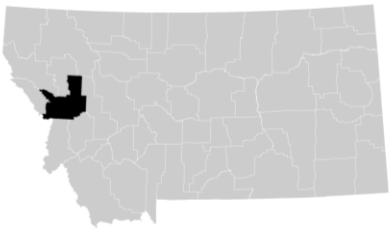
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 3



MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
MISSOULA COUNTY, UNINCORPORATED AREAS	300048
MISSOULA, CITY OF	300049

FEMA

REVISED:

OCTOBER 5, 2023

FLOOD INSURANCE STUDY NUMBER
30063CV001C
Version Number 2.6.4.6

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FLOOD INSURANCE STUDY REPORT
MISSOULA COUNTY, MONTANA

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be

charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as “Post-FIRM” buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community’s regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Missoula County.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8-Basin(s)	Located on FIRM Panel(s)	If not included Location of Flood Hazard Data
Missoula County, Unincorporated Areas	300048	17010202 17010203 17010204 17010205 17010209 17010211 17010212	30063C0025D[1] 30063C0032F 30063C0034F 30063C0035E[1] 30063C0042F 30063C0045E[1] 30063C0050E[1] 30063C0053F 30063C0055E[1] 30063C0061F 30063C0062F 30063C0063F 30063C0064F 30063C0075E[1] 30063C0100D[1] 30063C0125D[1] 30063C0150D[1] 30063C0175D[1] 30063C0177F 30063C0180E[1] 30063C0181F 30063C0183F 30063C0185E[1] 30063C0190E[1] 30063C0191F 30063C0195E[1] 30063C0225D[1] 30063C0250D[1] 30063C0275D[1] 30063C0300D[1] 30063C0325D[1] 30063C0350D[1] 30063C0375D[1] 30063C0400D[1] 30063C0425D[1] 30063C0450D[1] 30063C0475D[1] 30063C0500D[1] 30063C0525D[1] 30063C0550D[1] 30063C0575D[1] 30063C0600D[1] 30063C0625D[1] 30063C0650D[1] 30063C0675D[1] 30063C0700D[1] 30063C0717F	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8-Basin(s)	Located on FIRM Panel(s)	If not included Location of Flood Hazard Data
Missoula County, Unincorporated Areas	300048	17010202 17010203 17010204 17010205 17010209 17010211 17010212	30063C0725F[1] 30063C0736F 30063C0737F[1] 30063C0738F 30063C0739F 30063C0750E[1] 30063C0775D[1] 30063C0800D[1] 30063C0825E 30063C0850E 30063C0865E 30063C0870E 30063C0875E 30063C0890E 30063C0900D[1] 30063C0925D[1] 30063C0950D[1] 30063C0975D[1] 30063C1000D[1] 30063C1025D[1] 30063C1027F 30063C1031F 30063C1050F[1] 30063C1075D[1] 30063C1100D[1] 30063C1125E 30063C1135E 30063C1150D[1] 30063C1155E 30063C1160E 30063C1165E 30063C1170E 30063C1180E 30063C1185E 30063C1190E 30063C1195E 30063C1205E 30063C1210D[1] 30063C1215E 30063C1220E 30063C1240E 30063C1245E 30063C1250E[1] 30063C1275E 30063C1300D[1] 30063C1325D[1]	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8-Basin(s)	Located on FIRM Panel(s)	If not included Location of Flood Hazard Data
Missoula County, Unincorporated Areas	300048	17010202 17010203 17010204 17010205 17010209 17010211 17010212	30063C1350D[1] 30063C1375D[1] 30063C1395E 30063C1400D[1] 30063C1425E 30063C1435E 30063C1450E 30063C1455E 30063C1460E 30063C1465E 30063C1470E 30063C1480E 30063C1485E 30063C1490E 30063C1495D[1] 30063C1505E 30063C1510E 30063C1515D[1] 30063C1520E 30063C1540E 30063C1550E[1] 30063C1575D[1] 30063C1600D[1] 30063C1625D[1] 30063C1650D[1] 30063C1675D[1] 30063C1700D[1] 30063C1725D[1] 30063C1730E 30063C1735E 30063C1750E[1] 30063C1755E 30063C1760E 30063C1765E 30063C1770E 30063C1800D[1] 30063C1825D[1] 30063C1830E 30063C1835E 30063C1840E[1] 30063C1845E 30063C1855E 30063C1860E 30063C1900D[1]	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8-Basin(s)	Located on FIRM Panel(s)	If not included Location of Flood Hazard Data
Missoula, City of	300049	17010204 17010205	30063C1170E 30063C1185E 30063C1190E 30063C1195E 30063C1215E 30063C1220E 30063C1455E 30063C1460E 30063C1465E 30063C1470E 30063C1480E 30063C1485E	

[1] Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1-percent-annual-chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains; and 1-percent-annual-chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 32, “Map Repositories,” within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

The initial Countywide FIS Report for Missoula County became effective on August 16, 1988. Refer to Table for information about subsequent revisions to the FIRMs.

The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at **www.fema.gov/national-flood-insurance-program-community-rating-system** or contact your appropriate FEMA Regional Office for more information about this program.

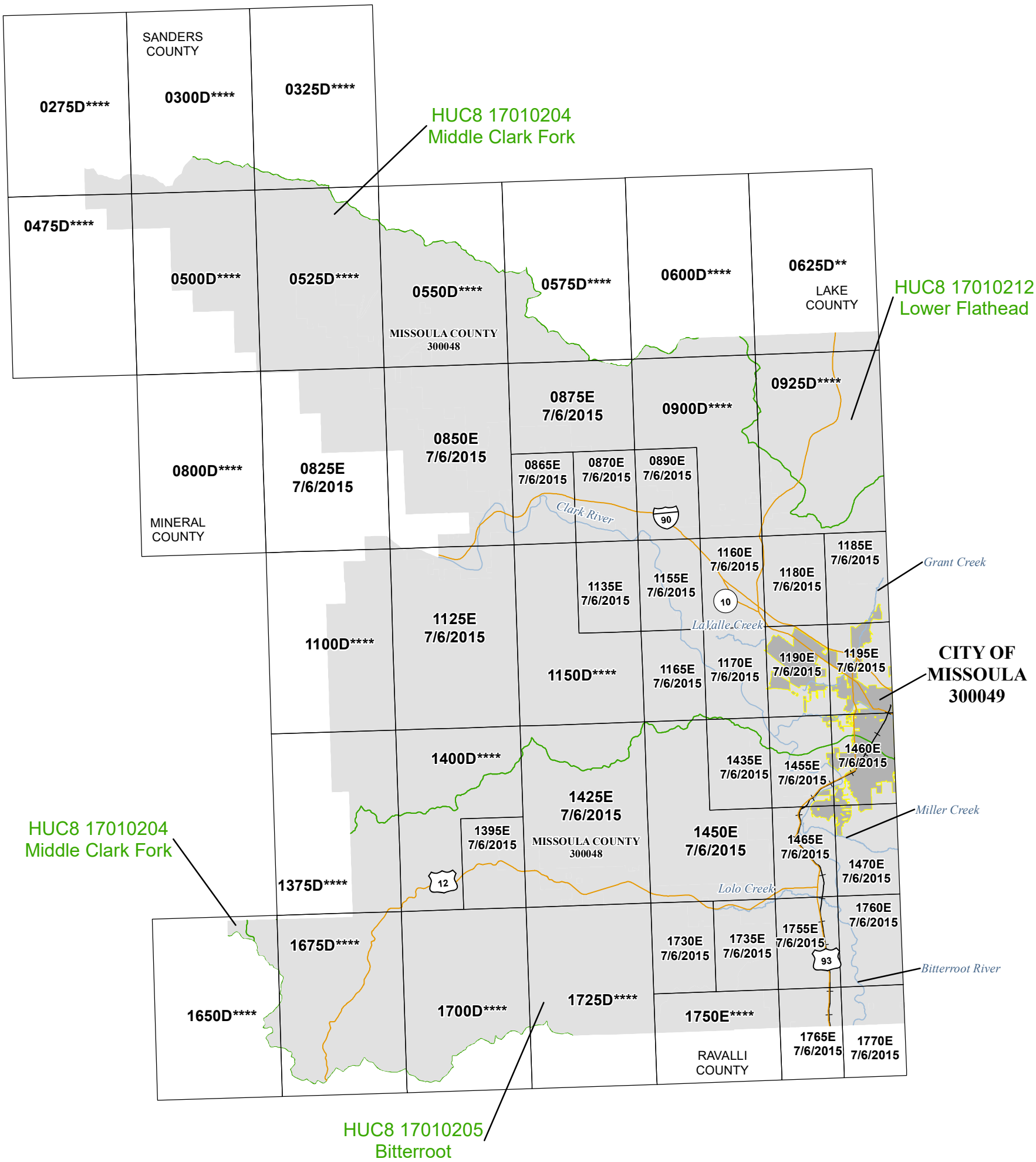
- Previous FIS Reports and FIRMs may have included levees that were accredited as reducing the risk associated with the 1-percent-annual-chance flood based on the information available and the mapping standards of the NFIP at that time. For FEMA to continue to accredit the identified levees, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

  Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented in Table of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE National Levee Database (**nld.usace.army.mil**). For all other levees, the user is encouraged to contact the appropriate local community.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Missoula County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and USGS HUC-8 codes.

Figure 1: FIRM Index



ATTENTION: The corporate limits shown on this FIRM Index are based on best information available at the time of publication. As such, they may be more current than those shown on the panels issued before October 5, 2023.

N

1 in = 5 miles 1:340,000

0 1.25 2.5 5 7.5 10 Miles

Map Projection:
Universal Transverse Mercator Zone 11 North;
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
**PANEL NOT PRINTED - AREA NOT INCLUDED
***PANEL NOT PRINTED - AREA OUTSIDE COUNTY BOUNDARY
**** PANEL NOT PRINTED - AREA IN ZONE D

INDEX LOCATOR DIAGRAM

THIS AREA SHOWN ON INDEX SHEET 1 OF 2

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX (Sheet 1 of 2)

MISSOULA COUNTY, MONTANA and Incorporated Areas

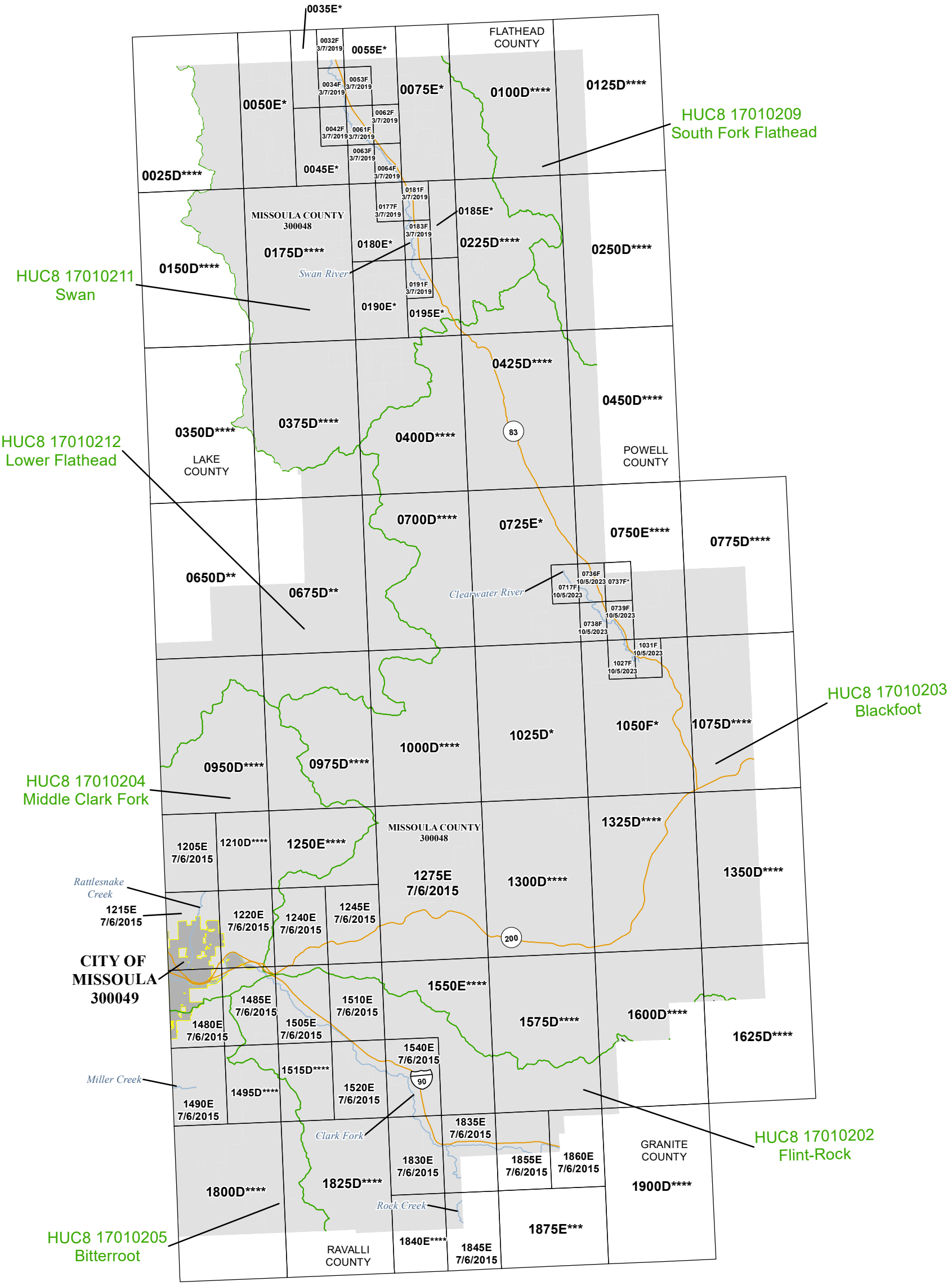
PANELS PRINTED:
0825, 0850, 0865, 0870, 0875, 0890, 1125, 1135, 1155, 1160, 1165, 1170, 1180, 1185, 1190, 1195, 1395, 1425, 1435, 1450, 1455, 1460, 1465, 1470, 1730, 1735, 1755, 1760, 1765, 1770

FEMA

MAP NUMBER
30063CIND1C

MAP REVISED
OCTOBER 5, 2023

Figure 1: FIRM Index (Continued)



ATTENTION: The corporate limits shown on this FIRM Index are based on best information available at the time of publication. As such, they may be more current than those shown on the panels issued before October 5, 2023.

N

1 in = 6 miles 1:380,000

Miles

0 1.5 3 6 9 12

Map Projection:
Universal Transverse Mercator Zone 11 North;
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
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INDEX LOCATOR DIAGRAM

THIS AREA SHOWN ON INDEX SHEET 1 OF 2

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX (Sheet 2 of 2)

MISSOULA COUNTY, MONTANA and Incorporated Areas

PANELS PRINTED:
0032, 0034, 0042, 0053, 0061, 0062, 0063, 0064, 0177, 0181, 0183, 0191, 0717, 0736, 0738, 0739, 1027, 1031, 1205, 1215, 1220, 1240, 1245, 1275, 1480, 1485, 1490, 1505, 1510, 1520, 1540, 1830, 1835, 1845, 1855, 1860

FEMA

MAP NUMBER
30063CIND2C

MAP REVISED
OCTOBER 5, 2023

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Mapping and Insurance eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 11. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight

Figure 2. FIRM Notes to Users

positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by the Montana State Library, dated 2017 & 2019; and the United States Department of Argriculture & Natural Resources Conservation Service, dated 2019. The digital orthophoto was provided by the U.S. Department of Agriculture, and published in 2015 & 2017. All data and imagery are at a scale of 1:24,000. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Missoula County, MT, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before October 5, 2023.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Missoula County, MT, effective October 5, 2023.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These

Figure 2. FIRM Notes to Users

plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Missoula County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood 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% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.
	Regulatory Floodway determined in Zone AE.

Figure 3: Map Legend for FIRM

OTHER AREAS OF FLOOD HAZARD

Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.

Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.

Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.

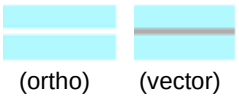
Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.

OTHER AREAS

Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

Unshaded Zone X: Areas of minimal flood hazard.

