

# FLOOD INSURANCE STUDY



## PUTNAM COUNTY, INDIANA AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
*BAINBRIDGE, TOWN OF	180214
CLOVERDALE, TOWN OF	180215
*FILLMORE, TOWN OF	180549
*GREENCASTLE, CITY OF	180216
PUTNAM COUNTY (unincorporated areas)	180213
*ROACHDALE, TOWN OF	180217
RUSSELLVILLE, TOWN OF	180218

\*No Special Flood Hazard Area Identified

Putnam County



**PRELIMINARY**



## Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER  
18133CV000A

## NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone:</u>	<u>New Zone:</u>
A1 through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date:

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**EXHIBITS**

Exhibit 1 - Flood Profiles	Panel #s
Big Walnut Creek	01P-06P

Exhibit 2 - Flood Insurance Rate Map Index

**Flood Insurance Rate Map**

# **FLOOD INSURANCE STUDY**

## **PUTNAM COUNTY, INDIANA AND INCORPORATED AREAS**

### **1.0 INTRODUCTION**

#### **1.1 Purpose of Study**

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and Flood Insurance Rate Maps (FIRMs) in the geographic area of Putnam County, Indiana, including the City of Greencastle, the Towns of Bainbridge, Cloverdale, Fillmore, Roachdale, and Russellville, and the unincorporated areas of Putnam County (hereinafter referred to collectively as Putnam County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. This information will also be used by Putnam County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. No Special Flood Hazard Areas have been identified in the City of Greencastle and the Towns of Bainbridge, Fillmore and Roachdale. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into local GIS and be accessed more easily by the community.

#### **1.2 Authority and Acknowledgments**

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.



The results of the countywide study were reviewed at the final CCO meeting held on --, and attended by representatives of FEMA, IDNR and representatives from Putnam County. All problems raised at that meeting have been addressed.

**2.0 AREA STUDIED**

**2.1 Scope of Study**

This FIS covers the geographic area of Putnam County, Indiana, including the incorporated communities listed in Section 1.1

All FIRM panels for Putnam County have been revised, updated, and republished in countywide format as a part of this FIS. The FIRM panel index, provided as Exhibit 2, illustrates the revised FIRM panel layout.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards as identified during the initial CCO meeting. For this study, ten new stream reaches and six lakes were studied using approximate methods. The scope and methods of new approximate studies were proposed and agreed upon by FEMA, the IDNR, and Putnam County.

Table 1: Streams Studied by Detailed Methods

Big Walnut Creek

Table 2: Streams Studied by Approximate Methods

Big Walnut Creek	Heritage Lake
Cagles Mill Reservoir	Little Deer Creek
Cecil M Harden Reservoir	Little Walnut Creek
Croys Creek	Little Walnut Creek Reservoir #3
Deer Creek	Little Walnut Creek Reservoir #5
Doe Creek	Mill Creek
Eel River	Monachals Fork
Glen Flint Lake	Rabbit Run

Table 3: Scope of Study

<u>Stream</u>	<u>Limits of Approximate Study</u>
Croys Creek	Mouth to Clay County Line
Deer Creek	Mouth to limit of Zone A
Doe Creek	Owen County line to Limit of Zone A

Table 3 (continued): Scope of Study

<u>Stream</u>	<u>Limits of Approximate Study</u>
Eel River	Owen County Line to Confluence of Big Walnut Creek and Mill Creek
Little Deer Creek	Mouth to limit of Zone A
Little Walnut Creek	Mouth to limit of Zone A
Mill Creek	Owen Co. line to Morgan Co. Line
Monachals Fork	Mouth to limit of Zone A
Rabbit Run	Mouth to limit of Zone A
Big Walnut Creek	Mouth to Oakalla Covered Bridge
Big Walnut Creek	CR 50 East to Hendricks County line
Glen Flint Lake	Entire
Heritage Lake	Entire
Cagles Mill Reservoir	Extent in Putnam County
Little Walnut Creek Reservoir #3	Entire
Little Walnut Creek Reservoir #5	Entire
Cecil M Harden Reservoir	Extent in Putnam County
<u>Stream</u>	<u>Limits of Detailed Study</u>
Big Walnut Creek	Oakalla Covered Bridge to CR 50 East

## **2.2 Community Description**

Putnam County is located in central Indiana and is bordered by Montgomery County to the north, Hendricks and Morgan Counties to the east, Owen County to the south, and Clay and Parke Counties to the west. Putnam County is located approximately 30 miles east of Indianapolis. Putnam County is served by Interstate 70, US routes 36, 40, and 231, and State Routes 42, 75, 236, 240, and 243.

