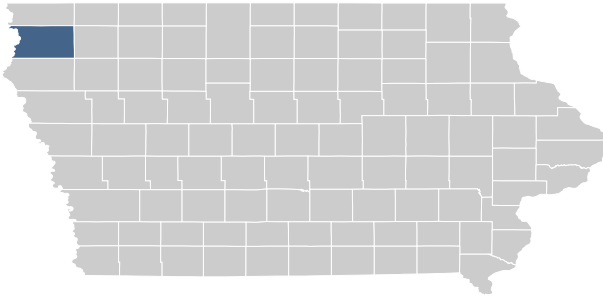


FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



SIoux COUNTY, IOWA AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
ALTON, CITY OF	190508	IRETON, CITY OF	190511
BOYDEN, CITY OF	190556	MATLOCK, CITY OF	195241
CHATSWORTH, CITY OF	190509	MAURICE, CITY OF	190512
GRANVILLE, CITY OF	190737	ORANGE CITY, CITY OF	190635
HAWARDEN, CITY OF	190252	ROCK VALLEY, CITY OF	190253
HOSPERS, CITY OF	190510	SIoux CENTER, CITY OF	190658
HULL, CITY OF	190595	SIoux COUNTY (UNINCORPORATED AREAS)	190906

PRELIMINARY:
May 29, 2020

EFFECTIVE:
To Be Determined

FLOOD INSURANCE STUDY NUMBER
19167CV000A

Version Number 2.4.1.1



FEMA

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Volume 1 Exhibits

<u>Flood Profiles</u>	<u>Panel</u>
Big Sioux River	01-03 P
Dry Creek	04-06 P

Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT SIOUX COUNTY, IOWA

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 Sioux County, Iowa.

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.

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Alton, City of	190508	10230002	19167C0469D, 19167C0488D, 19167C0632D, 19167C0651D	
Boyden, City of	190556	10230002	19167C0284D, 19167C0292D, 19167C0303D, 19167C0311D	
Chatsworth, City of	190509	10170203	19167C0542D	
Granville, City of	190737	10230002	19167C0657D, 19167C0676D ¹	
Hawarden, City of	190252	10170203	19167C0388D, 19167C0550D, 19167C0551D, 19167C0552D	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Hospers, City of	190510	10230002	19167C0483D, 19167C0484D, 19167C0500D	
Hull, City of	190595	10170204, 10230002	19167C0259D, 19167C0267D, 19167C0278D, 19167C0286D	
Ireton, City of	190511	10170203	19167C0577D, 19167C0579D, 19167C0583D, 19167C0586D	
Matlock, City of	195241	10170204	19167C0302D, 19167C0306D	
Maurice, City of	190512	10230002	19167C0602D, 19167C0604D, 19167C0606D, 19167C0608D	
Orange City, City of	190635	10230002	19167C0464D, 19167C0468D, 19167C0627D, 19167C0631D, 19167C0632D	
Rock Valley, City of	190253	10170204	19167C0229D, 19167C0233D, 19167C0234D, 19167C0250D	
Sheldon, City of	190216	10230002	N/A	O'Brien County FIS Report, TBD
Sioux Center, City of	190658	10170203, 10230002	19167C0429D, 19167C0431D, 19167C0432D, 19167C0433D, 19167C0434D, 19167C0441D, 19167C0442D	
Sioux County (Unincorporated Areas)	190906	10170203, 10170204, 10230002	19167C0025D, 19167C0050D, 19167C0075D, 19167C0100D, 19167C0125D, 19167C0150D, 19167C0175D, 19167C0200D, 19167C0225D, 19167C0227D, 19167C0229D, 19167C0231D, 19167C0232D, 19167C0233D, 19167C0234D, 19167C0250D, 19167C0259D, 19167C0267D, 19167C0275D, 19167C0278D, 19167C0284D, 19167C0286D, 19167C0292D, 19167C0300D, 19167C0301D, 19167C0302D, 19167C0303D, 19167C0306D, 19167C0311D, 19167C0317D, 19167C0325D, 19167C0336D, 19167C0350D, 19167C0375D, 19167C0388D, 19167C0400D, 19167C0425D, 19167C0429D, 19167C0431D, 19167C0432D, 19167C0433D, 19167C0434D, 19167C0441D, 19167C0442D, 19167C0450D, 19167C0464D, 19167C0468D, 19167C0469D, 19167C0475D, 19167C0483D, 19167C0484D, 19167C0488D, 19167C0500D, 19167C0525D, 19167C0542D, 19167C0550D, 19167C0551D, 19167C0552D, 19167C0575D, 19167C0577D, 19167C0579D, 19167C0583D, 19167C0586D, 19167C0600D, 19167C0602D, 19167C0604D, 19167C0606D, 19167C0608D, 19167C0625D, 19167C0627D, 19167C0631D, 19167C0632D, 19167C0650D, 19167C0651D, 19167C0657D, 19167C0675D, 19167C0676D ¹ , 19167C0700D	

