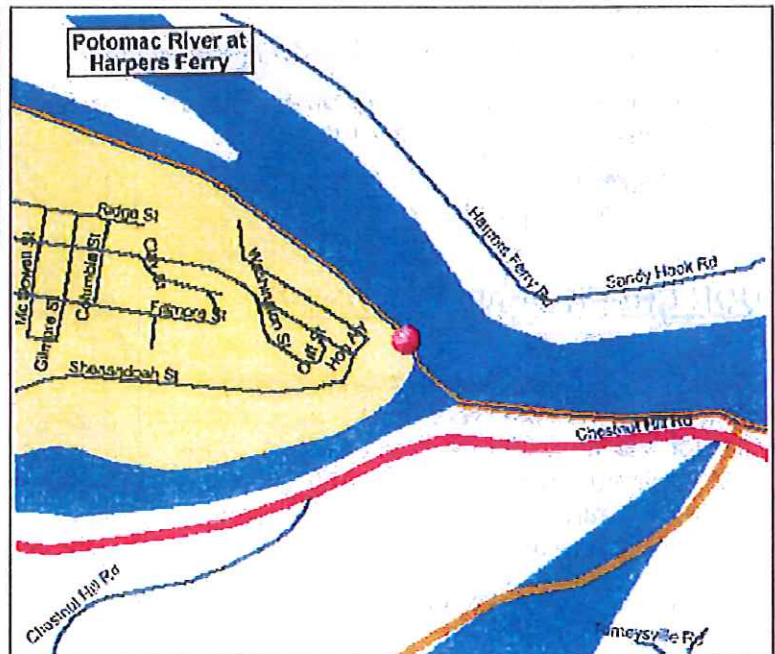
IMPACTS

- 18 feet – Water approaches the C&O Canal Towpath.
- 15 feet – River overflow low lying areas just downstream from Shepherdstown.
- 11 feet – Water begins to overflow low lying areas and the adjacent road just upstream from the Shepherdstown water plant.
- 5.1 feet – The river is at hazardous level for recreational use.



POTOMAC RIVER AT HARPERS FERRY

TOP 5 HISTORICAL CRESTS	
Date of Flood	Crest
March 19 th , 1936	36.50 feet
June 1 st , 1889	34.80 feet
October 16 th , 1942	33.80 feet
October 1 st , 1896	33.00 feet
November 6 th , 1985	30.10 feet



IMPACTS

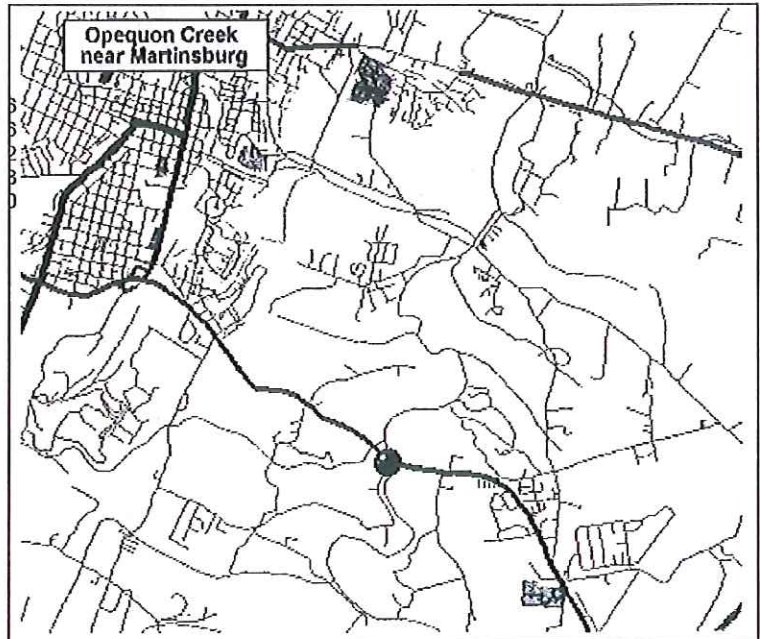
- 43.5 feet – Water approaches the lowest point on Potomac Avenue downriver in Brunswick Maryland.
- 40.0 feet – Water inundates the platform and depot of the MARC Railway Station at Harpers Ferry.
- 33.5 feet – Water reaches the railroad yards downriver in Brunswick Maryland.
- 32.0 feet – Water begins to inundate 2 to 3 dwellings on the low edge of the Town of Harpers Ferry.
- 29.0 feet – All buildings along Shenandoah Street are flooded in Historic Harpers Ferry.
- 25.5 feet – Water floods National Park Service buildings 34, 35, 43 and 44. Shenandoah Street is completely covered as water approaches buildings 6 and 7 on Potomac Street in Historic Harpers Ferry.
- 24.5 feet – Water floods National Park Service buildings 32, 33, 33A and 63. Water approaches the front of buildings 8 and 11 on Shenandoah Street in Historic Harpers Ferry.
- 23.5 feet – Water begins to inundate National Park Service building number 45 and 34A.
- 22.5 feet – Water covers Shenandoah Street to the edge of the business district and standing water in low sections of the roads adjacent to the intersections between Potomac and Shenandoah Streets.
- 21.5 feet – Water begins to reach Shenandoah Street and adjacent shuttle bus pavilion.
- 20.5 feet – Water begins to flow through the open tunnel between the Potomac River and historic Harpers Ferry. Water reaches the lower edge of town, inundating half of Main Street and half of the shuttle bus parking lot.
- 19.5 feet – Water approaches Bruce and Hamilton Streets in Historic Harpers Ferry.
- 18.0 feet – Water begins to inundate low lying service roads on the Shenandoah River side of Historic Harpers Ferry, due to backwater effects.
- 16.0 feet – The river begins to overflow onto the C&O Canal Towpath on the Maryland side of the river across from Harpers Ferry, WV.