The climate in Putnam County ranges from hot and humid in the summertime to cold during the winter season. Average daytime temperatures during the summer fall around 73.7 °F, while winter temperatures average at approximately 29.3 °F. Precipitation for Putnam County totals an annual amount of 44.20 inches.

According to U.S. Census Data from the year 2000, the population of Putnam County in 2005 was reported to be 36,019. Table 4 lists the population of the incorporated areas in Putnam County.

The City of Greencastle is located in central Putnam County along US Route 231, and is the county seat of the government. The nearest stream, Big Walnut Creek, is located approximately one mile north of the city.

The Town of Bainbridge is located about eight miles northeast of Greencastle along US Route 36.

The Town of Cloverdale is located about 10 miles south of Greencastle along US Route 231.

The Town of Fillmore is located about six miles east of Greencastle and approximately two and one half miles north of State Route 240.

The Town of Roachdale is located about 14 miles north of Greencastle along State Route 236.

The Town of Russelville is located about 15 miles northwest of Greencastle and about one mile north of State Route 236.

Table 4: Population of incorporated cities and towns in Putnam County (2000 Census)

<u>Community</u>	<u>Population</u>
Bainbridge, Town of	743
Cloverdale, Town of	2,243
Fillmore, Town of	545
Greencastle, City of	9,880
Roachdale, Town of	975
Russellville, Town of	340

### **2.3 Principal Flood Problems**

Major flooding in Putnam County primarily occurs along Big Raccoon Creek, Big Walnut Creek, and the tributaries to those streams. Major floods principally occur during the winter and spring months, but can occur during any season. Generally, two types of storm events cause flooding. During the winter and spring, storms of moderate intensity and long duration, coupled with frozen ground, cause flooding to occur. During the summer, thunderstorms which have high intensities and relatively short durations can cause floods. Localized flood problems in the incorporated areas are summarized below:

Table 5: Flood Crest Elevations

USGS gage for Big Raccoon Creek near Fincastle

<u>Year</u>	<u>Discharge</u> <u>Cubic Feet Per Second (CFS)</u>	<u>Elevation</u> <u>(feet, gage datum)</u>
1957	39,900	19.1
1962	15,100	15.42
1989	12,900	15.48
1991	16,000	16.1
2003	11,300	16.35

Table 6: Flood Crest Elevations  
USGS gage for Big Walnut Creek near Reelsville

<u>Year</u>	<u>Discharge Cubic Feet Per Second (CFS)</u>	<u>Elevation (feet, gage datum)</u>
1950	15,500	17.33
1952	15,700	17.96
1957	30,700	18.63
1960	16,000	17.12
1961	18,400	17.46
1963	19,800	17.71

- Bainbridge, Town of: There are no principal flood problems existing at this time.
- Cloverdale, Town of: Potential flooding due to Doe Creek and Ferguson Branch.
- Fillmore, Town of: There are no principal flood problems existing at this time.
- Greencastle, City of: There are no principal flood problems existing at this time.
- Roachdale, Town of: There are no principal flood problems existing at this time.
- Russellville, Town of: Potential flooding due to South Fork Little Raccoon Creek.

## 2.4 Flood Protection Measures

Putnam County is protected by a system of reservoirs extending along Little Walnut Creek. Little Walnut Creek Reservoir #3, Little Walnut Creek Reservoir #5, and Glen Flint Lake are flood control reservoirs that are part of the Little Walnut Creek conservancy district. Heritage Lake is a flood control reservoir as part of the Clear Creek conservancy district. Portions of the flood pool for Cagles Mill Reservoir and Cecil M Hardin Reservoir, flood control structures operated by the U. S. Army Corps of Engineers, extend into Putnam County.

### 3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in Putnam County, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

#### 3.1 Hydrologic Analysis

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting Putnam County. Table 7 contains a summary of peak discharges for the 10-, 2-, 1-, and 0.2-percent annual chance floods, where applicable, for each flooding source studied in detail in Putnam County.

Table 7. Summary of Discharges

<u>Flooding Source And Location</u>	<u>Drainage Area (Square Miles)</u>	<u>Peak Discharge (cfs)</u>			
		<u>10% Annual Chance</u>	<u>2% Annual Chance</u>	<u>1% Annual Chance</u>	<u>0.2% Annual Chance</u>
<b>BIG WALNUT CREEK</b>					
Above Little Walnut Creek	229	12,600	17,300	19,200	23,500
At CR 125 South	222	12,400	17,000	18,900	23,100
At US 231	216	12,200	16,700	18,600	22,700

Standard and accepted hydrologic methods were used to develop discharge data on the study streams in Putnam County. Discharges for Big Walnut Creek were derived

from evaluation of the gage record at the USGS gage at Reelsville, and review of previous determinations for similar nearby streams. These data were coordinated with the Indiana Department of Natural Resources, the Natural Resources Conservation Service (formally the Soil Conservation Service), the U. S. Geological Survey and the Louisville District of the U. S. Army Corps of Engineers, through a Memorandum Of Understanding dated May 6, 1976. Discharge curves for the 10%, 2%, 1%, and 0.2% annual chance floods were developed for each study stream using several different procedures and compared for consistency. Discharges for approximate study streams were calculated using the USGS Streamstats program, which is based on regression equations developed by Knipe and Rao

### **3.2 Hydraulic Analysis**

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data table in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

Cross sections for the backwater analyses for both Big Walnut Cree and the approximate studies were obtained from a variety of sources including: physical survey data, IDNR contour mapping, and USGS topographic mapping.