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 30, "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 Sioux County became effective on **To Be Determined**. Refer to Table 27 for information about subsequent revisions to the FIRMs.

- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels. In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
B	X (shaded)
C	X (unshaded)

- 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.”

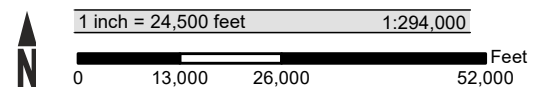
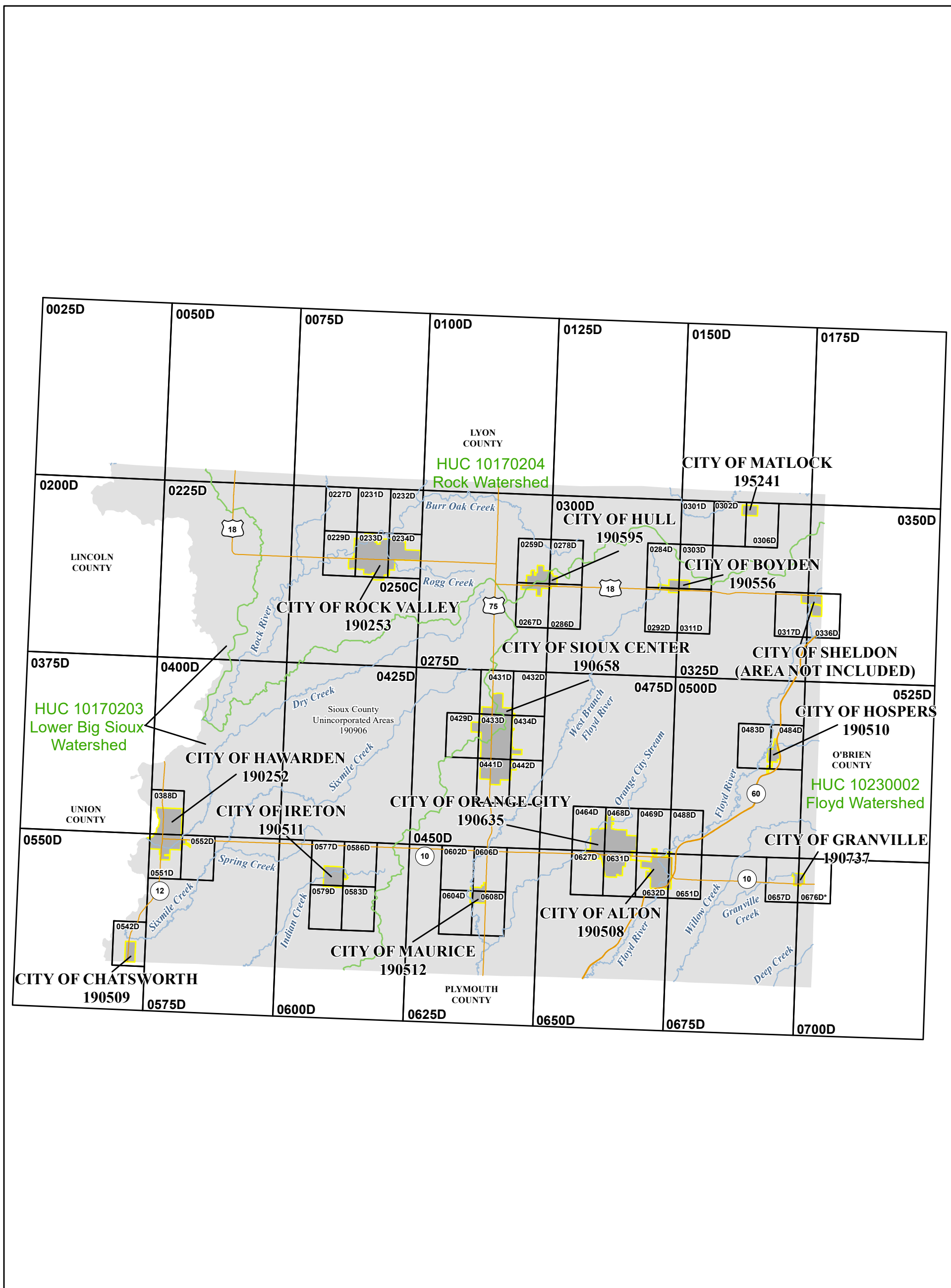
Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented in Table 8 of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE National Levee Database (nld.usace.army.mil). For all other levees, the user is encouraged to contact the appropriate local community.