FLOOD HAZARD AND OTHER BOUNDARY LINES



Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)

Limit of Study

Jurisdiction Boundary

Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet

GENERAL STRUCTURES

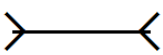
Aqueduct
Channel
Culvert
Storm Sewer

Channel, Culvert, Aqueduct, or Storm Sewer

Dam
Jetty
Weir

Dam, Jetty, Weir

Levee, Dike, or Floodwall



Bridge

Bridge

Figure 3: Map Legend for FIRM

REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad

Figure 3: Map Legend for FIRM

_____	Horizontal Reference Grid Line
⎯⎯	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
^{42}**76**^{000m}**E**	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Missoula County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1-percent-annual-chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1-percent and 0.2-percent-annual-chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1-percent-annual-chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Missoula County, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 2. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1-percent-annual-chance floodplain corresponds to the SFHAs. The 0.2-percent-annual-chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

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. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Bitterroot River	Missoula County, Unincorporated Areas	Confluence with Clark Fork	Ravalli County Boundary	17010205, 17010204	20	Y	AE	1975
Blackfoot River	Missoula County, Unincorporated Areas	Confluence with Clark Fork	Approximately 1 Mile Upstream of Marco Flat Bridge	17010203	4.2	Y	AE	1973
Clark Fork	Missoula County, Unincorporated Areas; Missoula, City of	Cross Section CJ	Cross Section CQ	17010202, 17010204	2	Y	AE	2008
Clark Fork	Missoula County, Unincorporated Areas; Missoula, City of	Hellgate Canyon	Granite County Boundary	17010202, 17010204	30	Y	AE	1974
Clark Fork	Missoula County, Unincorporated Areas; Missoula, City of	Mineral County Boundary	Confluence with Bitterroot River	17010202, 17010204	30	Y	AE	1973
Clark Fork	Missoula County, Unincorporated Areas; Missoula, City of	Confluence with Bitterroot River	Hellgate Canyon	17010202, 17010204	7.6	Y	AE	1967
Clearwater River	Missoula County, Unincorporated Areas	1,038 feet above confluence with Salmon Lake	Approximately 550 feet downstream of Boy Scout Rd	17010203	9.4	Y	AE	2020
DS Glacier Split	Missoula County, Unincorporated Areas	Confluence with Swan River	Approximately 8,300 feet upstream to split from Swan River	17010211	1.6	Y	AE	2016
Glacier Rd Split	Missoula County, Unincorporated Areas	Confluence with Swan River	Approximately 1,800 feet upstream to split from Swan River	17010211	0.3	N	AE	2016
Grant Creek	Missoula County, Unincorporated Areas; Missoula, City of	Bridge at Interstate Highway 90	Approximately 40 Feet Upstream of Snow Bowl Rd	17010204	3.5	Y	AE	1973

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
R Split	Missoula County, Unincorporated Areas	Confluence with Swan River	Approximately 290 feet upstream of Guest Ranch Road crossing to split from Swan River	17010211	0.2	Y	AE	2016
Honeysuckle Drainage	Missoula, City of	100 Feet East of Reserve Street	150 South of Cohosset Drive	17010205	0.6	N	AE	1977
Kauffman Split	Missoula County, Unincorporated Areas	Confluence with Swan River	Approximately 3,800 feet upstream to split from Swan River	17010211	0.7	Y	AE	2016
La Valle Creek	Missoula County, Unincorporated Areas	Frenchtown Irrigation District Ditch	1 Mile Upstream of County Road 13	17010204	3.5	Y	AE	2006
Lolo Creek	Missoula County, Unincorporated Areas	Confluence with Guest Bitterroot River	6.5 Miles Southwest of the City of Missoula	17010205	6.5	Y	AE	1975
Lower Grant Creek	Missoula County, Unincorporated Areas; Missoula, City of	Confluence with Clark Fork	Burlington Northern and Santa Fe Railway	17010204	3.7	N	AE	2011
Miller Creek	Missoula County, Unincorporated Areas	Confluence with Bitterroot River	600 Feet Upstream of Mossy Ridge	17010205	6	Y	AE	1979
Pattee Creek	Missoula County, Unincorporated Areas; Missoula, City of	Intersection of Higgins Avenue and Pattee Canyon Drive	1,300 Feet Upstream of Culvert on Pattee Canyon Drive	17010205	0.8	Y	AE	2004
Rattlesnake Creek	Missoula County, Unincorporated Areas; Missoula, City of	Confluence with Clark Fork	5.6 Miles North of the City of Missoula	17010204	5.6	Y	AE	1976
Rock Creek	Missoula County, Unincorporated Areas	Confluence with Clark Fork	Granite County Boundary	17010202	5.6	Y	AE	1973
Swan River	Missoula County, Unincorporated Areas	Lake County Boundary	Confluence of Beaver Creek	17010211	19.1	Y	AE	2016

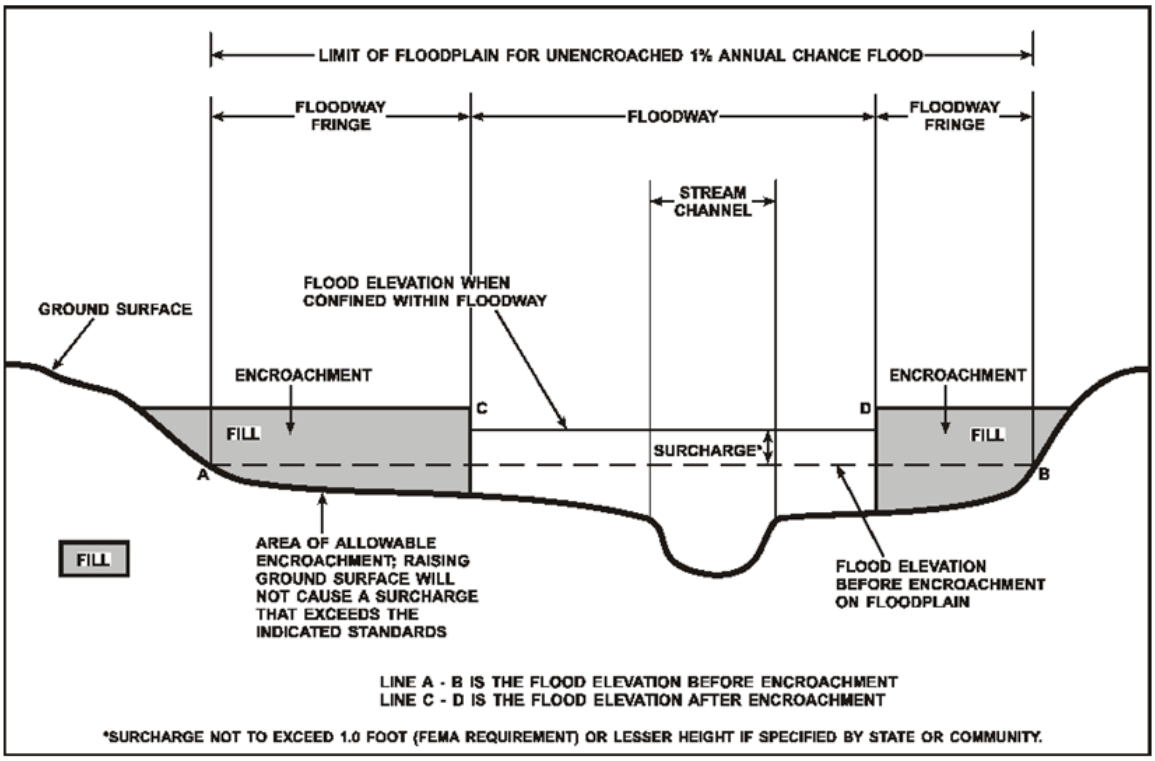
2.2 Floodways

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 balancing floodplain development against increasing flood hazard. With this approach, the area of the 1-percent-annual-chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1-percent-annual-chance flood. The floodway fringe is the area between the floodway and the 1-percent-annual-chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1-percent-annual-chance flood more than 0.5 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. Regulations for State require communities in Missoula County to limit increases caused by encroachment to 0.5 foot (MDNRC, 2014) and several communities have adopted additional restrictions. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. 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 on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The BFE is the elevation of the 1-percent-annual-chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

BFEs are primarily intended for flood insurance rating purposes. Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. 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. For example, the user may use the FIRM to determine the stream station of a location of interest and then use the profile to determine the 1-percent annual chance elevation at that location. Because only selected cross sections may be shown on the FIRM for riverine areas, the profile should be used to obtain the flood elevation between mapped cross sections. Additionally, for riverine areas, whole-foot elevations shown on the FIRM may not exactly reflect the elevations derived from the hydraulic analyses; therefore, elevations obtained from the profile may more accurately reflect the results of the hydraulic analysis.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Product.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Product.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Product.

Figure 5: Wave Runup Transect Schematic

[Not Applicable to this Flood Risk Project]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Product.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Product.

Figure 6: Coastal Transect Schematic

[Not Applicable to this Flood Risk Project]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Product.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, "Map Legend for FIRM." Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Missoula County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Missoula County, Unincorporated Areas	A, AE, AH, AO, X
Missoula, City of	A, AE, AO, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Bitterroot	17010205	Bitterroot River	Begins at the Ravalli County Boundary, flows north to the Confluence with Clark Fork	2,858
Middle Clark Fork	17010204	Clark Fork	Begins at the confluence of Blackfoot River and Clark Fork, flows northwest to the Mineral County Boundary	1,985

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Blackfoot	17010203	Blackfoot River	Begins at the Powell County Boundary, flows west to the confluence of Blackfoot River and Clark Fork	2,313
Flint-Rock	17010202	Clark Fork	Begins at the Granite County Boundary, flows northwest to the confluence of Blackfoot River and Clark Fork	1,820
Swan River	17010211	Swan River	Begins at the confluence of Beaver Creek, flows northwest to the Lake County Boundary	271

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for Missoula County by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Bitterroot River	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. A high ground water table contributes to shallow flooding in low-lying areas along Bitterroot River. June of 1974 flooding along the Bitterroot River was estimated at 29,000 cubic feet per second.
Blackfoot River	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. Winter flooding has occurred due to ice jams in isolated areas.
Clark Fork	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. A high ground water table contributes to shallow flooding in low-lying areas along Clark Fork. Winter flooding has occurred due to ice jams in isolated areas. May and June of 1908 was the largest known flood event to occur in Missoula County. Clark Fork had an estimated peak flow of 48,000 cubic feet per second.
Clearwater River	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Grant Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Honeysuckle Drainage Swale	Steep hills adjacent to the lowland alluvial area. Relatively large size of the contributory drainage area. Rapid urbanization of the formerly rural and agricultural land, including development on the hillsides. An inadequate stormwater drainage system in the developing area.
La Valle Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Lolo Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Lower Grant Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Miller Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Pattee Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Rattlesnake Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff.
Rock Creek	The most severe flooding occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. On June 20, 1975.
Swan River	The most severe flooding in the Swan Valley typically occurs in the spring and early summer months as a result of snowmelt and/or rainfall runoff. On occasion, localized flooding is caused by long, sustained rainfall and/or ice jams and debris jams.

Table 6 contains information about historic flood elevations in the communities within.

Table 6: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Bitterroot River	Bitterroot River near Missoula	13.1	1997	100	USGS gage
Blackfoot River	Blackfoot River near Bonner, MT	10.9	1964	20	USGS gage
Clark Fork	Clark Fork below Missoula, MT	12.2	1997	50	USGS gage
Clark Fork	Clark Fork above Missoula, MT	13.75	1975	50	USGS gage
Lolo Creek	Lolo Creek near Lolo, MT	n/a	1913	50	USGS gage
Rattlesnake Creek	Rattlesnake Creek at Missoula, MT	10.2	1964	10	USGS gage
Rock Creek	Rock Creek near Clinton	8.5	1972	10	USGS gage

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within Missoula County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Bitterroot River	N/A	Dike	Near the Lolo sewage-treatment plant	Earthfill dike, partially washed away in the 1975 flooding
Clark Fork	N/A	Dikes	Smurfit-Stone Paper Mill northwest of Missoula	Earthfill dike, partially washed away in the 1975 flooding
Clark Fork	N/A	Berm and riprap	Areas of the Reserve Street Bridge west of the City of Missoula	Shaping and rock riprap stabalization
Lolo Creek	N/A	Dike	North bank immediately downstream of Burlington Northern Railroad Bridge	Non-certified earthfill dike

4.4 Levees

For purposes of the NFIP, FEMA only recognizes levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with comprehensive floodplain management criteria. The Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10) describes the information needed for FEMA to determine if a levee system reduces the risk from the 1-percent-annual-chance flood. This information must be supplied to FEMA by the community or other party when a flood risk study or restudy is conducted, when FIRMs are revised, or upon FEMA request. FEMA reviews the information for the purpose of establishing the appropriate FIRM flood zone.

Levee systems that are determined to reduce the risk from the 1-percent-annual-chance flood are accredited by FEMA. FEMA can also grant provisional accreditation to a levee system that was previously accredited on an effective FIRM and for which FEMA is awaiting data and/or documentation to demonstrate compliance with Section 65.10. These levee systems are referred to as Provisionally Accredited Levees, or PALs. Provisional accreditation provides communities and levee owners with a specified timeframe to obtain the necessary data to confirm the levee's certification status. Accredited levee systems and PALs are shown on the FIRM using the symbology shown in Figure 3 and in Table 8. If the required information for a PAL is not submitted within the required timeframe, or if information indicates that a levee system no longer meets Section 65.10, FEMA will de-accredit the levee system and issue an effective FIRM showing the levee-impacted area as a SFHA.

FEMA coordinates its programs with USACE, who may inspect, maintain, and repair levee systems. The USACE has authority under Public Law 84-99 to supplement local efforts to repair flood control projects that are damaged by floods. Like FEMA, the USACE provides a program to allow public sponsors or operators to address levee system maintenance deficiencies. Failure to do so within the required timeframe results in the levee system being placed in an inactive status in the USACE Rehabilitation and Inspection Program. Levee systems in an inactive status are ineligible for rehabilitation assistance under Public Law 84-99.

FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within Missoula County. Table 8, "Levees," lists all accredited levees, PALs, and de-accredited levees shown on the FIRM for this FIS Report. Other categories of levees may also be included in the table. The Levee ID shown in this table may not match numbers based on other identification systems that were listed in previous FIS Reports. Levees identified as PALs in the table are labeled on the FIRM to indicate their provisional status.

Please note that the information presented in Table 8 is subject to change at any time. For that reason, the latest information regarding any USACE structure presented in the table should be obtained by contacting USACE and accessing the USACE National Levee Database. For levees owned and/or operated by someone other than the USACE, contact the local community shown in Table 30.

Please note that FEMA has identified levees in this jurisdiction that have not been demonstrated by the community or levee owner to meet the requirements of 44 CFR 65.10 of the NFIP regulations as it relates to the levee's capacity to provide 1-percent-annual-chance flood protection. As such, the existing flood hazard analysis in the affected areas has been carried forward from the previously-printed effective FIRM panel(s) and the area has been clearly identified on the FIRM panel with notes and bounding lines. This has been done to inform users that a temporary mapping action has been put in place until such time as FEMA is able to initiate a new flood risk project to apply new flood hazard mapping procedures for leveed areas. Levees and their accreditation status are listed in Table 8 of this FIS Report.

Table 8: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Missoula County, Unincorporated Areas	Clark River	South Bank	Missoula County	Yes	5505000201	Yes	30063C1195E, 30063C1455E, 30063C1460E
Missoula, City of	Clark River	North Bank	City of Missoula	Yes	5505000005	Yes	30063C1480E
Missoula, City of	Clark River	North Bank	City of Missoula	Yes	5505000004	Yes	30063C1195E
Missoula, City of	Grant Creek	West Bank	City of Missoula	Yes	5504000108	Yes	30063C1195E

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, 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 at least once on the average during any 10-, 25-, 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-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-percent-annual-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 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 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.