Water-surface elevations for floods of the selected recurrence intervals were computed through use of the USACE HEC-RAS step-backwater computer program. For the new approximate study reaches, the USACE HEC-RAS program was used.

Flood profiles were prepared for all streams studied by detailed methods and show computed water-surface elevations to an accuracy of 0.5 feet for floods of the selected recurrence intervals. New profiles have been prepared for the new detailed studies.

Channel and overbank roughness factors (Manning's "n" values) used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and floodplain areas. For other streams, factors were estimated by field inspection with the aid of "n" value tables and equations. Channel and overbank roughness factors used in the detailed studies are summarized by stream in Table 8.

Table 8. Channel and Overbank Roughness Factors

<u>Stream</u>	<u>Roughness Coefficients</u>	
	<u>Main Channel</u>	<u>Overbanks</u>
Big Walnut Creek	.045	.05-.07

For new approximate study areas, analyses were based on field inspection and modeling of the stream reaches using simplified HEC-RAS models. Structural measurements or field surveying was not performed. Cross section geometry was derived from 2' contour mapping compiled by the IDNR Division of Water and the 2005 statewide orthophotography project with a maximum spacing of 100 feet. Starting elevations were assumed to be normal depth.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

### 3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

In this revision, a vertical datum conversion of -0.37 feet was calculated at the centroid of the county and used to convert all elevations in Putnam county from NGVD29 to NAVD88 using the National Geologic Survey's VERTCON online utility (VERTCON, 2005).

$$(NGVD29 - 0.37 = NAVD88)$$

For more information on NAVD88, see the FEMA publication entitled Converting the National Flood Insurance Program to the North American Vertical Datum of 1988 (FEMA, June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address <http://www.ngs.noaa.gov>).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

## **4.0 FLOODPLAIN MANAGEMENT APPLICATIONS**

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, and the Floodway Data table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

### **4.1 Floodplain Boundaries**

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic mapping for Big Walnut Creek and from the 2005 statewide orthophotography flight.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, V, and VE); and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual chance floodplain boundary is shown on the FIRM (Exhibit 2).

## 4.2 Floodways

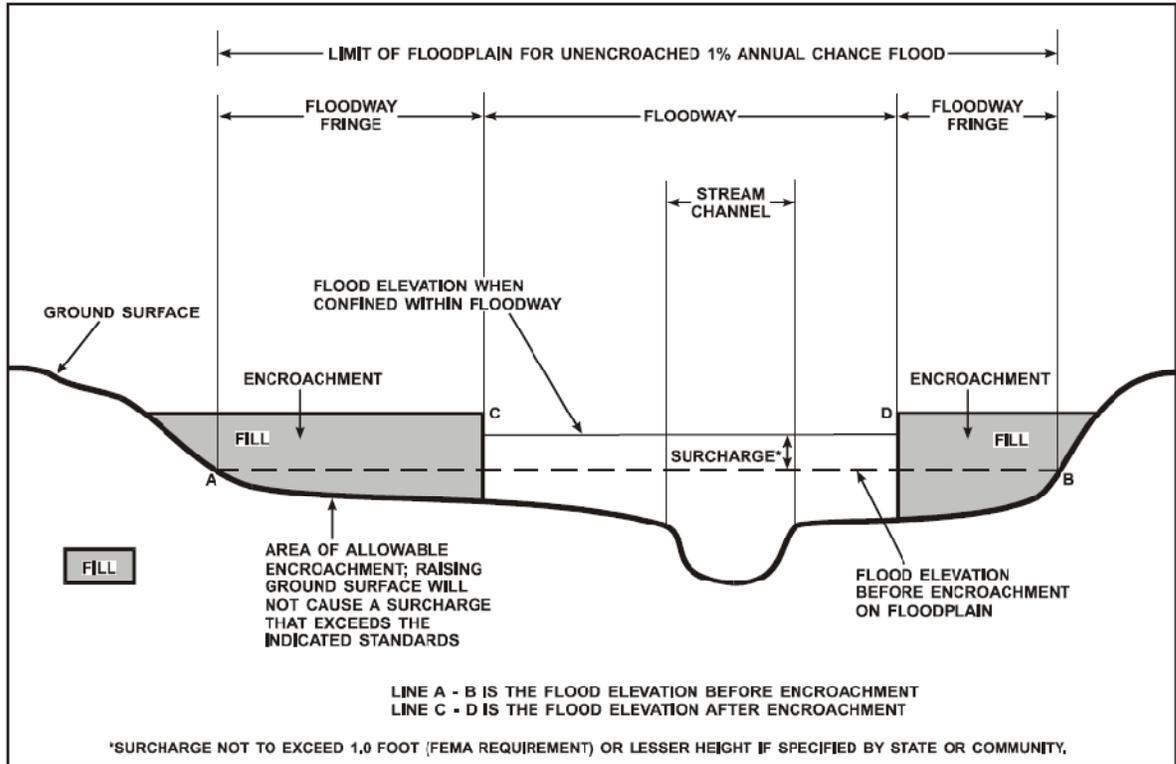
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The State of Indiana, however, per Indiana Code IC 14-28-1 and Indiana Administrative Code 312 IAC 10, has designated that encroachment in the floodplain is limited to that which will cause no significant increase in flood height. As a result, floodways for this study are delineated based on a flood surcharge of less than 0.15 feet. The floodways in this study were approved by the IDNR, and are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this FIS report and on the FIRM was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 9). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