Please also note that FEMA has identified one or more 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. These levees are on FIRM panel 19167C0551D, on the Hawarden Dry Creek Right Bank, and are identified on FIRM panels as potential areas of flood hazard data changes based on further review. Please refer to Section 4.4 of this FIS Report for more information.

- 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 Sioux 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

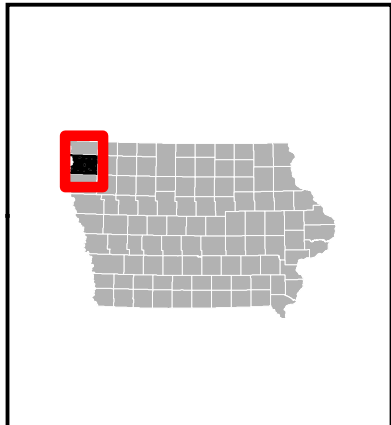


Map Projection:
 Universal Transverse Mercator Zone 15 North:
 North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

*PANEL NOT PRINTED -- NO SPECIAL FLOOD HAZARD AREAS




NATIONAL FLOOD INSURANCE PROGRAM
 FLOOD INSURANCE RATE MAP INDEX

SIoux COUNTY, IOWA and Incorporated Areas

PANELS PRINTED:
 0025, 0050, 0075, 0100, 0125, 0150, 0175, 0200, 0225, 0227, 0229, 0231, 0232, 0233, 0234, 0250, 0259, 0267, 0275, 0278, 0284, 0286, 0292, 0300, 0301, 0302, 0303, 0306, 0311, 0317, 0325, 0336, 0350, 0375, 0388, 0400, 0425, 0429, 0431, 0432, 0433, 0434, 0441, 0442, 0450, 0464, 0468, 0469, 0475, 0483, 0484, 0488, 0500, 0525, 0542, 0550, 0551, 0552, 0575, 0577, 0579, 0583, 0586, 0600, 0602, 0604, 0606, 0608, 0625, 0627, 0631, 0632, 0650, 0651, 0657, 0675, 0700

PRELIMINARY
5/29/2020



MAP NUMBER
 19167CIND0A
 EFFECTIVE DATE

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 Map Information 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 Map Information 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 27 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.

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

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.

Figure 2. FIRM Notes to Users (continued)

<p>PROJECTION INFORMATION: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 15N. The horizontal datum was the North American Datum of 1983 NAD83. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.</p>
<p>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.</p> <p>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 30 of this FIS Report.</p> <p>BASE MAP INFORMATION: Base map information shown on the FIRM was provided by Iowa Department of Natural Resources and the Iowa Department of Transportation. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.</p> <p>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.</p> <p>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.</p>
<p>NOTES FOR FIRM INDEX</p> <p>REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Sioux County, Iowa, 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 27 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.</p>
<p>SPECIAL NOTES FOR SPECIFIC FIRM PANELS</p> <p>This Notes to Users section was created specifically for Sioux County, Iowa, effective TBD.</p> <p>PROVISIONALLY ACCREDITED LEVEE: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by March 14, 2021. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit www.fema.gov/national-flood-insurance-program.</p>

Figure 2. FIRM Notes to Users (continued)

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 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 Sioux County.