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10%Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bitterroot River	At confluence with Clark Fork	2,842	20,900	*	29,700	31,800	42,000
Bitterroot River	At 4.3 miles below confluence of Lolo Creek	2,720	20,400	*	29,000	31,000	41,000
Bitterroot River	Just upstream of confluence of Lolo Creek	2,450	19,200	*	27,200	29,100	38,500
Blackfoot River	At USGS Gage No. 3400	2,290	16,800	*	22,500	25,000	31,200
Clark Fork	At downstream Limit of Detailed Study	9,272	49,250	*	61,000	67,000	86,000
Clark Fork	At USGS Gage No. 3530 below Missoula	9,003	47,000	*	58,000	64,000	82,000
Clark Fork	At USGS Gage No. 3405 above Missoula	5,999	27,000	*	38,200	42,500	56,000
Clark Fork	Just upstream of confluence of Blackfoot River	3,668	15,000	*	22,500	26,000	35,500
Clearwater River	Upstream of confluence with Morrel Creek	2,310	1,630	1,940	2,200	2,460	3,010
Clearwater River	Upstream of confluence with Owl Creek	2,310	1,840	2,280	2,620	2,990	3,890

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10%Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Clearwater River	Downstream of confluence with Owl Creek	2,310	2,440	2,990	3,440	3,990	5,040
Grant Creek	At Interstate Highway 90	25	245	*	380	465	730
Honeysuckle Drainage Swale	100 Feet East of Reserve Street	–[1]	–[1]	–[1]	–[1]	–[1]	–[1]
La Valle Creek	At Mullan Road Crossing	27	448	*	778	943	1,381
Lolo Creek	At confluence with Bitterroot River	270	2,300	*	2,900	3,300	3,800
Lolo Creek	At USGS Gage No. 3520	250	2,100	*	2,700	3,000	3,500
Lower Grant Creek	At confluence with Clark Fork	29.6	170	*	358	629	864
Miller Creek	At confluence with Bitterroot River	48	350	*	550	675	1,150
Pattee Creek	At confluence with Bitterroot River	16	109	*	250	348	780
Pattee Creek	At South Higgins Avenue in the City of Missoula, Total Drainage	9.8	105	*	165	195	265
Rattlesnake Creek	At USGS Gage No. 3410 in the City of Missoula	80	1,905	*	2,690	3,000	3,750

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10%Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Rock Creek	At confluence with Clark Fork	885	6,200	*	8,300	9,200	11,200
South Drainage East	At South Higgins Avenue in the City of Missoula, Total Drainage	1.3	45	*	70	80	105
South Drainage West	At Miller Creek Road in the City of Missoula, Total Drainage	1.7	25	*	40	50	65
Swan River	Upstream Study Limits	70.6	1,230	1,400	1,510	1,630	1,890
Swan River	Confluence with Holland Creek	109.7	1,730	1,960	2,120	2,280	2,650
Swan River	Confluence with Buck Creek	137.6	2,060	2,330	2,520	2,720	3,150
Swan River	Confluence with Glacier Creek	230.9	3,060	3,470	3,750	4,040	4,680
Swan River	Confluence with Cold Creek	271.1	3,470	3,920	4,250	4,560	5,290

*Not Calculated for this Flood Risk Project

[1] Data not Available

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 10: Summary of Non-Coastal Stillwater Elevations

[Not Applicable to this Flood Risk Project]

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Bitterroot River	12352500	USGS	Bitterroot River near Missoula, MT	2,824	1900	1904
Bitterroot River	12344000	USGS	Bitterroot River near Darby, MT	1,050	1937	1975
Blackfoot River	12340000	USGS	Blackfoot River near Bonner, MT	2,287	1899	1901
Blackfoot River	12340000	USGS	Blackfoot River near Bonner, MT	2,287	1903	1905
Blackfoot River	12335000	USGS	Blackfoot River near Helmville, MT	482	1940	1953
Clark Fork	12353000	USGS	Clark Fork below Missoula, MT	9,017	1929	1995
Clark Fork	12340500	USGS	Clark Fork above Missoula, MT	6,021	1929	1995
Clark Fork	12354500	USGS	Clark Fork at St. Regis	10,728	1911	1923
Clark Fork	12354500	USGS	Clark Fork at St. Regis	10,728	1929	1975
Clark Fork	12389000	USGS	Clark Fork near Plains, MT	19,964	1912	1975

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Clearwater River	12339450	USGS	Clearwater River near Clearwater MT	364	10/1/1974	9/29/1992
Lolo Creek	12352000	USGS	Lolo Creek above Sleeman Creek near Lolo, MT	250	1950	1960
Rattlesnake Creek	12341000	USGS	Rattlesnake Creek at Missoula, MT	80.7	1958	1967
Swan River	12369200	USGS	Swan River near Condon, MT	69.1	1973	1992
Swan River	12370000	USGS	Swan River near Bigfork, MT	671	1922	2013

5.2 Hydraulic Analyses

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. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. 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. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 23, “Floodway Data.”

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided inTable 13. Roughness

coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bitterroot River	Confluence with Clark Fork	Ravalli County Boundary	Log-Pearson III flood frequency analysis; USGS Regional Flood Prediction Equation (USGS, 1976)	HEC-2	1975	AE w/ Floodway	Below water cross sections from Flood Survey, 1977; Soil Conservation Survey published a report on the hydrology of Bitterroot River drainage and some information was incorporated into the study (SCS, 1972).
Blackfoot River	Confluence with Clark Fork	Approximately 1 mile upstream of Marco Flat Bridge	Log-Pearson III flood frequency analysis; USGS Regional Flood Prediction Equation	HEC-2	1973	AE w/ Floodway	Complete valley cross sections from Flood Survey, 1977
Clark Fork	Mineral County Bounty	Granite County Boundary	Log-Pearson III flood frequency analysis	HEC-2	1976	AE w/ Floodway	Below water cross sections from Flood Survey, 1977
Clearwater River	Feet above confluence with Salmon Lake	Approximately 550 feet upstream of Boy Scout Rd	Regional regression analysis, Basin area-weighted gage transfer	HEC-RAS 5.0.7	December 2019	AE w/ Floodway	
DS Glacier Split	Confluence with Swan River	Approximately 1.6 miles upstream of confluence with Swan River	Log interpolation between two gages: Log-Pearson III flood frequency analysis (Gage 12370000) and Move.1 analysis (Gage 12369200)	HEC-RAS, 4.1.0	November 2016	AE w/ Floodway	Split flow path of Swan River; Swan River model used lateral weirs to calculate unsteady flows for DS Glacier Split

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Glacier Rd Split	Confluence with Swan River	Approximately 1,800 feet upstream of confluence with Swan River	Log interpolation between two gages: Log-Pearson III flood frequency analysis (Gage 12370000) and Move.1 analysis (Gage 12369200)	HEC-RAS, 4.1.0	November 2016	AE	Split flow path of Swan River; Swan River model used lateral weirs to calculate unsteady flows for Glacier Rd Split
Grant Creek	Approximately 60 feet downstream of East Bound Exit Ramp of I-90	Approximately 40 feet upstream of Road to Snowbowl	USGS Open File Report 81-917	HEC-2	1973	AE w/ Floodway	
Guest R Split	Confluence with Swan River	Approximately 290 feet upstream of Guest Ranch Road	Log interpolation between two gages: Log-Pearson III flood frequency analysis (Gage 12370000) and Move.1 analysis (Gage 12369200)	HEC-RAS, 4.1.0	November 2016	AE w/ Floodway	Split flow path of Swan River; Swan River model used lateral weirs to calculate unsteady flows for Guest R Split
Honeysuckle Drainage Swale	100 feet east of Reserve Street	150 feet south of Cohosset Drive			1977	AE	Part of the South Hills Area Storm Drainage Plan (TD&H, 1977)

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Kauffman Split	Confluence with Swan River	Approximately 3,800 feet upstream of confluence with Swan River	Log interpolation between two gages: Log-Pearson III flood frequency analysis (Gage 12370000) and Move.1 analysis (Gage 12369200)	HEC-RAS, 4.1.0	November 2016	AE w/ Floodway	Split flow path of Swan River; Swan River model used lateral weirs to calculate unsteady flows for Kauffman Split
La Valle Creek	Frenchtown Irrigation District Ditch	Approximately 1 Mile Upstream of County Road 13	USGS Regression Equations (CCH Hydrology, 2006)	HEC-RAS 3.1.3	2006	AE w/ Floodway	
Lolo Creek	Confluence with Bitterroot River	Approximately 6.5 miles southwest of the City of Missoula	Log-Pearson III flood frequency analysis; USGS Regional Flood Prediction Equation; Dodge equation	HEC-2	1975	AE w/ Floodway	Increased drainage area adjustment done using Open-File Report 75-650
Lower Grant Creek	Confluence with Clark Fork	Approximately 20 feet downstream of Burlington Northern Rail Road			2011	AE	LOMR # 11-08-0184P

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Miller Creek	Confluence with Bitterroot River	600 Feet Upstream of Mossy Ridge	USGS Open File Report 81-917	HEC-2	1979	AE w/ Floodway	A small portion of Miller Creek was field surveyed for the Rodeo Ranchettes Subdivision, and cross section geometry was supplemented with topographic information (Pro Consults, 1979)
Pattee Creek	Intersection of Higgins Avenue and Pattee Canyon Drive	1,300 Feet Upstream of Culvert on Pattee Canyon Drive	USGS Regional Flood Prediction Equation; Dodge equation; SCS rainfall runoff method	HEC-2	1977	AE w/ Floodway	Below water cross sections from Flood Survey, 1977
Rattlesnake Creek	Confluence with Clark Fork	5.6 miles north of the City of Missoula	Log-Pearson III flood frequency analysis; USGS Regional Flood Prediction Equation	HEC-2	1976	AE w/ Floodway	
Rock Creek	Confluence with Clark Fork	Granite County line	USACE Study	HEC-2	1973	AE w/ Floodway	
Swan River	Lake County Boundary	Confluence with Beaver Creek	Log interpolation between two gages: Log-Pearson III flood frequency analysis (Gage 12370000) and Move.1 analysis (Gage 12369200)	HEC-RAS, 4.1.0	November 2016	AE w/ Floodway	Split flow discharges across junctions and lateral weirs

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Bitterrroot River	0.033 – 0.043	0.050 - 0.110
Blackfoot River	0.032 – 0.042	0.045 - 0.060
Clark Fork	0.024 – 0.060	0.032 - 0.090
Clearwater River	0.038	0.04 - 0.13
DS Glacier Split	0.055	0.07 - 0.1
Glacier Rd Split	0.05 – 0.1	0.05 - 0.1
Grant Creek	.060 – .080	0.080 - 0.125
Guest R Split	0.05	0.08 - 0.1
Honeysuckle Drainage Swale	0.035	0.035
Kauffman Split	0.05	0.06 - 0.1
La Valle Creek	0.045	0.07 - 0.08
Lolo Creek	0.036 – 0.047	0.050 - 0.095
Lower Grant Creek	0.025 – 0.035	0.035 - 0.065
Miller Creek	.040 - .045	0.050 - 0.055
Pattee Creek	0.030 – 0.031	0.045 - 0.050
Rattlesnake Creek	0.045 – 0.080	0.050 - 0.125
Rock Creek	0.040 – 0.100	0.045 - 0.110
Swan River	0.045 - 0.05	0.05 - 0.1

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Product.

Table 14: Summary of Coastal Analyses
[Not Applicable to this Flood Risk Project]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Product.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas
[Not Applicable to this Flood Risk Project]

Table 15: Tide Gage Analysis Specifics
[Not Applicable to this Flood Risk Project]

5.3.2 Waves

This section is not applicable to this Flood Risk Product.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Product.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Product.

Table 16: Coastal Transect Parameters
[Not Applicable to this Flood Risk Project]

Figure 9: Transect Location Map
[Not Applicable to this Flood Risk Project]

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Product.

Table 17: Summary of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

Table 18: Results of Alluvial Fan Analyses
[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

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 used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at 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 archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data. To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

Table 19: Countywide Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

Table 20: Stream-Based Vertical Datum Conversion

Flooding Source	Average Vertical Datum Conversion Factor (feet)
Bitterroot River	3.5
Blackfoot River	3.5
Clark Fork	3.6
Clearwater River	3.7
Grant Creek	3.6
Honeysuckle Drainage Swale	3.5
LaValle Creek	3.5
Lolo Creek	3.6
Lower Grant Creek	3.5
Miller Creek	3.5
Pattee Creek	3.5
Rattlesnake Creek	3.6
Rock Creek	3.6

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM Database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, https://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
USDA-FSA-AFPO Digital Ortho Mosiac	Aerial Photography Field Office	2017	1 meter GSD	2017 NAIP Imagery used for Missoula County, MT Study 20-08-0033S - grayscaled using Band 2 - 60 centimeter (2 foot) resolution
Digital Orthophoto	United States Department of Agriculture	2015	1 meter GSD	Color orthoimagery was provided for the county (2015 effective)
Montana Political Boundaries	Montana State Library	2019	1:24,000	Spatial and attribute information for Missoula County political boundaries
PLSS Framework Montana	Montana State Library	2017	1:24,000	Spatial and attribute information for Missoula County PLSS areas
Roads and Railroads from the Montana Transportation Framework	Montana State Library	2017	1:24,000	Spatial and attribute information for Missoula County transportation features
Montana Hydrography Framework (National Hydrography Dataset)	Montana State Library	2019	1:24,000	Spatial and attribute information for Missoula County water lines and areas
Watershed Boundary Dataset for Montana	US Department of Agriculture and Natural Resources Conservation Services	2019	1:24,000	Spatial and attribute information for Missoula County HUC8 watersheds

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1-percent 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.

The floodway widths presented in this FIS Report and on the FIRM were 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. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_z$	DEM Resolution	Citation
Missoula County	Clearwater River	Light Detection and Ranging data (LiDAR)	N/A	N/A	0.064m	N/A	Quantum Spatial Inc. 2020
Missoula County	Clark Fork, Bitterroot River, Blackfoot River, Grant Creek, Miller Creek, Lolo Creek, Rattlesnake Creek	Contour	N/A	2ft	N/A	N/A	Contours generated from 1999 LiDAR data in the vicinity of the City of Missoula
Missoula County	La Valle Creek	Contour	N/A	2 ft	N/A	N/A	Contours created from LiDAR flown January 2006

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_z$	DEM Resolution	Citation
Missoula County	Swan River	Light Detection and Ranging data (LiDAR)	N/A	N/A	15 cm	3 foot	Quantum Spatial Inc. 2015

BFEs shown at cross sections on the FIRM represent the 1-percent-annual-chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

Table 23: Floodway Data

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,800	410	3,491	9.1	3,111.8	3,111.8	3,111.8	0.0
B	2,850	339	4,101	7.8	3,112.9	3,112.9	3,113.2	0.3
C	2,880	341	4,174	7.6	3,112.9	3,112.9	3,113.4	0.5
D	3,080	545	6,167	5.2	3,113.8	3,113.8	3,114.2	0.4
E	5,105	1,454	9,005	3.5	3,115.4	3,115.4	3,115.7	0.3
F	9,030	1,416	8,399	3.8	3,118.5	3,118.5	3,119.0	0.5
G	13,580	1,199	7,238	4.4	3,122.7	3,122.7	3,123.2	0.5
H	16,805	1,973	12,763	2.5	3,125.2	3,125.2	3,125.7	0.5
I	20,725	2,524	14,544	2.2	3,126.6	3,126.6	3,127.1	0.5
J	24,325	323	3,754	8.5	3,128.7	3,128.7	3,129.1	0.4
K	25,550	322	4,900	6.5	3,130.4	3,130.4	3,130.9	0.5
L	25,625	322	4,919	6.5	3,130.5	3,130.5	3,131.0	0.5
M	25,675	364	4,709	6.8	3,130.5	3,130.5	3,131.0	0.5
N	25,700	364	4,727	6.7	3,130.5	3,130.5	3,131.0	0.5
O	25,850	835	6,471	4.9	3,131.0	3,131.0	3,131.4	0.4
P	29,350	2,801	19,260	1.7	3,132.9	3,132.9	3,133.4	0.5
Q	32,850	580	4,254	7.5	3,134.2	3,134.2	3,134.6	0.4
R	36,250	777	7,593	4.2	3,138.3	3,138.3	3,138.8	0.5
S	38,550	1,894	15,623	2.0	3,139.8	3,139.8	3,140.3	0.5
T	41,300	1,345	8,770	3.5	3,141.0	3,141.0	3,141.5	0.5
U	44,150	1,589	10,585	2.9	3,142.4	3,142.4	3,142.9	0.5
V	46,450	2,246	14,476	2.1	3,143.6	3,143.6	3,144.1	0.5