**Figure 1: Floodway Schematic**



FLOODING SOURCE		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Big Walnut Creek								
A	15.74	1335	11461	1.7	656.0	656.0	656.1	0.1
B	16.14	720	4851	4.0	656.5	656.5	656.6	0.1
C	16.44	930	7003	2.7	658.7	658.7	658.8	0.1
D	16.60	510	4480	4.3	659.1	659.1	659.2	0.1
E	16.70	873	6410	3.0	659.8	659.8	659.9	0.1
F	16.82	1390	7449	2.6	660.3	660.3	660.4	0.1
G	16.96	1329	8093	2.4	660.7	660.7	660.8	0.1
H	17.10	1124	8121	2.4	661.0	661.0	661.1	0.1
I	17.20	1150	6590	2.9	661.1	661.1	661.2	0.1
J	17.34	1110	4196	4.6	661.4	661.4	661.5	0.1
K	17.42	1106	4427	4.3	662.1	662.1	662.2	0.1
L	17.50	1046	5815	3.3	662.9	662.9	663.0	0.1
M	17.60	908	4718	4.1	663.2	663.2	663.3	0.1
N	17.74	774	3711	5.2	664.3	664.3	664.4	0.1
O	17.89	1415	6398	3.0	665.6	665.6	665.7	0.1
P	18.09	1679	7799	2.5	666.3	666.3	666.4	0.1
Q	18.26	962	4662	4.1	666.8	666.8	666.9	0.1
R	18.36	670	3683	5.2	667.5	667.5	667.6	0.1
S	18.43	844	3791	5.1	668.3	668.3	668.4	0.1
T	18.74	746	4967	3.8	670.3	670.3	670.4	0.1
U	18.86	780	5067	3.7	670.8	670.8	670.9	0.1
V	18.96	602	3597	5.3	671.2	671.2	671.3	0.1
W	19.02	652	3981	4.8	672.2	672.2	672.3	0.1
X	19.14	1601	8754	2.2	672.9	672.9	673.0	0.1
Y	19.31	2092	11682	1.6	673.2	673.2	673.3	0.1
Z	19.47	2061	11938	1.6	673.3	673.3	673.4	0.1

<sup>1</sup>Miles above confluence with Eel River

<b>TABLE 9</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>PUTNAM COUNTY, IN AND INCORPORATED AREAS</b>	<b>BIG WALNUT CREEK</b>

FLOODING SOURCE		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Big Walnut Creek								
AA	20.11	1460	6790	2.8	675.7	675.7	675.8	0.1
AB	20.20	1441	6013	3.1	676.1	676.1	676.2	0.1
AC	20.32	1349	5517	3.4	676.8	676.8	676.9	0.1
AD	20.40	1525	6241	3.0	677.3	677.3	677.4	0.1
AE	20.52	864	4115	4.6	678.0	678.0	678.1	0.1
AF	20.60	602	3473	5.4	678.6	678.6	678.7	0.1
AG	20.98	403	2905	6.4	682.1	682.1	682.2	0.1
AH	21.40	1037	7638	2.4	687.1	687.1	687.1	0.0
AI	21.51	608	5240	3.6	687.2	687.2	687.2	0.0
AJ	21.58	561	4872	3.8	687.4	687.4	687.4	0.0
AK	21.67	892	6342	2.9	687.9	687.9	688.0	0.1
AL	21.77	996	6011	3.1	688.1	688.1	688.2	0.1
AM	21.93	1621	10318	1.8	688.6	688.6	688.7	0.1
AN	22.07	1126	7494	2.5	688.8	688.8	688.8	0.0
AO	22.18	1156	7764	2.4	689.0	689.0	689.1	0.1
AP	22.28	1024	6730	2.8	689.1	689.1	689.2	0.1
AQ	22.39	1030	7738	2.4	689.5	689.5	689.6	0.1
AR	22.78	1894	11645	1.6	691.6	691.6	691.7	0.1