Figure 3: Map Legend for FIRM


SPECIAL FLOOD HAZARD AREAS: <i>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.</i>	
	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.







Figure 3: Map Legend for FIRM (continued)

	Regulatory Floodway determined in Zone AE.
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. See Notes to Users for important information.
	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	
<p><i>Aqueduct Channel Culvert Storm Sewer</i></p>	Channel, Culvert, Aqueduct, or Storm Sewer
<p><i>Dam Jetty Weir</i></p>	Dam, Jetty, Weir

Figure 3: Map Legend for FIRM (continued)

	Levee, Dike, or Floodwall
	Bridge
REFERENCE MARKERS	
	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
	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.
	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	
	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway

Figure 3: Map Legend for FIRM (continued)

	County Highway
	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
	Railroad
	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
4276⁰⁰⁰mE	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 Sioux 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- 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- 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 Sioux 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 13. 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.

Within this jurisdiction, there are one or more levees that have not been demonstrated by the communities or levee owners to meet the requirements of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10) as it relates to the levee's capacity to provide 1-percent-annual-chance flood protection. As such, the floodplain boundaries in this area are subject to change. Please refer to Section 4.4 of this FIS Report for more information on how this may affect the floodplain boundaries shown on this FIRM.

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)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Big Sioux River	Sioux County (Unincorporated Areas), City of Hawarden	At Plymouth County boundary	At Lyon County boundary	10170203	39.0		N	A	2014
Big Sioux River	Sioux County (Unincorporated Areas), City of Hawarden	Approximately 1.0 mile downstream of 10th Street	Approximately 4.0 miles downstream of State Highway 12	10170203	2.8		Y	AE	2020
Burr Oak Creek	Sioux County (Unincorporated Areas)	Confluence with Rock River	Approximately 0.1 miles downstream of County Road K60	10170204	14.2		N	A	2014
Deep Creek	Sioux County (Unincorporated Areas)	At Plymouth County boundary	At O'Brien County boundary	10230002	3.2		N	A	2014
Dry Creek	Sioux County (Unincorporated Areas)	Approximately 0.3 miles upstream of State Highway 10	Approximately 0.9 miles upstream of Grant Avenue	10170203	27.2		N	A	2014
Dry Creek	Sioux County (Unincorporated Areas), City of Hawarden	Confluence with Big Sioux River	Approximately 0.3 miles upstream of State Highway 10	10170203	2.6		Y	AE	2020
Dry Creek South Breakout	Sioux County (Unincorporated Areas), City of Hawarden	At Birch Avenue	At 3rd Street	10170203	1.3		N	A	2019
Dry Run Creek	Sioux County (Unincorporated Areas)	Confluence with Rock River	At Lyon County boundary	10170204	8.0		N	A	2014
Floyd River	Sioux County (Unincorporated Areas), City of Alton, City of Sheldon	At Plymouth County boundary	At O'Brien County boundary	10230002	39.8		N	A	2014

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Floyd Watershed Zone A Tributaries	Sioux County (Unincorporated Areas), City of Alton, City of Boyden, City of Hospers, City of Hull, City of Maurice, City of Sioux Center	Downstream limit of study	Upstream limit of study	10230002	170.0		N	A	2014
Granville Creek	Sioux County (Unincorporated Areas), City of Granville	Confluence with Willow Creek	Approximately 0.1 miles upstream of Marsh Avenue	10230002	5.8		N	A	2014
Indian Creek	Sioux County (Unincorporated Areas), City of Ireton	At Plymouth County boundary	Approximately 376 feet downstream of 460th Street	10170203	12.4		N	A	2014
Little Floyd River	Sioux County (Unincorporated Areas)	Confluence with Floyd River	At O'Brien County boundary	10230002	0.6		N	A	2014
Lower Big Sioux Watershed Zone A Tributaries	Sioux County (Unincorporated Areas), City of Ireton	Downstream limit of study	Upstream limit of study	10170203	90.4		N	A	2014
Nelson Creek	Sioux County (Unincorporated Areas)	At Lyon County boundary	At Lyon County boundary	10170203	0.2		N	A	2014
North Willow Creek	Sioux County (Unincorporated Areas), City of Hospers	Confluence with Floyd River	At O'Brien County boundary	10230002	2.7		N	A	2014
Orange City Slough	Sioux County (Unincorporated Areas), City of Orange City	Confluence with West Branch Floyd River	Approximately 376 feet downstream of 410th Street	10230002	15.2		N	A	2014
Otter Creek	Sioux County (Unincorporated Areas)	At Lyon County boundary	At Lyon County boundary	10170204	7.5		N	A	2014
Rock River	Sioux County (Unincorporated Areas), City of Rock Valley	Confluence with Big Sioux River	At Lyon County boundary	10170203, 10170204	26.0		N	A	2014