[1]Feet above confluence with Clark Fork

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: BITTERROOT RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	50,450	1,118	7,783	4.0	3,145.9	3,145.9	3,146.4	0.5
X	53,900	2,044	11,973	2.6	3,148.4	3,148.4	3,148.9	0.5
Y	58,000	1,688	10,563	2.9	3,151.2	3,151.2	3,151.7	0.5
Z	62,150	1,209	8,566	3.6	3,154.6	3,154.6	3,155.1	0.5
AA	65,400	1,556	11,101	2.8	3,157.2	3,157.2	3,157.7	0.5
AB	72,680	2,050	13,469	2.2	3,162.5	3,162.5	3,163.0	0.5
AC	76,840	2,944	14,666	2.0	3,165.1	3,165.1	3,165.6	0.5
AD	77,865	2,942	11,817	2.5	3,165.7	3,165.7	3,166.2	0.5
AE	77,890	2,936	11,821	2.5	3,165.7	3,165.7	3,166.2	0.5
AF	78,340	3,147	10,715	2.7	3,166.2	3,166.2	3,166.7	0.5
AG	81,340	4,508	19,688	1.5	3,168.3	3,168.3	3,168.8	0.5
AH	83,380	3,511	11,063	2.6	3,169.9	3,169.9	3,170.4	0.5
AI	87,990	1,542	8,274	3.5	3,175.6	3,175.6	3,176.1	0.5
AJ	92.140	4,956	16,009	1.8	3,178.9	3,178.9	3,179.4	0.5
AK	94,690	4,229	11,103	2.6	3,181.2	3,181.2	3,181.6	0.4
AL	99,215	2,595	10,339	2.8	3,186.0	3,186.0	3,186.5	0.5
AM	102,265	3,338	11,809	2.5	3,188.8	3,188.8	3,189.2	0.4
AN	106,265	2,315/310[2]	12,078	2.4	3,192.1	3,192.1	3,192.6	0.5

[1]Feet above confluence with Clark Fork
[2]Left Channel / Right Channel

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: BITTERROOT RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	350	218	5,035	5.0	3,268.7	3,264.1[2]	3,264.6[2]	0.5
B	460	219	5,035	5.0	3,268.7	3,264.2[2]	3,264.7[2]	0.5
C	785	228	5,527	4.5	3,268.7	3,264.4[2]	3,264.9[2]	0.5
D	825	228	5,530	4.5	3,268.7	3,264.5[2]	3,265.0[2]	0.5
E	1,115	322	6,297	4.0	3,268.7	3,264.7[2]	3,265.2[2]	0.5
F	1,240	263	5,740	4.4	3,268.7	3,264.7[2]	3,265.2[2]	0.5
G	1,290	263	5,753	4.4	3,268.7	3,264.8[2]	3,265.3[2]	0.5
H	1,470	310	6,058	4.1	3,268.7	3,264.8[2]	3,265.3[2]	0.5
I	1,530	311	6,066	4.1	3,268.7	3,265.0[2]	3,265.5[2]	0.5
J	1,930	289	5,578	4.5	3,268.7	3,265.1[2]	3,265.5[2]	0.4
K	3,090	266	5,250	4.8	3,268.7	3,265.5[2]	3,265.9[2]	0.4
L	4,990	227	3,820	6.5	3,268.7	3,266.3[2]	3,266.7[2]	0.4
M	5,190	228	3,815	6.5	3,268.7	3,266.5[2]	3,266.8[2]	0.3
N	5,210	205	3,149	7.9	3,271.5	3,271.5	3,271.9	0.4
O	5,335	229	3,527	7.1	3,271.8	3,271.8	3,272.1	0.3
P	6,385	143	2,513	9.9	3,272.4	3,272.4	3,272.7	0.3
Q	7,385	312	4,309	5.8	3,274.4	3,274.4	3,274.6	0.2
R	7,465	312	4,411	5.7	3,274.4	3,274.4	3,274.9	0.5
S	8,265	331	3,732	6.7	3,274.9	3,274.9	3,275.3	0.4
T	10,215	233	2,757	9.1	3,277.5	3,277.5	3,277.5	0.0
U	12,715	183	2,815	8.9	3,282.5	3,282.5	3,282.5	0.0
V	15,715	193	2,522	9.9	3,288.3	3,288.3	3,288.6	0.3

[1]Feet above confluence with Clark Fork

[2]Elevation Computed Without Consideration of Backwater Effects From Clark Fork

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: BLACKFOOT RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	16,815	250	3,261	7.7	3,291.1	3,291.1	3,291.2	0.1
X	18,015	223	2,917	8.6	3,292.7	3,292.7	3,293.0	0.3
Y	22,170	187	2,006	12.5	3,304.3	3,304.3	3,304.8	0.5

[1]Feet above confluence with Clark Fork

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: BLACKFOOT RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0	430	7,738	8.7	2,964.2	2,964.2	2,964.2	0.0
B	1,300	431	7,851	8.5	2,965.5	2,965.5	2,965.5	0.0
C	5,300	488	8,307	8.1	2,969.0	2,969.0	2,969.0	0.0
D	10,000	539	8,785	7.6	2,973.0	2,973.0	2,973.0	0.0
E	15,200	344	7,066	9.5	2,977.1	2,977.1	2,977.2	0.1
F	19,630	409	7,371	9.1	2,981.5	2,981.5	2,981.6	0.1
G	21,000	585	11,473	5.8	2,983.4	2,983.4	2,983.5	0.1
H	22,100	681	9,986	6.7	2,984.1	2,984.1	2,984.2	0.1
I	22,870	686	10,682	6.3	2,985.2	2,985.2	2,985.3	0.1
J	26,750	1,198	16,398	4.1	2,987.2	2,987.2	2,987.4	0.2
K	33,600	671	9,548	7.0	2,990.2	2,990.2	2,990.5	0.3
L	38,250	677	8,922	7.5	2,994.2	2,994.2	2,994.3	0.1
M	43,650	664	9,921	6.8	2,998.5	2,998.5	2,998.8	0.3
N	47,600	1,028	13,215	5.1	3,001.1	3,001.1	3,001.5	0.4
O	52,200	2,162	20,669	3.2	3,003.1	3,003.1	3,003.6	0.5
P	55,700	765	10,219	6.6	3,004.8	3,004.8	3,005.2	0.4
Q	57,000	1,667	15,407	4.4	3,006.0	3,006.0	3,006.3	0.3
R	58,400	2,339	15,463	4.3	3,007.1	3,007.1	3,007.3	0.2
S	61,900	2,766	20,884	3.2	3,009.1	3,009.1	3,009.6	0.5
T	65,850	2,087	15,659	4.3	3,011.4	3,011.4	3,011.9	0.5
U	68,400	2,356	13,118	5.1	3,013.6	3,013.6	3,014.0	0.5
V	72,000	3,399	18,024	3.7	3,017.2	3,017.2	3,017.7	0.5

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	76,800	3,707	16,973	4.0	3,021.4	3,021.4	3,021.8	0.4
X	81,400	6,450	25,546	2.6	3,024.7	3,024.7	3,025.0	0.3
Y	82,460	4,451	20,890	3.2	3,025.3	3,025.3	3,025.8	0.5
Z	83,700	3,884	20,820	3.2	3,026.1	3,026.1	3,026.6	0.5
AA	85,020	3,350	17,349	3.9	3,027.0	3,027.0	3,027.5	0.5
AB	86,040	2,489	10,753	6.2	3,028.0	3,028.0	3,028.5	0.5
AC	87,180	4,061	21,167	3.2	3,030.0	3,030.0	3,030.4	0.4
AD	88,280	2,835	13,369	5.0	3,031.1	3,031.1	3,031.5	0.4
AE	90,190	1,957	14,613	4.6	3,033.7	3,033.7	3,034.2	0.5
AF	91,290	955	9,288	7.2	3,035.4	3,035.4	3,035.8	0.4
AG	92,460	1,568	15,947	4.2	3,036.8	3,036.8	3,037.3	0.5
AH	93,680	2,422	13,957	4.8	3,037.7	3,037.7	3,038.1	0.4
AI	95,330	1,485	11,172	6.0	3,039.7	3,039.7	3,039.8	0.1
AJ	96,910	1,791	18,326	3.7	3,041.4	3,041.4	3,041.8	0.4
AK	97,880	1,368	14,807	4.5	3,041.7	3,041.7	3,042.1	0.4
AL	98,780	1,250	10,847	6.2	3,042.3	3,042.3	3,042.6	0.3
AM	99,870	853	8,175	8.2	3,043.1	3,043.1	3,043.4	0.3
AN	101,000	853	7,646	8.8	3,044.2	3,044.2	3,044.7	0.5
AO	101,840	715	10,334	6.5	3,045.9	3,045.9	3,046.4	0.5
AP	102,140	690	9,680	6.9	3,046.0	3,046.0	3,046.5	0.5
AQ	103,115	905	9,726	6.9	3,046.6	3,046.6	3,047.1	0.5
AR	104,000	760	8,123	8.2	3,047.2	3,047.2	3,047.6	0.4
AS	105,220	565	7,312	9.2	3,048.6	3,048.6	3,048.9	0.3

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AT	106,500	553	7,902	8.5	3,050.1	3,050.1	3,050.3	0.2
AU	108,140	528	7,810	11.0	3,051.4	3,051.4	3,051.5	0.1
AV	109,910	1,523	12,461	5.3	3,053.4	3,053.4	3,053.7	0.3
AW	110,960	1,714	11,844	5.6	3,053.9	3,053.9	3,054.2	0.3
AX	112,760	1,535	7,465	8.9	3,054.9	3,054.9	3,055.3	0.4
AY	114,860	1,449	8,611	7.7	3,057.0	3,057.0	3,057.4	0.4
AZ	116,050	1,883	8,087	8.2	3,058.1	3,058.1	3,058.6	0.5
BA	116,100	1,883	10,432	6.3	3,059.7	3,059.7	3,060.1	0.4
BB	117,185	1,810	11,398	5.8	3,060.6	3,060.6	3,060.9	0.3
BC	118,585	1,880	12,175	5.4	3,061.7	3,061.7	3,061.9	0.2
BD	120,485	1,475	9,279	7.1	3,063.5	3,063.5	3,063.6	0.1
BE	121,535	1,383	10,081	6.5	3,064.8	3,064.8	3,065.2	0.4
BF	122,915	985	7,995	8.2	3,066.1	3,066.1	3,066.5	0.4
BG	125,215	2,597	14,493	4.5	3,069.3	3,069.3	3,069.8	0.5
BH	126,735	2,699	16,566	3.9	3,070.8	3,070.8	3,071.3	0.5
BI	128,485	3,342	20,694	3.2	3,072.5	3,072.5	3,072.9	0.4
BJ	130,985	5,373	11,358	5.8	3,075.1	3,075.1	3,075.5	0.4
BK	132,260	4,549	26,123	2.5	3,077.5	3,077.5	3,077.9	0.4
BL	134,860	1,844	10,346	6.3	3,080.5	3,080.5	3,080.9	0.4
BM	136,680	1,671	13,412	4.9	3,083.2	3,083.2	3,083.7	0.5
BN	138,380	656	7,691	8.5	3,084.9	3,084.9	3,085.3	0.4
BO	139,410	1,256	14,317	4.6	3,086.5	3,086.5	3,087.0	0.5
BP	140,480	1,432	12,569	5.1	3,087.1	3,087.1	3,087.6	0.5

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BQ	143,230	1,079	8,469	7.6	3,090.6	3,090.6	3,090.7	0.1
BR	145,380	542	7,403	8.7	3,094.1	3,094.1	3,094.3	0.2
BS	147,980	1,120	12,054	5.4	3,097.5	3,097.5	3,097.7	0.2
BT	148,980	1,478	12,611	5.1	3,098.3	3,098.3	3,098.4	0.1
BU	150,730	833	9,401	6.8	3,100.1	3,100.1	3,100.4	0.3
BV	151,870	441	6,742	9.5	3,101.5	3,101.5	3,101.7	0.2
BW	153,295	369	6,610	9.7	3,103.4	3,103.4	3,103.6	0.2
BX	155,545	796	11,005	5.8	3,106.4	3,106.4	3,106.7	0.3
BY	157,545	4,909	8,194	7.8	3,108.0	3,108.0	3,108.3	0.3
BZ	158,695	4,790	14,895	4.3	3,111.1	3,111.1	3,111.4	0.3
CA	160,295	2,290	6,687	6.4	3,112.9	3,112.9	3,113.0	0.1
CB	164,100	4,865	18,002	2.4	3,119.5	3,119.5	3,120.0	0.5
CC	166,000	4,451	11,588	3.7	3,121.9	3,121.9	3,122.2	0.3
CD	170,000	3,542	11,383	3.7	3,129.7	3,129.7	3,130.1	0.4
CE	171,600	3,000	10,237	4.2	3,133.5	3,133.5	3,133.9	0.4
CF	173,900	1,381	6,820	6.2	3,137.8	3,137.8	3,138.2	0.4
CG	176,700	2,426	10,090	4.2	3,144.6	3,144.6	3,145.0	0.4
CH	178,670	1,299	6,879	6.2	3,147.8	3,147.8	3,148.1	0.3
CI	178,720	1,306	7,096	6.0	3,147.9	3,147.9	3,148.4	0.5
CJ	180,745	730	4,891	8.7	3,151.8	3,151.8	3,151.8	0.0
CK	183,099	1,480	10,982	3.9	3,156.5	3,156.5	3,156.5	0.0
CL	183,399	1,480	9,953	4.3	3,157.3	3,157.3	3,157.3	0.0
CM	183,934	1,313	7,025	6.1	3,157.5	3,157.5	3,157.5	0.0

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CN	186,214	394	3,913	10.9	3,162.7	3,162.7	3,162.8	0.1
CO	187,817	451	4,541	9.4	3,167.3	3,167.3	3,167.3	0.0
CP	189,167	374	4,478	9.5	3,169.9	3,169.9	3,169.9	0.0
CQ	189,217	399	4,346	9.8	3,169.9	3,169.9	3,170.3	0.4
CR	190,497	393	4,486	9.5	3,172.4	3,172.4	3,172.6	0.2
CS	190,547	393	4,499	9.4	3,172.4	3,172.4	3,172.6	0.2
CT	192,637	367	3,548	12.0	3,175.6	3,175.6	3,175.7	0.1
CU	192,687	371	3,956	10.7	3,176.4	3,176.4	3,176.9	0.5
CV	194,277	380	3,999	10.6	3,179.4	3,179.4	3,179.5	0.1
CW	194,327	384	4,212	10.1	3,179.5	3,179.5	3,180.0	0.5
CX	196,027	416	4,295	9.9	3,182.6	3,182.6	3,182.7	0.1
CY	196,077	447	4,503	9.4	3,182.7	3,182.7	3,183.2	0.5
CZ	196,797	294	3,482	12.2	3,184.0	3,184.0	3,184.3	0.3
DA	198,257	307	4,072	10.4	3,188.6	3,188.6	3,188.6	0.0
DB	198,307	310	4,259	10.0	3,188.7	3,188.7	3,189.2	0.5
DC	199,297	632	5,252	8.1	3,190.9	3,190.9	3,191.2	0.3
DD	199,347	633	5,329	8.0	3,190.9	3,190.9	3,191.4	0.5
DE	201,457	466	5,752	7.4	3,193.9	3,193.9	3,194.2	0.3
DF	202,007	361	4,163	10.2	3,194.7	3,194.7	3,194.9	0.2
DG	204,257	351	4,648	9.1	3,199.0	3,199.0	3,199.0	0.0
DH	206,377	380	5,456	7.8	3,202.0	3,202.0	3,202.0	0.0
DI	208,242	404	5,464	7.8	3,204.6	3,204.6	3,204.6	0.0
DJ	210,267	461	5,651	7.5	3,207.1	3,207.1	3,207.1	0.0

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DK	212,697	357	3,636	11.7	3,210.8	3,210.8	3,210.8	0.0
DL	214,167	335	5,003	8.5	3,214.1	3,214.1	3,214.1	0.0
DM	214,217	339	5,226	8.1	3,214.2	3,214.2	3,214.7	0.5
DN	214,337	323	4,348	9.8	3,214.3	3,214.3	3,214.8	0.5
DO	214,427	324	4,379	9.7	3,214.4	3,214.4	3,214.9	0.5
DP	215,177	286	3,734	11.4	3,215.7	3,215.7	3,216.1	0.4
DQ	217,327	212	3,324	12.8	3,219.6	3,219.6	3,219.7	0.1
DR	217,377	215	3,463	12.3	3,219.9	3,219.9	3,220.4	0.5
DS	219,177	371	5,225	8.1	3,223.6	3,223.6	3,223.8	0.2
DT	221,677	274	4,183	10.2	3,225.9	3,225.9	3,226.1	0.2
DU	224,877	314	3,659	11.6	3,230.8	3,230.8	3,230.9	0.1
DV	226,552	211	2,937	14.5	3,234.4	3,234.4	3,234.4	0.0
DW	226,602	215	3,139	13.5	3,234.8	3,234.8	3,235.3	0.5
DX	228,397	289	4,653	9.1	3,239.2	3,239.2	3,239.4	0.2
DY	230,387	642	7,409	5.7	3,241.6	3,241.6	3,241.7	0.1
DZ	230,437	648	7,693	5.5	3,241.7	3,241.7	3,242.2	0.5
EA	231,177	578	7,263	5.9	3,242.2	3,242.2	3,242.6	0.4
EB	231,437	268	2,459	17.3	3,245.8	3,245.8	3,245.8	0.0
EC	231,487	268	8,506	5.0	3,268.3	3,268.3	3,268.3	0.0
ED	231,677	1,055	17,522	2.4	3,268.8	3,268.8	3,268.8	0.0
EE	233,577	1,901	17,507	1.5	3,268.8	3,268.8	3,268.8	0.0
EF	236,277	624	6,846	3.8	3,268.8	3,268.8	3,268.8	0.0
EG	236,327	625	6,818	3.8	3,268.8	3,268.8	3,268.8	0.0
EH	237,447	2,602	20,636	1.3	3,268.8	3,268.8	3,268.8	0.0