<sup>1</sup>Miles above confluence with Eel River

<b>TABLE 9</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>PUTNAM COUNTY, IN AND INCORPORATED AREAS</b>	<b>BIG WALNUT CREEK</b>

## **5.0 INSURANCE APPLICATIONS**

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

### Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

### Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

### Zone AH

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

### Zone AO

Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analyses are shown within this zone.

### Zone AR

Zone AR is the flood insurance risk zone that corresponds to an area of special flood hazard formerly protected from the 1-percent-annual-chance flood event by a flood-control system that was subsequently decertified. Zone AR indicates that the former flood-control system is being restored to provide protection from the 1-percent-annual-chance or greater flood event.

### Zone A99

Zone A99 is the flood insurance risk zone that corresponds to areas of the 1-percent-annual-chance floodplain that will be protected by a Federal flood protection system

where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone.

#### Zone V

Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

#### Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

#### Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, and areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

#### Zone X (Future Base Flood)

Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.

#### Zone D

Zone D is the flood insurance risk zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
*Bainbridge, Town of	N/A	None	N/A	None
Cloverdale, Town of	June 7, 1974	August 6, 1976	June 17, 1986	None
*Fillmore, Town of	N/A	None	N/A	None
*Greencastle, City of	N/A	None	N/A	None
Putnam County (Unincorporated Areas)	January 3, 1975	February 24, 1978	October 1, 1992	None
*Roachdale, Town of	N/A	None	N/A	None
*Russellville, Town of	TBD	None	TBD	None

\*No Special Flood Hazard Area Identified

**TABLE 10**

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

**PUTNAM COUNTY, IN  
AND INCORPORATED AREAS**

**COMMUNITY MAP HISTORY**

## **6.0 FLOOD INSURANCE RATE MAP**

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current FIRM presents flooding information for the entire geographic area of Putnam County. Previously, separate FIRMs were prepared for each identified flood prone incorporated community and for the unincorporated areas of the county. Historical data relating to the maps prepared for each community are presented in Table 10.