Table 2: Flooding Sources Included in this FIS Report (*continued*)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi ²) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Rock Watershed Zone A Tributaries	Sioux County (Unincorporated Areas), City of Rock Valley, City of Matlock	Downstream limit of study	Upstream limit of study	10170204	69.7		N	A	2014
Rogg Creek	Sioux County (Unincorporated Areas), City of Rock Valley	Confluence with Rock River	Approximately 432 feet downstream of Grant Avenue	10170204	7.2		N	A	2014
Sixmile Creek	Sioux County (Unincorporated Areas)	Confluence with Big Sioux River	Approximately 262 feet downstream of Grant Avenue	10170203	37.1		N	A	2014
Spring Creek	Sioux County (Unincorporated Areas)	Confluence with Sixmile Creek	Approximately 1.0 mile upstream of County Road K24	10170203	7.1		N	A	2014
West Branch Floyd River	Sioux County (Unincorporated Areas), City of Boyden, City of Maurice	At Plymouth County boundary	Approximately 166 feet downstream of 300th Street	10230002	37.3		N	A	2014
Willow Creek	Sioux County (Unincorporated Areas)	At Plymouth County boundary	At O'Brien County boundary	10230002	15.6		N	A	2014

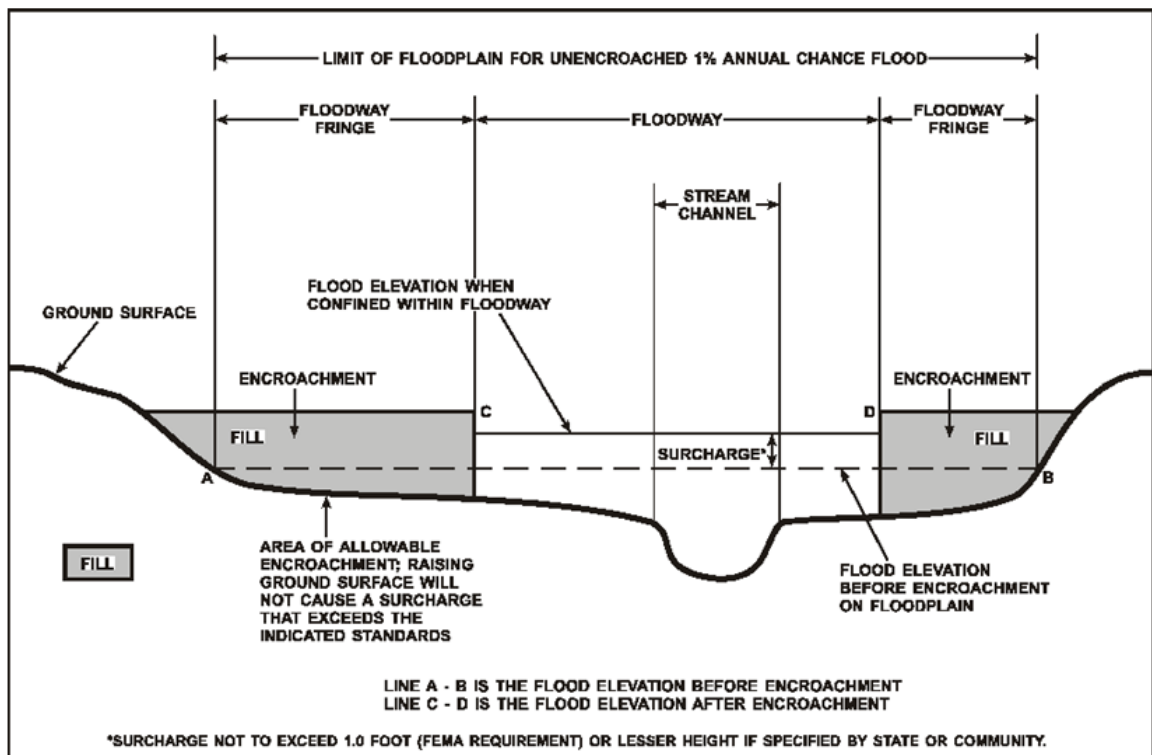
2.2 Floodways

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 1 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. 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 Base Flood Elevation (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 Project.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

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 Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

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 Project.