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EI	239,977	3,542	10,711	2.4	3,268.8	3,268.8	3,268.8	0.0
EJ	243,827	2,100	6,089	4.3	3,278.6	3,278.6	3,278.6	0.0
EK	246,217	1,342	3,722	7.0	3,286.8	3,286.8	3,287.1	0.3
EL	249,227	1,564	6,961	3.7	3,296.5	3,296.5	3,296.5	0.0
EM	251,747	1,159	4,081	6.4	3,302.5	3,302.5	3,302.8	0.3
EN	255,277	784	4,009	6.5	3,314.0	3,314.0	3,314.2	0.2
EO	258,077	1,632	5,746	4.5	3,321.4	3,321.4	3,321.4	0.0
EP	260,327	240	1,904	13.7	3,329.0	3,329.0	3,329.0	0.0
EQ	260,377	260	2,236	11.6	3,329.9	3,329.9	3,330.4	0.5
ER	261,857	420	3,354	7.8	3,336.0	3,336.0	3,336.1	0.1
ES	264,497	344	2,469	10.5	3,342.1	3,342.1	3,342.6	0.5
ET	266,757	492	3,374	7.7	3,350.5	3,350.5	3,350.5	0.0
EU	269,777	601	3,356	7.7	3,358.9	3,358.9	3,359.3	0.4
EV	270,817	366	3,494	7.4	3,361.7	3,361.7	3,362.0	0.3
EW	270,867	367	3,600	7.2	3,361.9	3,361.9	3,362.4	0.5
EX	271,827	1,566	2,368	11.0	3,365.2	3,365.2	3,365.2	0.0
EY	275,837	1,624	5,919	4.4	3,382.4	3,382.4	3,382.4	0.0
EZ	278,297	1,191	4,299	6.0	3,387.9	3,387.9	3,388.0	0.1
FA	282,797	768	3,716	7.0	3,403.9	3,403.9	3,404.4	0.5
FB	286,777	1,174	5,474	4.7	3,415.4	3,415.4	3,415.6	0.2
FC	290,317	1,932	3,725	7.0	3,427.5	3,427.5	3,427.5	0.0
FD	294,077	1,039	4,606	5.6	3,441.0	3,441.0	3,441.5	0.5
FE	296,227	830	3,913	6.6	3,446.2	3,446.2	3,446.7	0.5

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FF	299,727	597	3,368	7.7	3,457.9	3,457.9	3,458.1	0.2
FG	302,287	1,200	3,825	6.8	3,466.6	3,466.6	3,466.9	0.3
FH	305,047	1,240	5,182	5.0	3,476.2	3,476.2	3,476.3	0.1
FI	305,137	1,250	3,893	6.7	3,476.2	3,476.2	3,476.3	0.1
FJ	305,187	1,300	6,519	4.0	3,477.2	3,477.2	3,477.5	0.3
FK	308,597	788	3,258	8.0	3,486.2	3,486.2	3,486.7	0.5
FL	311,007	900	5,101	5.1	3,494.1	3,494.1	3,494.5	0.4
FM	313,847	757	3,364	7.7	3,502.8	3,502.8	3,503.1	0.3
FN	315,137	874	5,306	4.9	3,507.9	3,507.9	3,508.4	0.5
FO	316,387	869	3,680	7.1	3,511.0	3,511.0	3,511.1	0.1
FP	317,367	900	4,471	5.8	3,514.0	3,514.0	3,514.4	0.4
FQ	318,867	598	3,146	8.3	3,518.3	3,518.3	3,518.5	0.2
FR	320,447	381	2,705	9.6	3,523.8	3,523.8	3,524.3	0.5
FS	322,777	231	2,174	11.0	3,533.8	3,533.8	3,533.9	0.1
FT	323,457	253	2,605	9.2	3,536.3	3,536.3	3,536.7	0.4
FU	325,437	437	3,742	6.4	3,540.8	3,540.8	3,541.2	0.4
FV	325,817	1,034	8,461	2.8	3,542.7	3,542.7	3,543.2	0.5
FW	326,777	996	5,168	4.6	3,543.3	3,543.3	3,543.8	0.5
FX	328,317	344	2,748	8.7	3,548.1	3,548.1	3,548.2	0.1
FY	329,517	360	3,263	7.4	3,550.9	3,550.9	3,551.1	0.2
FZ	330,727	569	3,734	6.4	3,553.8	3,553.8	3,554.0	0.2
GA	331,877	269	1,971	12.2	3,556.0	3,556.0	3,556.4	0.4
GB	332,317	295	2,665	9.0	3,558.9	3,558.9	3,559.3	0.4

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GC	332,867	249	2,221	10.8	3,560.6	3,560.6	3,560.7	0.1
GD	333,937	306	2,653	9.1	3,566.4	3,566.4	3,566.9	0.5
GE	334,917	795	4,434	5.4	3,569.6	3,569.6	3,570.0	0.4
GF	335,917	790	3,930	6.1	3,571.9	3,571.9	3,572.2	0.3
GG	337,517	1,440	5,540	4.3	3,575.7	3,575.7	3,576.0	0.3
GH	338,917	907	4,505	5.3	3,578.2	3,578.2	3,578.6	0.4
GI	339,937	708	2,980	8.1	3,581.7	3,581.7	3,582.2	0.5
GJ	341,117	1,100	5,529	4.3	3,585.5	3,585.5	3,586.0	0.5
GK	342,327	950	3,821	6.3	3,588.3	3,588.3	3,588.4	0.1
GL	343,817	730	4,590	5.2	3,592.8	3,592.8	3,593.0	0.2
GM	344,867	640	3,675	6.5	3,595.4	3,595.4	3,595.6	0.2
GN	346,037	994	4,054	5.9	3,598.9	3,598.9	3,598.9	0.0
GO	346,117	1677	13,116	1.8	3,603.9	3,603.9	3,603.9	0.0
GP	347,547	1908	11,929	2.0	3,604.2	3,604.2	3,604.2	0.0
GQ	351,437	1519	3,271	7.3	3,612.9	3,612.9	3,612.9	0.0
GR	352,667	996	5,303	4.5	3,618.4	3,618.4	3,618.7	0.3
GS	353,627	847	3,333	7.2	3,620.5	3,620.5	3,620.8	0.3
GT	354,187	500	6,063	4.0	3,629.2	3,629.2	3,629.2	0.0
GU	354,557	277	3,255	7.4	3,629.2	3,629.2	3,629.2	0.0
GV	356,007	279	2,889	8.3	3,631.4	3,631.4	3,631.5	0.1
GW	357,397	270	2,654	9.0	3,634.8	3,634.8	3,635.0	0.2
GX	358,867	232	2,438	9.8	3,638.3	3,638.3	3,638.5	0.2

[1]Feet above Missoula County/Mineral County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLARK FORK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,038	637	1,920	2.0	3,914.0	3,914.0	3,914.5	0.5
B	4,137	1,058	4,407	0.9	3,916.8	3,916.8	3,917.2	0.4
C	7,346	1,427	4,571	0.9	3,918.1	3,918.1	3,918.5	0.4
D	8,688	1,736	4,205	0.9	3,920.0	3,920.0	3,920.5	0.5
E	10,035	1,368	3,087	1.3	3,922.6	3,922.6	3,923.1	0.5
F	11,906	326	1,445	2.1	3,927.3	3,927.3	3,927.7	0.4
G	12,607	276	1,373	2.2	3,929.6	3,929.6	3,929.9	0.3
H	13,634	1,004	3,165	0.9	3,930.1	3,930.1	3,930.5	0.4
I	14,069	424	1,067	2.8	3,930.3	3,930.3	3,930.6	0.3
J	14,435	545	1,283	2.3	3,931.2	3,931.2	3,931.7	0.5
K	14,989	153	520	5.7	3,932.2	3,932.2	3,932.6	0.4
L	15,663	257	981	3.0	3,934.4	3,934.4	3,934.7	0.3
M	16,619	215	856	3.5	3,935.9	3,935.9	3,936.3	0.4
N	17,491	635	1,976	1.5	3,937.6	3,937.6	3,938.1	0.5
O	18,326	244	689	4.3	3,939.5	3,939.5	3,939.9	0.4
P	19,491	446	1,295	2.3	3,942.7	3,942.7	3,943.1	0.4
Q	20,039	380	1,390	2.2	3,944.8	3,944.7	3,945.1	0.4
R	20,606	126	576	5.2	3,945.7	3,945.4	3,945.7	0.3
S	21,765	445	1,239	2.4	3,946.9	3,946.9	3,947.3	0.4
T	22,266	267	577	5.2	3,948.6	3,948.6	3,949.1	0.5
U	22,670	80	421	5.8	3,949.9	3,949.9	3,950.3	0.4
V	23,245	78	268	9.2	3,951.6	3,951.6	3,951.9	0.3
W	23,834	107	626	3.9	3,954.3	3,954.3	3,954.7	0.4
X	24,443	223	1,087	2.3	3,955.8	3,955.8	3,956.2	0.4
Y	25,140	449	1,558	1.6	3,956.7	3,956.7	3,957.2	0.5
Z	26,424	434	1,092	2.3	3,958.2	3,958.2	3,958.6	0.4

[1] Feet above confluence with Salmon Lake

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MT

AND INCORPORAED AREAS

FLOODWAY DATA

FLOODING SOURCE: CLEARWATER RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Clearwater River								
AA	27,507	719[2]	891	2.8	3,960.4	3,960.4	3,960.8	0.4
AB	28,408	229	535	4.6	3,963.3	3,963.3	3,963.7	0.4
AC	29,596	217	927	2.7	3,966.6	3,966.6	3,967.0	0.5
AD	31,205	272	1,001	2.3	3,971.0	3,971.0	3,971.4	0.4
AE	31,987	124	526	4.6	3,972.9	3,972.9	3,973.1	0.2
AF	32,315	88	426	5.8	3,974.5	3,974.5	3,974.5	0.1
AG	33,007	98	451	5.5	3,976.2	3,976.2	3,976.3	0.1
AH	34,011	99	386	6.4	3,979.8	3,979.8	3,980.2	0.4
AI	34,271	114	547	4.5	3,981.3	3,981.3	3,981.7	0.4
AJ	34,866	94	318	7.7	3,982.9	3,982.9	3,982.9	0.0
AK	35,568	101	579	4.3	3,985.8	3,985.8	3,986.1	0.3
AL	36,572	118	591	4.2	3,988.5	3,988.5	3,988.7	0.2
AM	37,419	102	435	5.7	3,990.4	3,990.4	3,990.5	0.1
AN	38,197	118	423	5.8	3,992.8	3,992.8	3,992.9	0.1
AO	38,646	196	645	3.8	3,994.1	3,994.1	3,994.1	0.0
AP	39,726	114	529	4.7	3,998.1	3,998.1	3,998.3	0.2
AQ	40,283	126	639	3.9	3,999.1	3,999.1	3,999.5	0.3
AR	41,143	181	1,155	2.1	4,001.2	4,001.2	4,001.6	0.4
AS	42,191	427	2,933	0.8	4,001.4	4,001.4	4,001.7	0.3
AT	43,340	464	3,574	0.7	4,001.4	4,001.4	4,001.8	0.4
AU	44,843	808	5,605	0.4	4,001.4	4,001.4	4,001.8	0.4
AV	46,256	393	3,667	0.7	4,001.4	4,001.4	4,001.8	0.4
AW	47,745	282	2,817	0.9	4,001.5	4,001.5	4,001.8	0.3
AX	48,866	367	3,542	0.7	4,001.5	4,001.5	4,001.8	0.3
AY	49,821	440	3,757	0.7	4,001.5	4,001.5	4,001.9	0.4
AZ	50,541	559	4,129	0.6	4,001.5	4,001.5	4,001.9	0.4

[1] Feet above confluence with Salmon Lake

[2] Floodway top width includes width of high ground area.

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MT

AND INCORPORAED AREAS

FLOODWAY DATA

CLEARWATER RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,520	203[2]	336	4.5	3,642.8	3,642.8	3,642.8	0.0
B	3,155	90	294	5.2	3,650.7	3,650.7	3,650.8	0.1
C	4,228	185	552	3.1	3,655.0	3,655.0	3,655.5	0.5
D	5,703	221	536	3.7	3,660.1	3,660.1	3,660.6	0.5
E	7,101	153	357	5.5	3,666.5	3,666.5	3,666.7	0.2
F	8,336	179	375	5.2	3,673.6	3,673.6	3,673.8	0.2

[1]Feet above confluence with Swan River
[2]Floodway top width includes width of high ground area

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: DS GLACIER SPLIT

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	25	30	111	4.2	3,276.3	3,276.3	3,276.3	0.0
B	200	38	75	6.2	3,279.4	3,279.4	3,279.4	0.0
C	500	29	101	4.6	3,283.7	3,283.7	3,283.7	0.0
D	675	24	85	5.5	3,285.9	3,285.9	3,285.9	0.0
E	1,399	60	103	4.5	3,299.1	3,299.1	3,299.1	0.0
F	2,103	37	106	4.4	3,315.0	3,315.0	3,315.0	0.0
G	3,780	32	88	5.3	3,343.4	3,343.4	3,343.4	0.0
H	4,805	118	176	2.6	3,362.6	3,362.6	3,363.1	0.5
I	6,930	79	155	3.0	3,412.3	3,412.3	3,412.8	0.5
J	8,830	81	95	4.9	3,451.5	3,451.5	3,451.5	0.0
K	10,130	38	101	4.6	3,484.7	3,484.7	3,485.2	0.5
L	12,530	31	96	4.8	3,544.2	3,544.2	3,544.2	0.0
M	13,405	93	116	4.0	3,561.0	3,561.0	3,561.0	0.0
N	14,855	105	193	2.4	3,606.8	3,606.8	3,606.8	0.0
O	17,830	47	131	3.8	3,687.3	3,687.3	3,687.3	0.0
P	19,380	27	94	4.9	3,730.8	3,730.8	3,731.3	0.5
Q	21,080	100	157	3.3	3,779.0	3,779.0	3,779.2	0.2
R	21,305	25	96	4.8	3,785.6	3,785.6	3,785.6	0.0

[1]Feet above East Bound Exit Ramp I-90

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: GRANT CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	477	63	216	4.6	3,766.4	3,766.4	3,766.4	0.0
B	1,186	116	549	1.7	3,773.5	3,773.5	3,774.0	0.5

[1]Feet above confluence with Swan River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: GUEST R SPLIT

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	480	98	378	5.0	3,596.8	3,596.8	3,597.0	0.2
B	1,851	298[2]	604	3.5	3,602.4	3,602.4	3,602.9	0.5
C	3,213	145	556	3.6	3,606.9	3,606.9	3,607.4	0.5

[1]Feet above confluence with Swan River
[2]Floodway top width includes width of high ground area

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: KAUFFMAN SPLIT

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	100	525	2,066	0.5	3,074.5	3,074.5	3,074.5	0.0
B	1,061	545	2,467	0.4	3,074.5	3,074.5	3,074.5	0.0
C	1,796	318	1010	0.9	3,074.5	3,074.5	3,074.6	0.1
D	2,535	746	2,356	0.4	3,074.6	3,074.6	3,074.7	0.1
E	2,697	737	1,953	0.5	3,074.6	3,074.6	3,074.7	0.1
F	2,814	733	1,878	0.5	3,074.6	3,074.6	3,074.7	0.1
G	2,905	693	1,496	0.6	3,074.6	3,074.6	3,074.7	0.1
H	3,261	643	1,505	0.6	3,074.6	3,074.6	3,074.7	0.1
I	4,741	876	1,476	0.6	3,074.8	3,074.8	3,075.0	0.2
J	6,209	650	795	1.2	3,075.7	3,075.7	3,075.8	0.1
K	7,835	174	362	2.6	3,078.5	3,078.5	3,078.5	0.0
L	8,917	183	572	1.6	3,079.5	3,079.5	3,079.6	0.1
M	9,725	274	699	1.4	3,079.8	3,079.8	3,080.0	0.2
N	10,442	377	923	1.0	3,080.1	3,080.1	3,080.3	0.2
O	11,290	396	1,165	0.8	3,080.3	3,080.3	3,080.5	0.2
P	11,757	304	961	1.0	3,080.3	3,080.3	3,080.5	0.2
Q	12,128	357	1,046	0.9	3,080.4	3,080.4	3,080.6	0.2
R	12,267	528	1,734	0.5	3,081.4	3,081.4	3,081.5	0.1
S	12,681	735	2,371	0.4	3,081.5	3,081.5	3,081.5	0.0
T	13,326	738	2,442	0.4	3,081.5	3,081.5	3,081.6	0.1
U	13,925	685	1,820	0.5	3,081.5	3,081.5	3,081.6	0.1
V	14,633	386	1,094	0.9	3,081.6	3,081.6	3,081.7	0.1