## **7.0 OTHER STUDIES**

This FIS report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

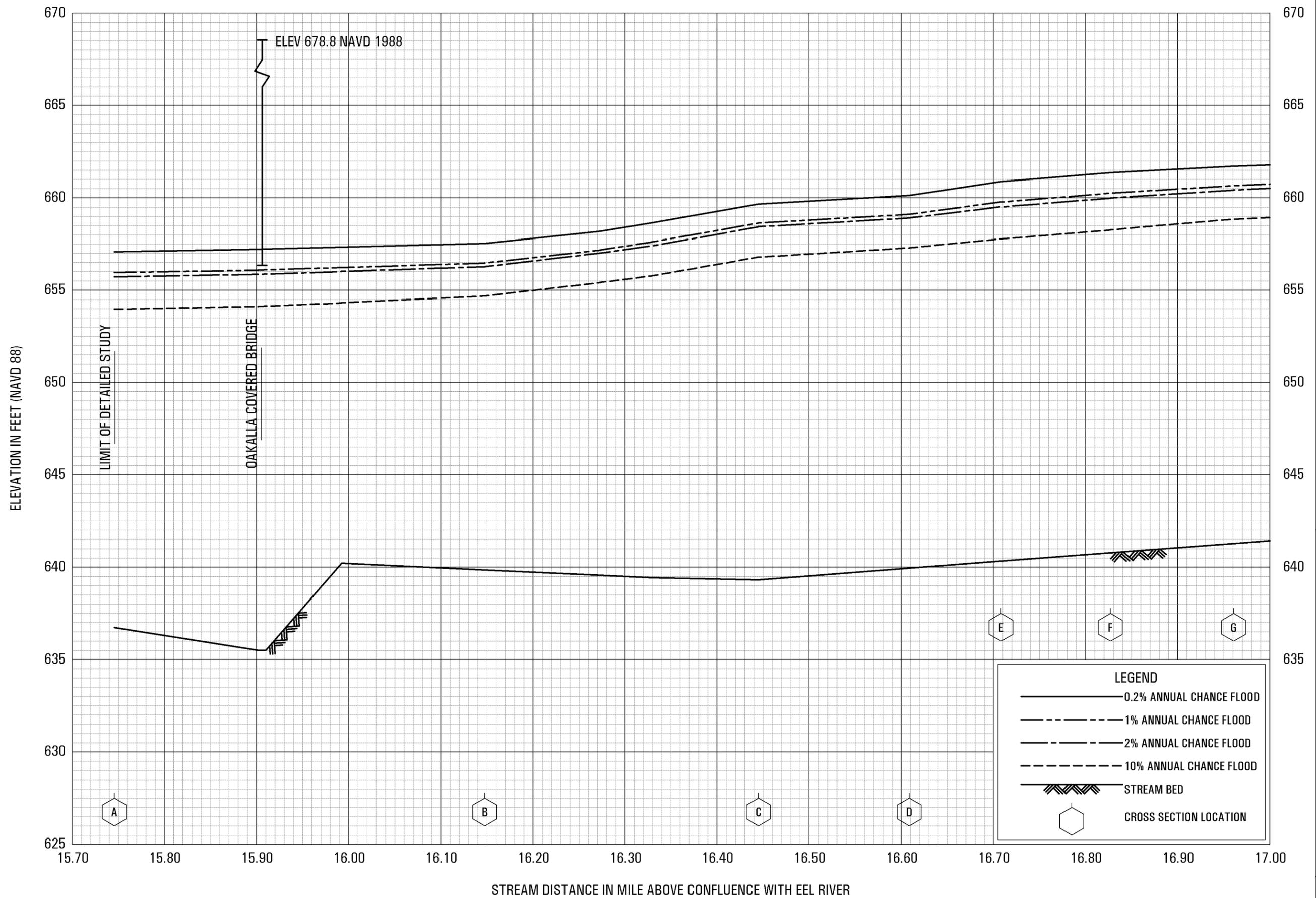
## **8.0 LOCATION OF DATA**

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, Region V, 536 S. Clark Street, 6<sup>th</sup> Floor, Chicago, IL 60605

## **9.0 BIBLIORAPHY AND REFERENCES**

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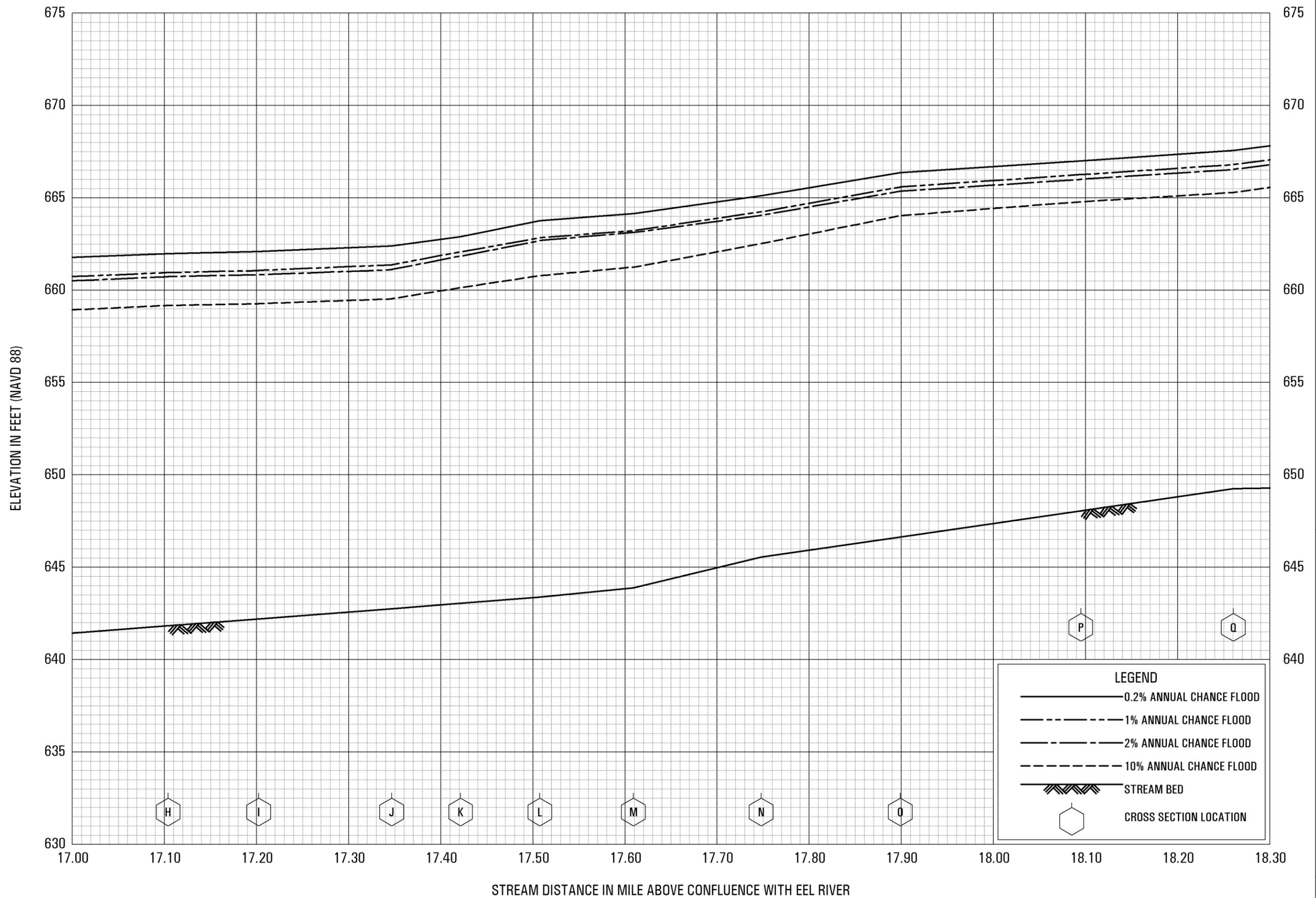
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**FLOOD PROFILES**