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 Sioux County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Alton, City of	A, X
Boyden, City of	A, X
Chatsworth, City of	A, X
Granville, City of	A, X
Hawarden, City of	AE, A, X
Hospers, City of	A, X
Hull, City of	A, X

Table 3: Flood Zone Designations by Community (continued)

Community	Flood Zone(s)
Ireton, City of	A, X
Matlock, City of	A, X
Maurice, City of	A, X
Orange City, City of	A, X
Rock Valley, City of	A, X
Sioux Center, City of	A, X
Sioux County (Unincorporated Areas)	AE, A, 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)
Floyd	10230002	Floyd River	This is the eastern portion of Sioux County, which drains to the Missouri-Little Sioux River Basin.	369
Lower Big Sioux	10170203	Lower Big Sioux River	This is the western portion of Sioux County, which drains to the Big Sioux River Basin	242
Rock	10170204	Rock River	This is the northern portion of Sioux County which drains to the Big Sioux River Basin	159

4.2 Principal Flood Problems

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

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Big Sioux River	In June 2018, roads coming into Hawarden were closed due to overflowing water from the Big Sioux River. Bridges along the Big Sioux River were also closed due to dangerously high river stages.
Dry Creek	The City of Hawarden has experienced many severe floods during its history, the most notable occurring in 1897 and 1926 resulting from a combination of snow melt and heavy rain. A loss of life was recorded in the 1926 flood. Hawarden also experienced significant flooding in 1934, 1936, 1942, 1952, and 1953. Destructive flooding in Hawarden was caused primarily by Old Dry Creek which flowed diagonally through the center of the community. The new channel of Dry Creek was constructed in 1963. The city has taken steps to lessen flooding along the Old Dry Creek channel. The creek has been rerouted along the southern edge of the community to flow through a series of gravel pits. The new Dry Creek, has a levee system incorporated along both sides of the creek. The fill of the levee along the north side of the creek is approximately four feet higher than the opposite bank. The left levee was designed, intentionally, with levee crest elevations lower than the right levee to act as a relief, and direct high flows to agricultural lands south of Hawarden thus providing protection to the city. The rerouted creek flows through undeveloped areas of the community.
Floyd River	In June 2018, heavy rains occurred over northwestern Iowa. Floyd River overflowed its banks resulting in several road closures, including a portion of Highway 60 near Alton, Iowa. A bridge collapse and train derailment was also believed to be the result of flooding. In September 2018, the area around Alton, Iowa was inundated with record rainfall resulting in damage to residential homes and road closures.
Rock River	In June 2018, Sioux County experienced heavy rainfall from a series of thunderstorms which produced flash-flood conditions throughout the region. The record rainfall caused Rock River to overflow its banks. Additionally, high river levels kept the storm gates closed so the Rock Valley storm drains could not empty water. Residents in Rock Valley were forced to evacuate their homes, and dozens of roads were closed, including Highway 18. In 2014, Rock River reached historically high levels causing severe flooding, power outages and damage to drinking water and sewage treatment facilities.