[1]Feet above Frenchtown Irrigation District Ditch Centerline

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: LA VALLE CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	15,259	621	1,872	0.3	3,081.6	3,081.6	3,081.7	0.1
X	15,708	598	1,850	0.3	3,081.6	3,081.6	3,081.7	0.1
Y	16,607	978	2,219	0.2	3,081.6	3,081.6	3,081.7	0.1
Z	17,264	1,465	2,061	0.3	3,081.7	3,081.7	3,081.8	0.1
AA	18,447	2,057	1,295	0.4	3,082.1	3,082.1	3,082.1	0.0

[1]Feet above Frenchtown Irrigation District Ditch Centerline

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: LA VALLE CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	2,700	1,380	771	4.3	3,165.1	3,165.1	3,165.6	0.5
B	4,100	1,000	1,712	1.9	3,169.3	3,169.3	3,169.7	0.4
C	5,190	111	415	7.9	3,174.1	3,174.1	3,174.6	0.5
D	5,240	66	393	8.4	3,174.4	3,174.4	3,174.8	0.4
E	5,270	66	413	8.0	3,174.7	3,174.7	3,175.1	0.4
F	5,870	120	508	6.5	3,178.0	3,178.0	3,178.0	0.0
G	6,370	123	462	7.1	3,180.3	3,180.3	3,180.6	0.3
H	6,450	120	492	6.7	3,180.7	3,180.7	3,181.1	0.4
I	6,480	120	519	6.4	3,180.8	3,180.8	3,181.3	0.5
J	7,900	200	749	4.4	3,186.9	3,186.9	3,187.0	0.1
K	8,300	161	570	5.8	3,188.4	3,188.4	3,188.7	0.3
L	9,080	294	570	5.8	3,194.7	3,194.7	3,194.7	0.0
M	10,520	236	734	4.5	3,202.9	3,202.9	3,203.1	0.2
N	11,940	201	513	6.4	3,211.4	3,211.4	3,211.4	0.0
O	12,515	203	631	5.2	3,215.3	3,215.3	3,215.4	0.1
P	14,170	141	412	8.0	3,225.9	3,225.9	3,225.9	0.0
Q	15,335	159	563	5.9	3,233.6	3,233.6	3,233.8	0.2
R	16,220	246	574	5.8	3,238.1	3,238.1	3,238.5	0.4
S	18,385	340	546	6.0	3,249.6	3,249.6	3,250.1	0.5
T	20,830	314	684	4.8	3,263.9	3,263.9	3,263.9	0.0
U	22,200	250	610	5.4	3,272.7	3,272.7	3,272.9	0.2
V	24,275	75	390	8.5	3,286.2	3,286.2	3,286.3	0.1

[1]Feet above confluence with Bitterroot River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: LOLO CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	26,075	99	369	8.1	3,299.5	3,299.5	3,299.5	0.0
X	27,925	78	404	7.4	3,311.7	3,311.7	3,311.7	0.0
Y	27,955	78	448	6.7	3,311.8	3,311.8	3,312.3	0.5
Z	28,050	343	1,173	2.6	3,312.7	3,312.7	3,313.0	0.3
AA	28,375	177	419	7.2	3,313.0	3,313.0	3,313.2	0.2
AB	31,870	532	916	3.3	3,332.5	3,332.5	3,333.0	0.5
AC	35,180	397	619	4.8	3,356.3	3,356.3	3,356.3	0.0
AD	36,550	79	402	7.5	3,365.9	3,365.9	3,365.9	0.0
AE	36,580	79	420	7.1	3,366.1	3,366.1	3,366.1	0.0
AF	36,680	107	548	5.5	3,366.8	3,366.8	3,366.8	0.0
AG	36,940	142	441	6.8	3,367.7	3,367.7	3,367.7	0.0

[1]Feet above confluence with Bitterroot River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: LOLO CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A through D (No Floodway Computed)								
E	14,800	82	130	5.2	3,364.8	3,364.8	3,365.3	0.5
F	15,286	257	264	2.6	3,371.7	3,371.7	3,372.0	0.3
G	15,500	200	608	1.1	3,372.0	3,372.0	3,372.4	0.4
H	15,800	70	99	6.8	3,375.1	3,375.1	3,375.1	0.0
I	16,350	79	150	4.5	3,382.8	3,382.8	3,383.0	0.2
J	17,475	116	153	4.4	3,403.2	3,403.2	3,403.2	0.0
K	18,000	79	103	6.6	3,413.3	3,413.3	3,413.3	0.0
L	18,550	65	133	5.1	3,421.6	3,421.6	3,421.9	0.3
M	20,850	70	183	3.7	3,470.8	3,470.8	3,470.8	0.0
N	22,400	61	128	5.3	3,487.4	3,487.4	3,487.6	0.2
O	24,000	67	96	7.1	3,518.3	3,518.3	3,518.8	0.5
P	25,400	90	176	3.8	3,544.3	3,544.3	3,544.4	0.1
Q	26,250	20	65	10.4	3,557.6	3,557.6	3,557.6	0.0
R	27,800	145	235	2.9	3,581.1	3,581.1	3,581.6	0.5
S	30,250	99	190	3.6	3,608.8	3,608.8	3,609.2	0.4
T	31,350	55	91	7.4	3,626.5	3,626.5	3,626.5	0.0
U	32,900	212	180	3.7	3,652.4	3,652.4	3,652.4	0.0
V	34,250	155	124	5.4	3,666.6	3,666.6	3,666.6	0.0
W	36,400	194	149	4.5	3,703.1	3,703.1	3,603.6	0.5

[1]Feet above confluence with Bitterroot River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: MILLER CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	315	26	46	4.2	3,233.7	3,233.7	3,233.7	0.0
B	1,375	47	52	3.8	3,262.6	3,262.6	3,262.6	0.0
C	1,550	116	117	1.7	3,268.7	3,268.7	3,268.7	0.0
D	1,815	40	36	5.4	3,275.7	3,275.7	3,275.7	0.0
E	1,885	41	36	5.4	3,279.6	3,279.6	3,279.6	0.0
F	2,655	23	30	6.5	3,300.7	3,300.7	3,300.7	0.0
G	2,855	222	629	0.3	3,311.2	3,311.2	3,311.2	0.0
H	3,055	33	34	5.7	3,316.5	3,316.5	3,316.5	0.0
I	3,555	31	33	5.9	3,334.5	3,334.5	3,334.5	0.0
J	4,085	46	38	5.2	3,355.6	3,355.6	3,355.6	0.0

[1]Feet above South Higgins Avenue in the City of Missoula

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: PATTEE CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	220	150	289	12.1	3,189.9	3,182.1[2]	3,182.1[2]	0.0
B	500	230	652	4.6	3,189.9	3,188.3[2]	3,188.3[2]	0.0
C	750	63	354	8.5	3,191.6	3,191.6	3,191.6	0.0
D	940	210	270	11.1	3,195.6	3,195.6	3,195.6	0.0
E	1,030	230	638	4.7	3,197.5	3,197.5	3,197.5	0.0
F	1,540	64	323	9.3	3,202.4	3,202.4	3,202.4	0.0
G	1,570	66	345	8.7	3,202.7	3,202.7	3,202.7	0.0
H	1,680	85	322	9.3	3,204.2	3,204.2	3,204.2	0.0
I	2,110	74	423	7.1	3,211.7	3,211.7	3,211.7	0.0
J	2,145	73	436	6.9	3,211.9	3,211.9	3,211.9	0.0
K	3,025	270	378	7.9	3,222.5	3,222.5	3,222.5	0.0
L	4,205	380	440	6.8	3,240.9	3,240.9	3,240.9	0.0
M	5,205	390	609	4.9	3,256.4	3,256.4	3,256.4	0.0
N	5,585	42	226	13.3	3,263.5	3,263.5	3,263.5	0.0
O	5,885	354	861	5.7	3,269.4	3,269.4	3,269.4	0.0
P	6,065	154	336	10.3	3,271.2	3,271.2	3,271.2	0.0
Q	6,875	475	822	4.3	3,285.0	3,285.0	3,285.0	0.0
R	7,870	74	272	11.0	3,302.8	3,302.8	3,302.8	0.0
S	8,370	102	415	8.5	3,313.1	3,313.1	3,313.1	0.0
T	9,000	288	472	9.1	3,321.6	3,321.6	3,321.6	0.0
U	9,750	570	606	6.3	3,334.0	3,334.0	3,334.0	0.0
V	10,330	295	391	9.4	3,342.8	3,342.8	3,342.8	0.0

[1]Feet above confluence with Clark Fork
[2]Elevations Computed Without Consideration of Backwater Effects From Clark Fork

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: RATTLESNAKE CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	10,800	360	1,760	1.5	3,354.4	3,354.4	3,354.4	0.0
X	10,850	370	685	4.4	3,354.4	3,354.4	3,354.4	0.0
Y	11,900	500	338	9.9	3,370.6	3,370.6	3,370.6	0.0
Z	12,350	450	930	2.7	3,377.6	3,377.6	3,377.6	0.0
AA	12,600	494	1,250	2.9	3,379.0	3,379.0	3,379.0	0.0
AB	13,425	436	667	9.7	3,393.2	3,393.2	3,393.2	0.0
AC	14,530	490	556	8.5	3,409.0	3,409.0	3,409.0	0.0
AD	15,340	470	1,601	7.3	3,421.2	3,421.2	3,421.2	0.0
AE	16,170	460	450	6.7	3,434.6	3,434.6	3,434.6	0.0
AF	17,145	390	526	7.1	3,450.0	3,450.0	3,450.0	0.0
AG	18,250	230	421	9.9	3,467.6	3,467.6	3,467.6	0.0
AH	19,340	410	528	7.6	3,484.3	3,484.3	3,484.3	0.0
AI	19,790	210	256	11.7	3,490.6	3,490.6	3,490.6	0.0
AJ	20,400	100	398	7.9	3,500.0	3,500.0	3,500.0	0.0
AK	20,500	65	426	7.0	3,501.2	3,501.2	3,501.2	0.0
AL	20,550	368	5,009	0.6	3,514.1	3,514.1	3,514.1	0.0
AM	21,140	180	592	6.0	3,514.2	3,514.2	3,514.2	0.0
AN	21,340	130	350	8.6	3,516.0	3,516.0	3,516.0	0.0
AO	21,700	150	347	8.8	3,520.9	3,520.9	3,520.9	0.0
AP	22,220	140	408	8.6	3,530.1	3,530.1	3,530.1	0.0
AQ	22,860	110	325	9.5	3,542.5	3,542.5	3,542.5	0.0
AR	23,920	120	565	6.4	3,557.6	3,557.6	3,557.6	0.0
AS	23,960	52	253	11.9	3,557.6	3,557.6	3,557.6	0.0

[1]Feet above confluence with Clark Fork

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: RATTLESNAKE CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AT	23,980	52	344	8.7	3,559.4	3,559.4	3,559.4	0.0
AU	24,500	340	433	8.5	3,565.8	3,565.8	3,565.8	0.0
AV	25,450	410	541	8.0	3,582.3	3,582.3	3,582.3	0.0
AW	26,225	110	553	6.8	3,594.4	3,594.4	3,594.4	0.0
AX	27,260	170	470	8.6	3,607.2	3,607.2	3,607.2	0.0
AY	27,900	160	375	8.6	3,617.1	3,617.1	3,617.1	0.0
AZ	28,400	190	416	9.3	3,626.6	3,626.6	3,626.6	0.0
BA	29,400	200	742	5.6	3,641.3	3,641.3	3,641.3	0.0

[1]Feet above confluence with Clark Fork

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: RATTLESNAKE CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0.10	710	2,069	4.5	3,527.1	3,525.8[2]	3,526.3[2]	0.5
B	0.30	460	2,097	4.4	3,533.1	3,533.1	3,533.6	0.5
C	0.32	500	1,640	5.6	3,533.2	3,533.2	3,533.7	0.5
D	0.60	1,170	3,973	2.3	3,540.0	3,540.0	3,540.2	0.2
E	0.87	600	1,724	5.3	3,547.7	3,547.7	3,548.1	0.4
F	1.21	585	2,238	4.1	3,559.9	3,559.9	3,560.2	0.3
G	1.45	725	2,284	4.0	3,565.6	3,565.6	3,565.9	0.3
H	1.67	675	1,859	5.0	3,571.0	3,571.0	3,571.0	0.0
I	1.92	750	2,392	3.9	3,576.4	3,576.4	3,576.9	0.5
J	2.13	930	2,599	3.5	3,581.6	3,581.6	3,581.9	0.3
K	2.29	805	2,893	3.2	3,584.6	3,584.6	3,585.0	0.4
L	2.44	655	2,225	4.1	3,587.6	3,587.6	3,588.1	0.5
M	2.57	380	1,598	5.8	3,591.4	3,591.4	3,591.4	0.0
N	2.73	580	1,647	5.6	3,595.5	3,595.5	3,596.0	0.5
O	2.76	885	6,219	1.5	3,600.3	3,600.3	3,600.8	0.5
P	2.90	830[3]	3,080	3.0	3,600.7	3,600.7	3,601.2	0.5
Q	4.03	715[3]	2,227	4.1	3,631.7	3,631.7	3,632.2	0.5
R	4.32	1130	3,018	3.1	3,640.1	3,640.1	3,640.5	0.4
S	4.54	650	1,785	5.2	3,647.6	3,647.6	3,647.6	0.0
T	4.85	750	2,473	3.7	3,658.4	3,658.4	3,658.5	0.1
U	5.09	385	1,084	8.5	3,666.0	3,666.0	3,666.4	0.4
V	5.34	475	1,592	5.8	3,676.4	3,676.4	3,676.8	0.4
W	5.57	641	2,177	4.2	3,684.4	3,684.4	3,684.7	0.3

[1]Miles above confluence with Clark Fork

[2]Elevation Computed Without Consideration of Backwater Effects from Clark Fork

[3]Floodway Lies Entirely Outside County Corporate Limits

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ROCK CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	330	716	1,783	2.6	3,512.3	3,512.3	3,512.7	0.4
B	1,156	1,160[2]	1,518	3.0	3,516.3	3,516.3	3,516.5	0.2
C	2,478	736[2]	1,850	2.5	3,520.1	3,520.1	3,520.4	0.3
D	3,460	707	1,505	3.0	3,523.2	3,523.2	3,523.5	0.3
E	4,614	625[2]	885	5.2	3,526.5	3,526.5	3,526.7	0.2
F	6,101	366	940	4.8	3,533.8	3,533.8	3,534.3	0.5
G	7,420	207	785	5.8	3,539.0	3,539.0	3,539.3	0.3
H	9,616	138	671	6.8	3,547.8	3,547.8	3,548.3	0.5
I	10,819	304	962	4.2	3,552.2	3,552.2	3,552.5	0.3
J	11,861	367	1,163	3.5	3,557.4	3,557.4	3,557.9	0.5
K	12,994	308[2]	910	4.4	3,562.0	3,562.0	3,562.1	0.1
L	14,128	406	888	4.5	3,566.7	3,566.7	3,566.8	0.1
M	15,692	600	1,340	3.0	3,572.2	3,572.2	3,572.5	0.3
N	16,920	306[2]	736	5.5	3,578.0	3,578.0	3,578.0	0.0
O	18,205	245	589	6.9	3,583.8	3,583.8	3,584.0	0.2
P	19,739	232	690	5.9	3,590.8	3,590.8	3,591.1	0.3
Q	20,844	246[2]	538	4.0	3,594.9	3,594.9	3,595.2	0.3
R	22,075	229[2]	445	4.4	3,599.7	3,599.7	3,600.2	0.5
S	23,661	122[2]	373	5.4	3,607.4	3,607.4	3,607.8	0.4
T	24,917	315[2]	901	4.5	3,612.1	3,612.1	3,612.3	0.2
U	26,120	331	1,008	4.0	3,617.5	3,617.5	3,617.9	0.4
V	27,271	740	1,652	2.4	3,623.3	3,623.3	3,623.8	0.5