**BIG WALNUT CREEK**

**FEDERAL EMERGENCY MANAGEMENT AGENCY  
PUTNAM COUNTY, IN  
AND INCORPORATED AREAS**



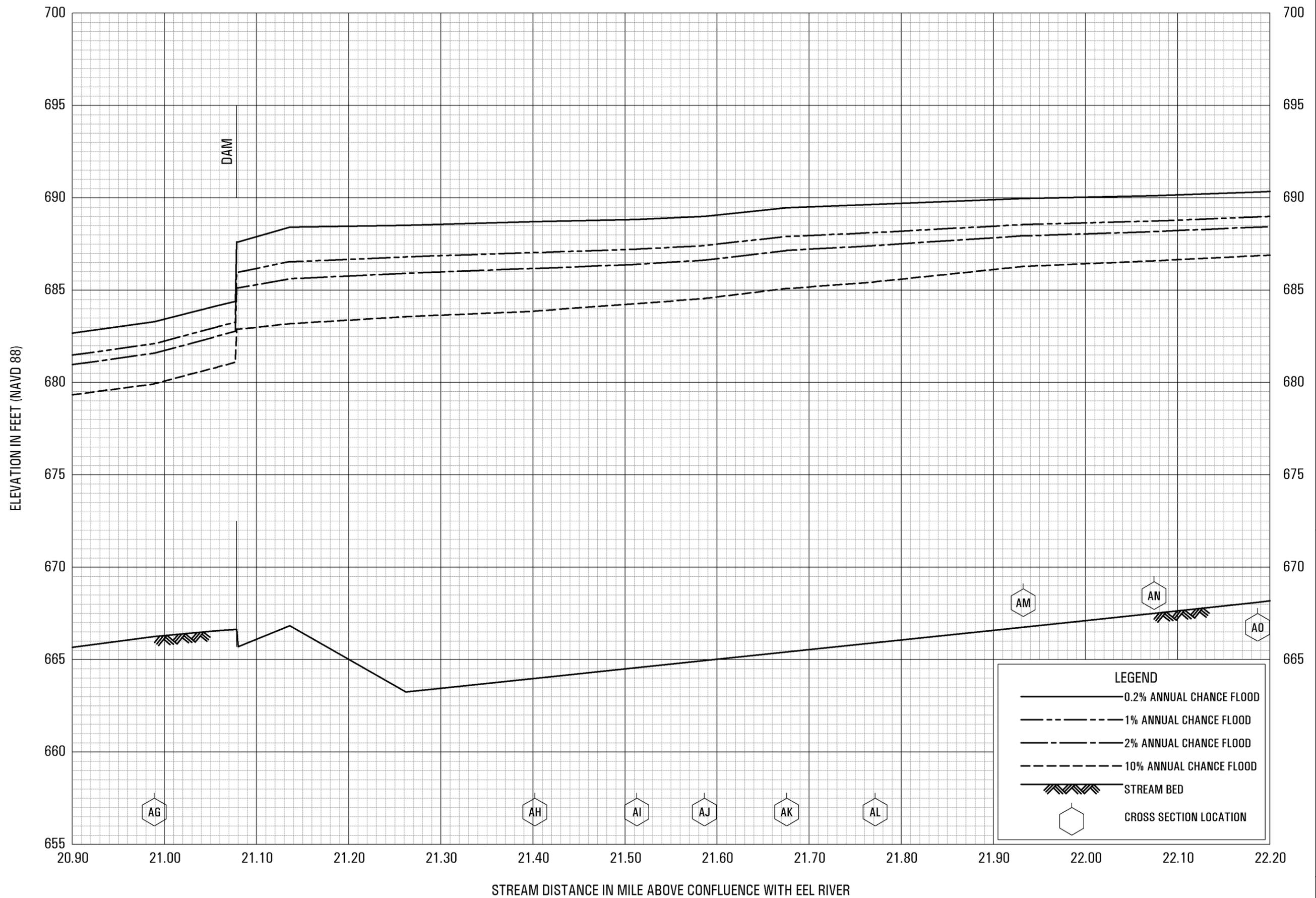
**FLOOD PROFILES**  
BIG WALNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**PUTNAM COUNTY, IN**  
AND INCORPORATED AREAS