OPEQUON CREEK NEAR MARTINSBURG

TOP 5 HISTORICAL CRESTS	
Date of Flood	Crest
January 20 th , 1996	18.76 feet
March 18 th , 1936	17.50 feet
June 22 nd , 1972	17.45 feet
May 19 th , 1988	16.29 feet
November 13 th , 1970	15.81 feet

IMPACTS

- 10 feet – Water begins to overflow low lying areas.



APPENDIX 3 TO ANNEX R

RAIN AND STREAM GAUGE INFORMATION

IFLOWS RAIN GAUGES IN JEFFERSON COUNTY, WEST VIRGINIA

Gauge Number	Type of Station	Point of Contact / Phone Number	Address	Latitude/Longitude	Elevation
ID 7962	MET	WV DOH County Supervisor 304.725.5821	1301 Old Lee Town Pike Kearneysville, WV	39 20.185 77 54.938	541.6 ft.
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
ID 6150	Rain	[REDACTED]	836 Eagles Nest Lane Harpers Ferry, WV	39 11.864 77 49.012	1488 ft.
ID 7972	MET	[REDACTED]	4960 Engle Moler Road Shepherdstown, WV	39 24.049 77 46.267	436.3 ft.

STREAM GAUGES IN JEFFERSON COUNTY, WEST VIRGINIA

USGS Shenandoah River at Millville, WV 01636500

Location	Lat 39°16'55", Long 77°47'22", NAD 27 – Jefferson County, Hydrologic Unit 02070007 on left bank 0.4 miles downstream from Cattail Run, 1.0 miles upstream from Millville, 5.0 miles upstream from Harpers Ferry, and at mile 4.7.
Drainage Area	3,041 square miles.
Period of Record	April 1895 to March 1909 August 1928 to September 2001 Measurements = Daily Mean Discharge and Annual Maximums. October 2001 to September 2004 Measurements = Daily Mean Discharge, Annual Maximums, Discharges at 1 hour or less) October 2004 to current year Measurements = Daily Mean Discharges, Annual Maximums, Gage Heights, Discharges at 1 hour or less)
Revised Records	WSP 951: 1936 (M). WSP 1432: 1895-99, 1901-02, 1905, 1907-08. 1932 (M) 1935 (M)
Gage	Water-stage recorder with satellite telemeter. Datum of gage is 293 feet above NGVD 29. April 15, 1895 to March 31, 1909, non-recording gage at site 0.8 miles downstream at datum 0.32 feet higher.
Remarks	Some regulation by upstream hydroelectric plants, including that of Potomac Light and Power Company, 0.5 miles upstream from station.
Extremes Outside Period of Record	Flood of 1870 reached practically same stage as flood of March 18, 1936, 26.36 feet, with discharge of 151,000 Cubic feet per second (ft ³ /s).

This gauging station is maintained in cooperation with Allegheny Energy Supply Company. The website for this gauge station is: http://waterdata.usgs.gov/usa/nwis/uv?site_no=01636500.

USGS Bullskin Run below Kabletown, WV

PROVISIONAL DATA SUBJECT TO REVISIONS

This gauging station is maintained in cooperation with the County Commission of Jefferson County. The station is managed by the Charleston Field Office. The website for this gauge is:

http://waterdata.usgs.gov/wv/nwis/uv?site_no=01636464&format=gif&period=31