[1]Feet above Lake/Missoula County Line

[2]Floodway top width includes width of high ground area

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SWAN RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
W	28,597	485	1,264	3.2	3,629.2	3,629.2	3,629.6	0.4
X	29,862	314	897	4.5	3,634.0	3,634.0	3,634.1	0.1
Y	31,508	315	823	3.1	3,643.0	3,643.0	3,643.4	0.4
Z	32,759	275	775	3.2	3,650.0	3,650.0	3,650.5	0.5
AA	33,949	196	536	4.1	3,656.3	3,656.3	3,656.3	0.0
AB	35,329	151	422	4.9	3,664.7	3,664.7	3,664.7	0.0
AC	36,432	175	564	3.7	3,671.7	3,671.7	3,671.8	0.1
AD	37,785	396	1,044	3.9	3,679.5	3,679.5	3,680.0	0.5
AE	39,066	82	376	6.3	3,686.1	3,686.1	3,686.1	0.0
AF	40,224	155	595	4.6	3,691.8	3,691.8	3,692.1	0.3
AG	41,505	433[2]	1,082	2.5	3,699.2	3,699.2	3,699.6	0.4
AH	42,699	624[2]	932	2.9	3,705.0	3,705.0	3,705.1	0.1
AI	44,082	340	686	4.0	3,713.9	3,713.9	3,714.4	0.5
AJ	45,417	266[2]	526	5.2	3,721.5	3,721.5	3,722.0	0.5
AK	46,612	76	340	8.0	3,730.4	3,730.4	3,730.7	0.3
AL	48,127	184	571	4.8	3,739.3	3,739.3	3,739.6	0.3
AM	49,406	249	769	3.5	3,746.6	3,746.6	3,747.1	0.5
AN	50,832	169	485	5.6	3,755.5	3,755.5	3,755.9	0.4
AO	52,324	84	331	5.8	3,768.8	3,768.8	3,769.2	0.4
AP	53,460	341[2]	764	3.6	3,777.9	3,777.9	3,778.4	0.5
AQ	54,642	74	381	7.1	3,787.5	3,787.5	3,787.7	0.2
AR	55,795	82	379	7.2	3,796.1	3,796.1	3,796.2	0.1
AS	57,095	512[2]	848	2.7	3,803.5	3,803.5	3,804.0	0.5
AT	58,409	300	526	4.3	3,813.3	3,813.3	3,813.3	0.0
AU	59,913	266	565	4.0	3,823.6	3,823.6	3,824.1	0.5

[1]Feet above Lake/Missoula County Line
[2]Floodway top width includes width of high ground area

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SWAN RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AV	61,399	82	299	7.6	3,833.1	3,833.1	3,833.3	0.2
AW	62,446	206	483	4.7	3,840.6	3,840.6	3,841.0	0.4
AX	63,577	166	348	6.6	3,848.5	3,848.5	3,848.6	0.1
AY	64,987	288[2]	585	3.9	3,861.3	3,861.3	3,861.5	0.2
AZ	66,140	173	486	4.7	3,869.3	3,869.3	3,869.8	0.5
BA	67,478	180[2]	470	4.8	3,878.6	3,878.6	3,879.0	0.4
BB	68,448	240	619	3.7	3,884.6	3,884.6	3,885.0	0.4
BC	70,028	244[2]	475	4.8	3,892.2	3,892.2	3,892.7	0.5
BD	71,244	201	598	3.8	3,899.8	3,899.8	3,900.3	0.5
BE	72,369	155	591	3.9	3,904.9	3,904.9	3,905.2	0.3
BF	73,473	160	515	4.4	3,909.0	3,909.0	3,909.4	0.4
BG	74,645	95	403	5.7	3,915.1	3,915.1	3,915.2	0.1
BH	75,870	322	963	2.4	3,918.6	3,918.6	3,919.1	0.5
BI	77,103	506	1,209	1.9	3,920.6	3,920.6	3,920.9	0.3
BJ	78,540	620	916	2.5	3,922.1	3,922.1	3,922.3	0.2
BK	79,960	668[2]	1,145	2.0	3,924.8	3,924.8	3,925.2	0.4
BL	81,436	370	859	2.7	3,929.8	3,929.8	3,930.3	0.5
BM	82,852	377	932	2.4	3,933.7	3,933.7	3,934.1	0.4
BN	84,053	177	523	4.4	3,939.1	3,939.1	3,939.5	0.4
BO	85,177	251	769	3.0	3,943.9	3,943.9	3,944.4	0.5
BP	86,365	315	678	3.4	3,949.3	3,949.3	3,949.8	0.5
BQ	87,454	241	424	3.8	3,953.8	3,953.8	3,954.2	0.4
BR	88,140	152	396	4.1	3,958.2	3,958.2	3,958.5	0.3
BS	89,355	89	370	4.4	3,966.5	3,966.5	3,966.8	0.3

[1]Feet above Lake/Missoula County Line

[2]Floodway top width includes width of high ground area

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SWAN RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BT	90,672	78	249	6.6	3,977.5	3,977.5	3,977.8	0.3
BU	92,067	124	399	4.1	3,991.4	3,991.4	3,991.4	0.0
BV	93,589	144	413	3.9	4,004.3	4,004.3	4,004.3	0.0
BW	94,738	86	307	5.3	4,010.8	4,010.8	4,010.9	0.1
BX	95,943	89	378	4.3	4,015.9	4,015.9	4,016.1	0.2
BY	97,262	154	822	2.0	4,018.2	4,018.2	4,018.5	0.3
BZ	98,491	225	802	2.0	4,018.8	4,018.8	4,019.3	0.5
CA	99,773	459	1,067	1.5	4,020.0	4,020.0	4,020.5	0.5

[1]Feet above Lake/Missoula County Line

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MONTANA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SWAN RIVER

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not applicable to this Flood Risk Project]

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this Flood Risk Project.

Table 25: Summary of Coastal Transect Mapping Considerations

[Not applicable to this Flood Risk Project]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 30, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit www.fema.gov/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Mapping and Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Mapping and Insurance eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/media-library/assets/documents/1343 and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Mapping and Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Missoula County FIRM are listed in Table 26.

Table 26: Incorporated Letters of Map Change
[Not applicable to this Flood Risk Project]

6.5.4 Physical Map Revisions

A Physical Map Revisions (PMR) is an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Missoula County Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 27 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first FHBM. This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as PMRs of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by

the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Missoula County FIRMs in countywide format was 08/16/1988.

Table 27: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Missoula, City of	03/08/1974	03/08/1974	08/15/1975	01/06/1983	07/06/2015 08/16/1988
Missoula County, Unincorporated Areas	08/30/1974	08/30/1974	05/24/1977	08/15/1983	10/5/2023 03/07/2019 07/06/2015 08/16/1988 06/05/1985

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 28 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Bitterroot River	07/06/2015	USACE	N/A	1975	Missoula, City of; Missoula County, Unincorporated Areas
Blackfoot River	07/06/2015	USACE	N/A	1973	Missoula County, Unincorporated Areas
Clark Fork	07/06/2015	HKM Engineering, Inc.	N/A	2008	Missoula, City of; Missoula County, Unincorporated Areas
Clark Fork	07/06/2015	University of Montana, Department of Geology	N/A	1974	Missoula, City of; Missoula County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Clark Fork	07/06/2015	USACE	N/A	August 1973	Missoula, City of; Missoula County, Unincorporated Areas
Clark Fork	07/06/2015	USACE	N/A	1967	Missoula, City of; Missoula County, Unincorporated Areas
Clearwater River	10/5/2023	Compass PTS JV	HSFE60-15-D-0003	October 2023	Missoula County, Unincorporated Areas
Grant Creek	07/06/2015	USACE	N/A	1973	Missoula, City of; Missoula County, Unincorporated Areas
Honeysuckle Drainage Swale	07/06/2015	N/A	N/A	1977	Missoula, City of
La Valle Creek	07/06/2015	PBS&J	N/A	2006	Missoula County, Unincorporated Areas
Lolo Creek	07/06/2015	USACE	N/A	June 1975	Missoula County, Unincorporated Areas
Lower Grant Creek	07/06/2015	N/A	N/A	2011	Missoula, City of; Missoula County, Unincorporated Areas
Miller Creek	07/06/2015	Professional Consultants, Inc.	N/A	1979	Missoula County, Unincorporated Areas
Pattee Creek	07/06/2015	USACE	N/A	1977	Missoula, City of; Missoula County, Unincorporated Areas
Rattlesnake Creek	07/06/2015	USACE	N/A	1976	Missoula, City of; Missoula County, Unincorporated Areas
Rock Creek	07/06/2015	N/A	N/A	1973	Missoula County, Unincorporated Areas
Swan River	03/07/2019	DOWL	MAS No. 2015-01	November, 2016	Missoula County, Unincorporated Areas
Lolo Creek	07/06/2015	USACE	N/A	June 1975	Missoula County, Unincorporated Areas

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 29. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 29: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
City of Missoula	7/6/2015	10/6/2005	Kickoff	FEMA, Montana DNRC, Missoula County, City of Missoula, and the study contractor
		5/14/2009	Initial CCO	FEMA, Montana Department of Natural Resources, and the study contractor
		1/20/2011	CCO	FEMA, Montana DNRC, Missoula County, City of Missoula and the study contractors
		8/14/2013	Final CCO	FEMA, Montana DNRC, Missoula County, City of Missoula and the study contractors
Missoula County, Unincorporated Areas	10/5/2023	3/1/2021	Final CCO	FEMA, Montana DNRC, Missoula County, and Compass JV PTS

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

The additional data that was used for this project includes the FIS Report and FIRM that were previously prepared for Missoula County and the City of Missoula, (FEMA 2019).

Table 30 is a list of the locations where FIRMs for Missoula County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 30: Map Repositories

Community	Address	City	State	Zip Code
Missoula, City of	Office of Planning and Grants 435 Ryman Steet	Missoula	MT	59802
Missoula County, Unincorporated Areas	Community & Planning Services Department 127 East Main Street, Suite 2	Missoula	MT	59802

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM Databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 31.

Table 31 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 31: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov

FEMA Region VIII	Denver Federal Center Building 710 Box 25267 Denver, CO 80225-0267 (303) 235-4800
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Traci Sears, CFM Dept. of Natural Resources and Conservation 1625 Eleventh Ave. Helena, MT 59601 Phone: (406) 444-6654 tsears@mt.gov
Bureau Chief of Water Operations	Stephen Story, PE, CFM Dept. of Natural Resources and Conservation 1625 Eleventh Ave. Helena, MT 59601 Phone: (406) 444-6816 sestory@mt.gov
Missoula County Floodplain Administrator	Matt Heimel 200 W Broadway Missoula, MT 59802 Phone: (406) 258-3799 mheimel@missoulacounty.us

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
Bulletin No. 17B	Interagency Advisory Committee on Water Data	Guidelines for Determining Flood Flow Frequency, Bulletin No. 17B of the Hydrology Subcommittee	N/A	N/A	1982	
CCH Hydraulics 2006	Clear Creek Hydrology, Inc.	Hydraulic Analyses of La Valle and Butler Creek, Missoula County, Montana	N/A	N/A	2006	
Dodge equation	Montana Department of Highways	Application of Hydrologic and Hydraulic Research to Culvert Selection in Montana, Volumes I and II	E.R. Dodge	N/A	1972	
ESRI 2013	ESRI	ArcGIS 10.2	ESRI	Redlands, CA	2013	http://www.esri.com/software/arcgis/arcgis-for-desktop
FEMA 2009	Federal Emergency Management Agency	Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix C	FEMA	N/A	2009	http://www.fema.gov/media-library/assets/documents/34953
FEMA 2013	Federal Emergency Management Agency	cHECk-RAS, Version 2.0.1 Software.	FEMA	N/A	2013	http://www.fema.gov/check-ras-hec-ras-validation-tool
FEMA 2015	Federal Emegency Management Agency	Flood Insurance Study, Missoula County, Montana and Incorporated Areas	FEMA	N/A	July 6, 2015	msc.fema.gov
FEMA 2015	Federal Emergency Management Agency	Mapping Activity Statement (MAS) No. 2015-01 Missoula County, MT	FEMA	N/A	2015	https://www.fema.gov/cooperating-technical-partners-program
FEMA 2015	Federal Emergency Management Agency	RASPLOT, Version 3.0 Software	FEMA	N/A	2015	https://www.fema.gov/raplot-version-30

Table 32: Bibliography and References

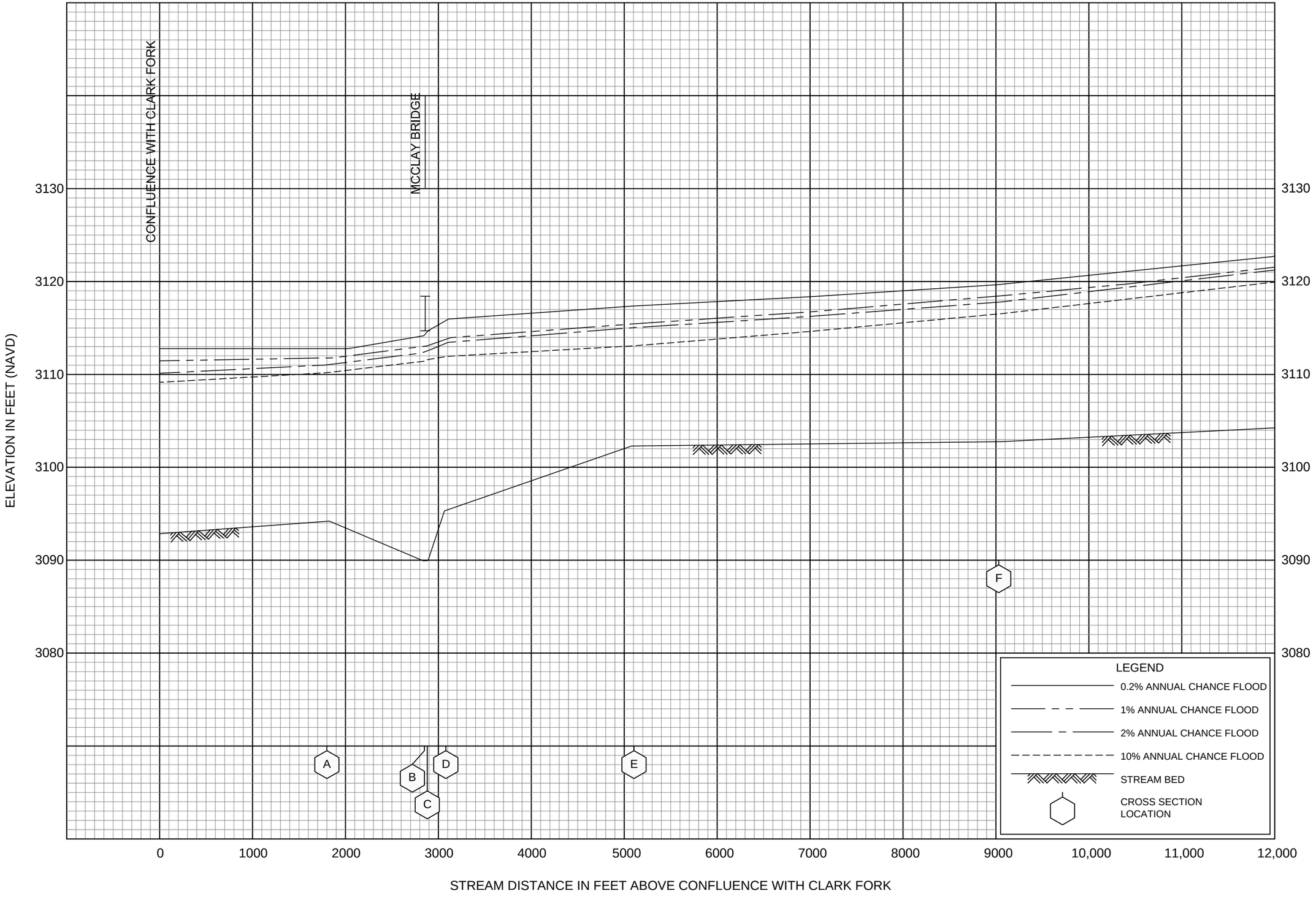
Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
FEMA 2016	Federal Emergency Management Agency	Technical Reference: Flood Insurance Study (FIS) Report	FEMA	N/A	2016	http://www.fema.gov/media-library/assets/documents/34519
Flood Survey 1977	Sorenson and Co.	Flood Study Field Surveys for Missoula County, Montana	N/A	Missoula, MT	1977	
HKM 2008	HKM Engineering, Inc.	Clark Fork Flood Study, Reserve Street Bridge	PBS&J	N/A	2008	
MDNRC 2015	Montana Department of Natural Resources and Conservation	Hydrology Design Report, Swan River Detailed Floodplain Study	MDNRC	N/A	2015	http://dnrc.mt.gov/divisions/water/operations/floodplain-management
Missoula County 2014	Department of Public Works Surveyor's Office Missoula, MT	Swan River Survey Report: Structures and Bathymetry	Missoula County	Missoula, MT	2014	http://www.missoulacounty.us/government/public-works/public-works
Quantum Spatial Inc 2015	Quantum Spatial Inc.	Swan-Clearwater LiDAR Processing: Technical Data Report	Quantum Spatial Inc.	Portland, OR	2015	https://quantumspatial.com/
Pro Consults 1979	Professional Consultants, Incorporated	Miller Creek Flood Plain Delineation	N/A	Missoula, MT	1979	
Simons 1986	Simons, LI & Associates, Inc.	Lower Swan River Flood Study, Lake County, Montana	Simons, LI & Associates, Inc.	Fort Collins, CO	1986	
Simons 1986	Simons, LI & Associates, Inc.	Upper Swan River Flood Study, Lake County, Montana	Simons, LI & Associates, Inc.	Fort Collins, CO	1986	
SCS 1969	United States Department of Agriculture	Engineering Handbook, Hydrology, Section 4	Soil Conservation Service	N/A	1969	