Table 5: Principal Flood Problems (continued)

Flooding Source	Description of Flood Problems
Various rivers and streams within Sioux County, IA	<p>Flooding in Sioux County usually occurs as a result of flash flooding during heavy rains in the spring or early summer, while more severe flooding typically occurs in late winter or early spring from rainfall and/or snowmelt in conjunction with ice jams.</p> <p>In June of 1953, precipitation in excess of 7 inches was recorded throughout Northwestern Iowa. Floods caused by overflowing streams were recorded in Hawarden, Sioux Center, and Alton causing hundreds of thousands of dollars in damage to stocks and structures.</p> <p>In the summer of 1993, record rainfall and saturated soils led to one of the largest floods in Iowa history. Sioux County was one of Iowa's 99 counties declared as a Federal Disaster Area.</p> <p>Other recent disaster declarations for Sioux County occurred in June 2014 and August 2018 due to severe storms and flooding which resulted in damage to roads and bridges. There were also reports of residential flooding.</p>

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

Table 6: Historic Flooding Elevations

[Not Applicable to this Flood Risk Project]

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within Sioux 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

[Not Applicable to this Flood Risk Project]

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 Sioux 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-annualchance flood protection. This levee occurs on FIRM panel 19167C0551D, along the Hawarden Dry Creek Right Bank and is identified on the FIRM panel as a potential area of flood hazard data changes based on further review. 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)
Hawarden, City of	Dry Creek	Left Bank	City of Hawarden	No	4705000022	Yes	19167C0551D
Hawarden, City of	Dry Creek	Left Bank	City of Hawarden	No	4705000022	Yes	19167C0551D
Hawarden, City of	Dry Creek	Right Bank	City of Hawarden	No	4705000021	Yes	19167C0551D
Hawarden, City of	Dry Creek	Right Bank	City of Hawarden	No	4705000021	Yes	19167C0551D

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 one 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.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1-percent-annual-chance flood elevation and a 1-percent-annual-chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1-percent-annual-chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

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 Existing	1% Annual Chance Plus	0.2% Annual Chance
Big Sioux River	Approximately 4.0 miles down-stream of State Highway 12	6,995	35,640	53,260	68,370	85,040	104,020	129,900
Dry Creek	State Highway 10 (aka Tenth Street)	49	3,893	5,708	7,007	8,333	11,164	11,322

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
Big Sioux River	06485500	USGS	Big Sioux River at Akron	7,879	03/1929	05/2017
Dry Creek	06484000	USGS	Dry Creek at Hawarden	49	03/1949	04/1969

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 in Table 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
Big Sioux River	Approximately 1.0 mile downstream of 10th Street	Approximately 4.0 miles downstream of State Highway 12	Gage Analysis	HEC-RAS 1D	01/06/2020	AE w/ Floodway	
Dry Creek	Confluence with Big Sioux River	Approximately 0.3 miles upstream of State Highway 10	Gage weighted with regression	HEC-RAS 1D and 2D	01/06/2020	AE w/ Floodway	Levee analysis and mapping procedures were applied to the Levees. The Right Bank Levee was granted Provisional Accreditation. The Left Bank Levee does not meet freeboard requirements and has been de-accredited.
Dry Creek South Breakout	At Birch Avenue	At 3rd Street	Regression Equations	HEC RAS 3.1.1 and higher	12/18/2019	A	
All Zone A Flooding Sources within Sioux County; except Dry Creek South Breakout	Downstream limit of study	Upstream limit of study	Regression Equations	HEC RAS 3.1.1 and higher	02/04/2014	A	For streams studied by approximate methods, the peak flood discharges were computed for the 10-, 2-, 1- and 0.2- percent-annual-chance storm events using hydrologic analyses recommended by the Iowa Department of Natural Resources (IDNR) and the Iowa Department of Transportation. This hydrologic analysis method includes use of gage information and United States Geological Survey (USGS) regression equations. For additional information on the hydrologic analyses please refer to the Technical Support Data Notebook (TSDN) on the Mapping Information Platform (MIP). The flooding for Rock River was updated within the City of Rock Valley on 12/12/2019 by Moore Engineering, Inc.

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Big Sioux River	0.035	0.016-0.120
Dry Creek	0.045	0.016-0.120
All approximate flooding sources	0.030-0.045	0.020-0.150

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

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 Project.

Figure 8: 1-Percent-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 Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

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 Project.

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.

The datum conversion locations and values that were calculated for Sioux County are provided in Table 19.