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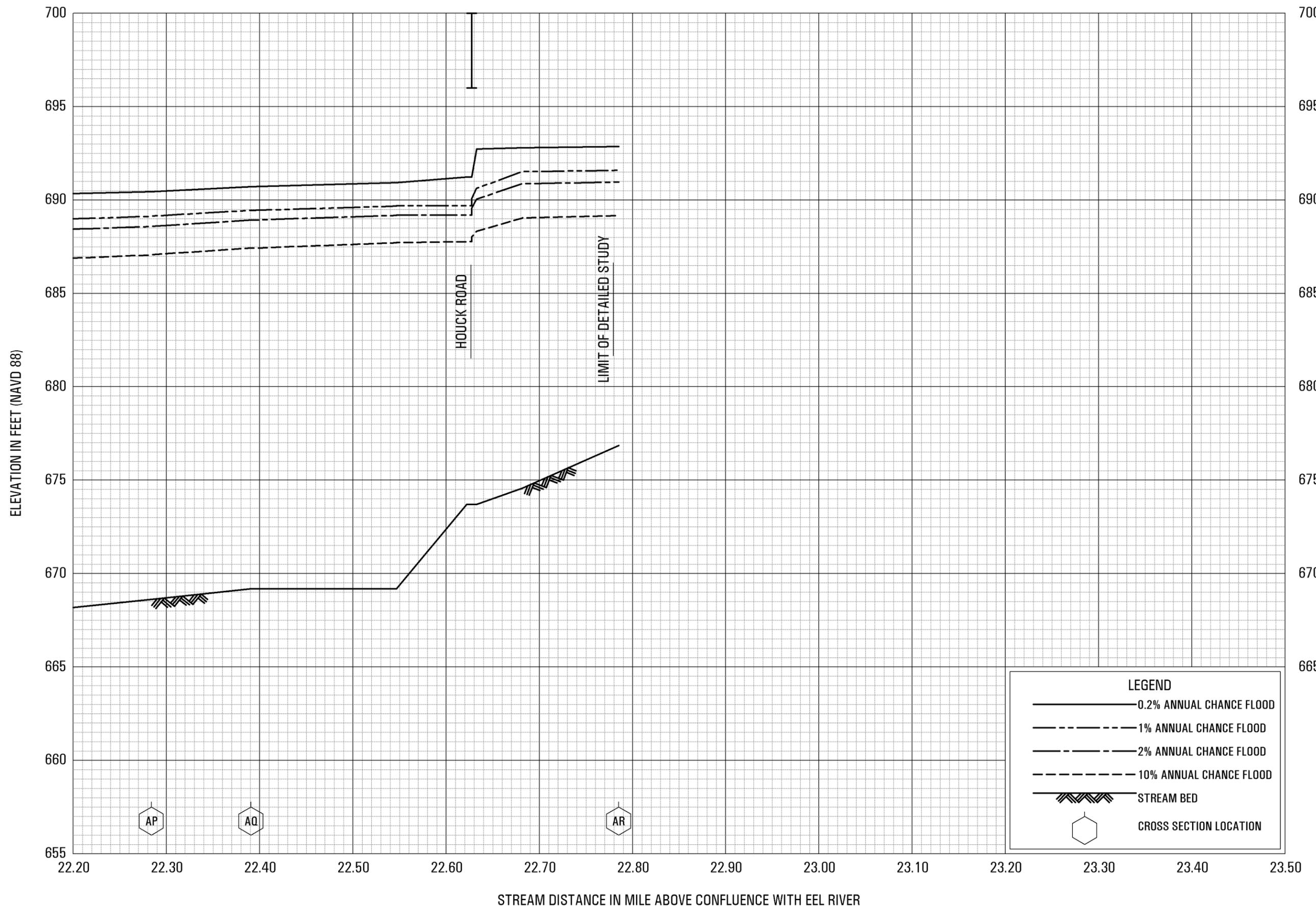


**FLOOD PROFILES**

**BIG WALNUT CREEK**

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

**PUTNAM COUNTY, IN  
AND INCORPORATED AREAS**



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