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
SCS 1972	United States Department of Agriculture	Hydrology of Bitterroot River Drainage, Based on Mountain Precipitation as Determined from Snow Survey and Precipitation Gages	Soil Conservation Service	Bozeman, Montana	March 1972	
TD&H 1977	Thomas, Dean and Hoskins Engineering Consultants	Storm Drainage Management Plan for South Hills Area, Missoula, Montana	N/A	N/A	June 1977	
USACE 1967	United States Army Corps of Engineers	Flood Plain Information, Clark Fork, Vicinity of Missoula, Montana	USACE	N/A	1967	
USACE 1973	United States Army Corps of Engineers	Special Flood Hazard Information, Clark Fork, Vicinity of Missoula to Alberton, Montana	USACE	N/A	August 1973	
USACE 1975	United States Army Corps of Engineers	Special Study, Suggested Hydraulic Floodway, Bitterroot River and Lolo Creek, Vicinity of Lolo, Missoula County, Montana	USACE	N/A	1975	
USACE 1976	United States Army Corps of Engineers	Special Study, Suggested Hydraulic Floodway, Rattlesnake Creek, Vicinity of Missoula, Missoula County, Montana	USACE	N/A	1976	
USACE 2010	United States Army Corps of Engineers	HEC-RAS Applications Guide, Version 4.1.0.	USACE Hydrologic Engineering Center	Davis, CA	2010	http://www.hec.usace.army.mil/software/hec-ras/
USACE 2010	United States Army Corps of Engineers	HEC-RAS Hydraulic Reference Manual, Version 4.1.0.	USACE Hydrologic Engineering Center	Davis, CA	2010	http://www.hec.usace.army.mil/software/hec-ras/

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
USACE 2010	United States Army Corps of Engineers	HEC-RAS User's Manual, Version 4.1.0.	USACE Hydrologic Engineering Center	Davis, CA	2010	http://www.hec.usace.army.mil/software/hec-ras/
USACE 2012	United States Army Corps of Engineers	HEC-GeoRAS User's Manual, Version 10	USACE, Hydrologic Engineering Center	Davis, CA	2012	http://www.hec.usace.army.mil/software/hec-georas/
USACE 2013	United States Army Corps of Engineers	HEC-GeoRAS 10.2, GIS Tools for Suppot of HEC-RAS	USACE, Hydrologic Engineering Center	Davis, CA	2013	http://www.hec.usace.army.mil/software/hec-georas/
USACE unpublished	United States Army Corps of Engineers	Clark Fork and Rock Creek Floodway Study	USACE	Unpublished		
USDA-FSA 2013	United States Department of Agriculture: Farm Service Agency	National Agriculture Imagery Program (NAIP) Aerial Photographs	USDA-FSA	Salt Lake City, UT	2013	http://www.fsa.usda.gov/contact-us
USGS 1967	United States Geological Survey	Water-Supply Paper 1849, Roughness Characteristics of Natural Channels	Harry H. Barnes, Jr.	Washington, D.C	1967	http://pubs.usgs.gov/wsp/wsp_1849/
USGS 1976	United States Department of the Interior	Open-File Report 75-650, A Method for Estimating Magnitude and Frequency of Floods in Montana	Omang and Johnson	N/A	1976	
USGS 1981	United States Department of the Interior	Revised Techniques for Estimating Magnitude for Frequency of Floods in Montana	USGS	Helena, MT	September 1981	



FLOOD PROFILES

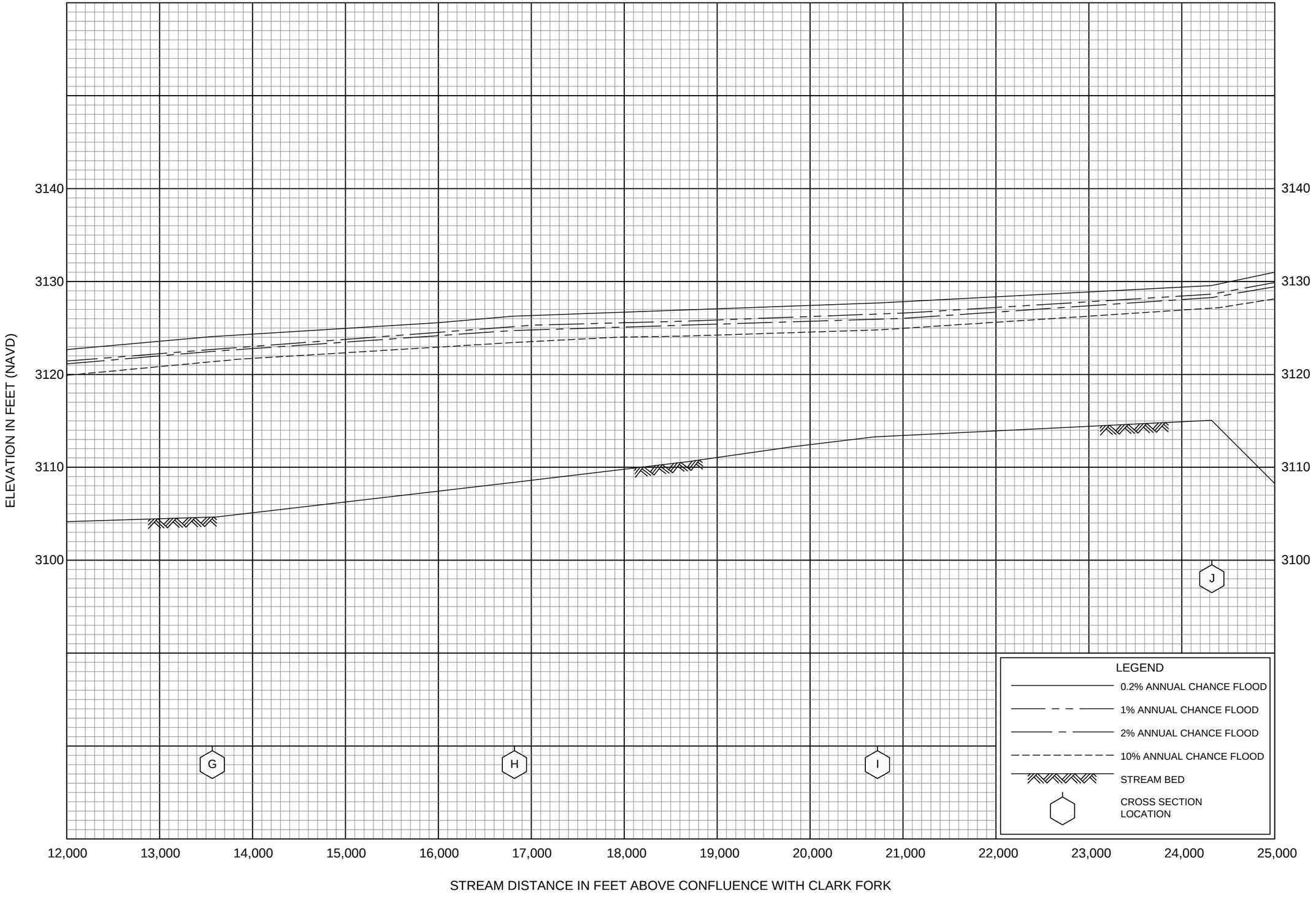
BITTERROOT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSOULA COUNTY, MT

AND INCORPORATED AREAS

001P



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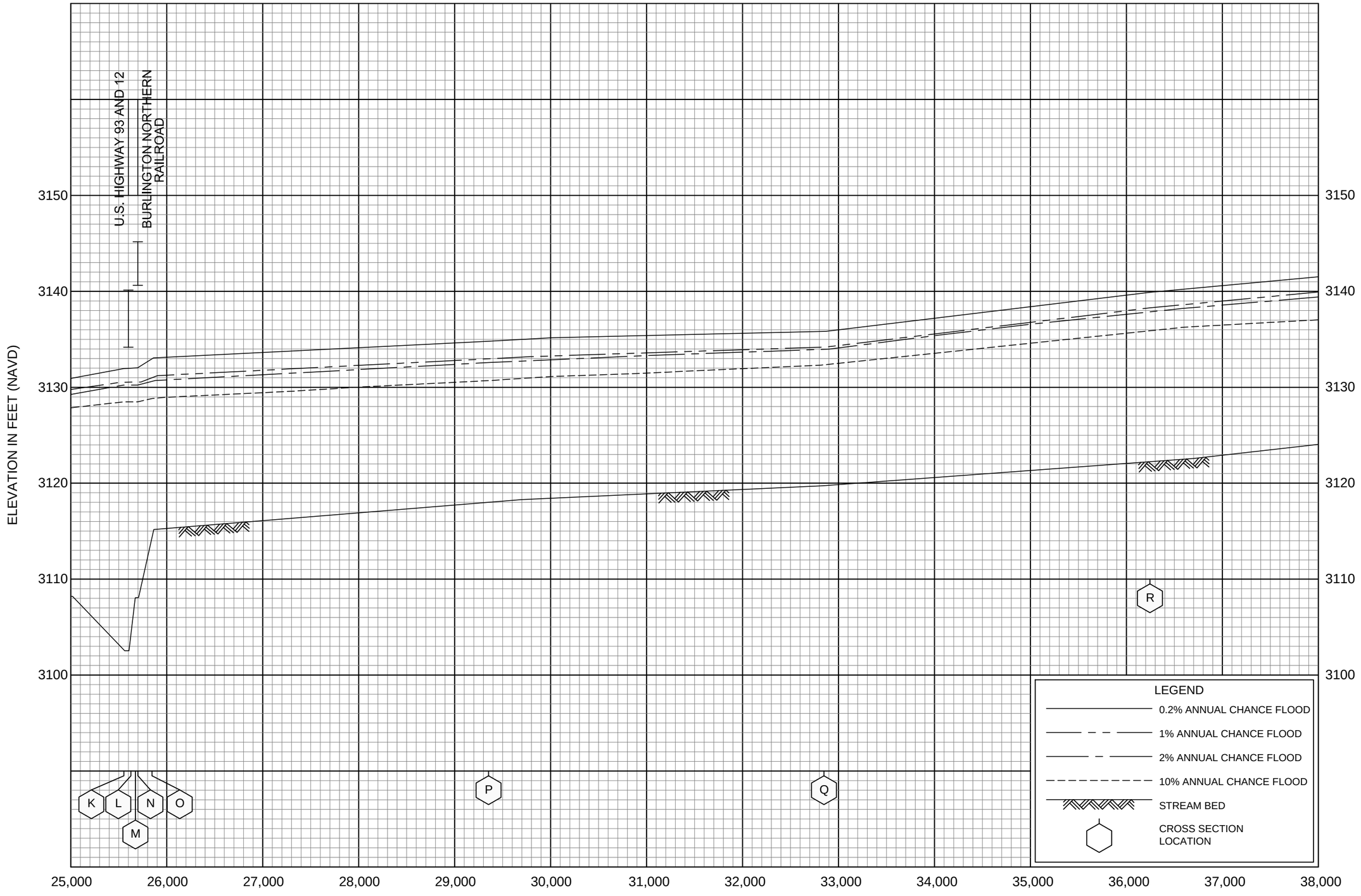

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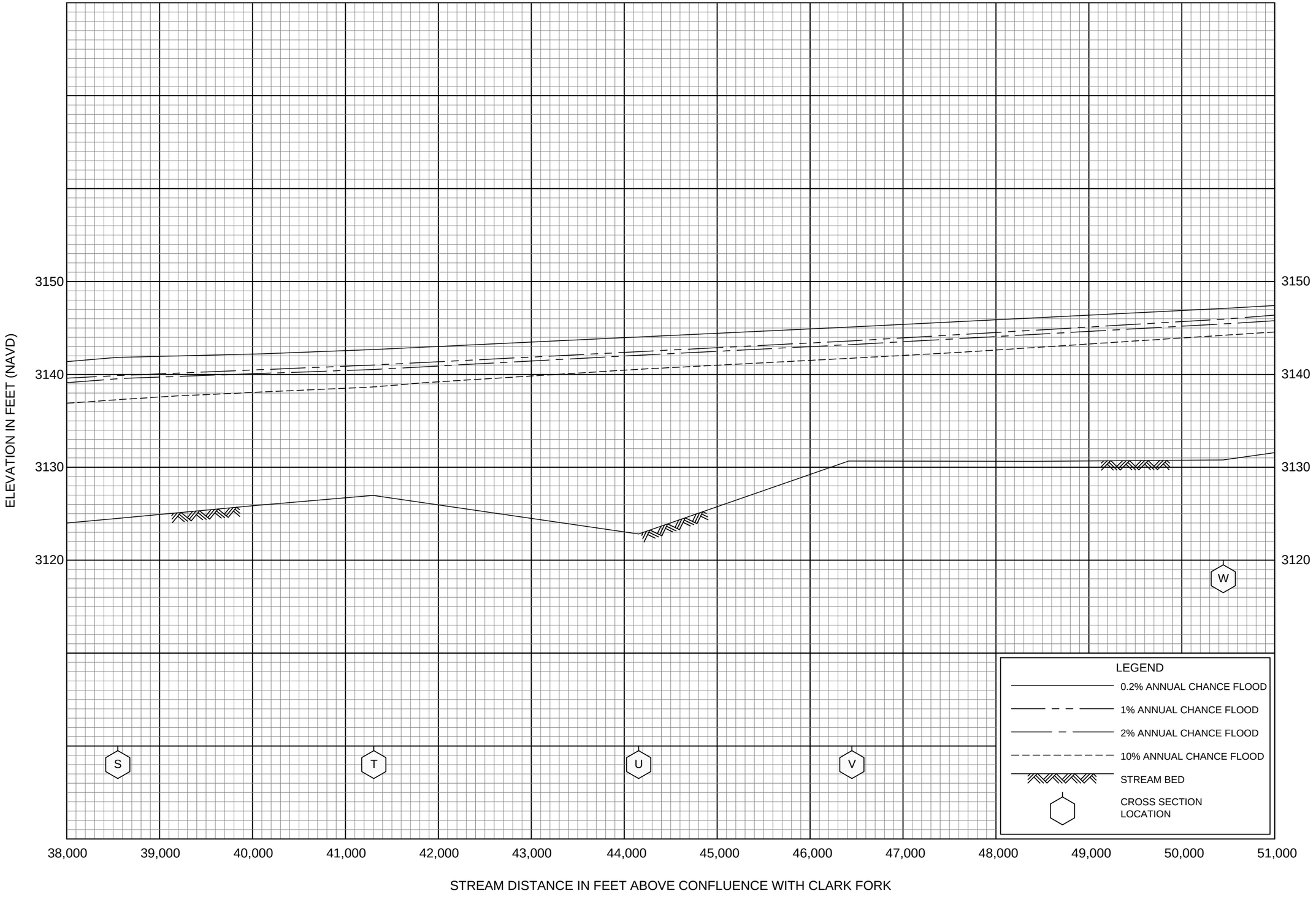

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