Table 19: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Alcester SE	SE	43	-96.5	0.676
Alton	SE	42.875	-96	0.623
Alvord	SE	43.25	-96.25	0.715
Boyden	SE	43.125	-96	0.650
Canton	SE	43.25	-96.5	0.771
Chatsworth	SE	42.875	-96.5	0.653
Doon	SE	43.25	-96.125	0.696
Fairview	SE	43.125	-96.375	0.732
George East	SE	43.25	-95.875	0.623
George West	SE	43.25	-96	0.653
Granville West	SE	42.875	-95.875	0.630
Hawarden North	SE	43	-96.375	0.702
Hawarden South	SE	42.875	-96.375	0.689
Hospers	SE	43	-95.875	0.623
Hull	SE	43.125	-96.125	0.682
Inwood	SE	43.25	-96.375	0.768
Ireton	SE	42.875	-96.25	0.656
Lebanon	SE	43	-96.25	0.692
Matlock	SE	43.125	-95.875	0.623
Maurice	SE	42.875	-96.125	0.617
Orange City	SE	43	-96	0.610
Rock Valley	SE	43.125	-96.25	0.715
Sioux Center	SE	43	-96.125	0.653
Average Conversion from NGVD29 to NAVD88 = +0.672 feet				

Table 20: Stream-Based Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

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*, 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
City Boundaries	Iowa Department of Natural Resources	2018	1:24,000	Location and attributes for political jurisdictions shown on the FIRM.
County Boundaries	Iowa Department of Natural Resources - Iowa Geological Survey	1990	1:24,000	Political boundaries
Digital Orthophoto	Iowa Geological and Water Survey, DNR	2007	1:4,800	Base Imagery
General Structures	Iowa Department of Natural Resources - Geological and Water Survey	2014	1:24,000	Location and attributes for flood control structures shown on the flood profiles and FIRM.
HUC-8 Subbasins	U. S. Department of Agriculture, Natural Resources Conservation Service	2008	1:24,000	Location and attributes for subbasins in the hydrologic analysis.
Public Land Survey System (PLSS)	Iowa Department of Natural Resources	1998	1:24,000	Location and attributes of sections, townships, and ranges on the FIRM.
Transportation Features	Iowa Department of Transportation	2011	1:5,000	Location and attributes for roads, railroads, and other transportation features shown on the FIRM.

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- 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	Vertical Accuracy	Horizontal Accuracy	Citation
Sioux County	All Flooding Sources	Light Detection and Ranging data (LiDAR)	18.5cm (bare earth) 37cm (dense vegetation)	+/- 1 meter	IDNR 2014a

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 ² (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	1,810	3,457 / 2,606	45,997	2.6	1,175.1	1,175.1	1,175.3	0.2
B	4,652	3,238 / 161	40,934	2.1	1,175.7	1,175.7	1,176.2	0.5
C	5,165	3,758 / 181	51,310	1.7	1,175.9	1,175.9	1,176.4	0.5
D	6,898	4,490 / 650	57,436	1.5	1,176.8	1,176.8	1,177.1	0.3
E	12,888	4,316 / 122	47,684	1.8	1,177.3	1,177.3	1,177.7	0.4

¹ Feet above Limit of Detailed Study {Limit of Detailed Study is approximately 5000 feet downstream of 10th Street bridge}

² Total floodway width / width within jurisdiction

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY
SIoux COUNTY, IOWA
 AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: BIG SIOUX RIVER

Table 23: Floodway Data (continued)

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	6,427	284	1,501	5.6	1,179.8	1,179.8	1,180.2	0.4
B	7,588	350	2,333	3.6	1,181.9	1,181.9	1,182.6	0.7
C	8,845	342	1,820	4.6	1,184.0	1,184.0	1,184.4	0.4
D	9,133	267	1,810	4.6	1,185.6	1,185.6	1,186.3	0.7
E	10,557	300	2,387	3.5	1,188.3	1,188.3	1,188.7	0.4
F	11,491	244	2,526	3.8	1,189.0	1,189.0	1,189.8	0.8
G	12,032	153	1,424	5.9	1,191.1	1,191.1	1,191.2	0.1
H	13,518	433	3,096	2.7	1,192.5	1,192.5	1,193.4	0.9

¹ Feet above confluence with Big Sioux River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY
SIoux COUNTY, IOWA
 AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: DRY CREEK

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/floodplain-management/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 Map Information 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/floodplain-management/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 Map Information 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 Map Information 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 Sioux 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 Sioux County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBM) and/or Flood Boundary and Floodway Maps (FBFM) 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 Sioux County FIRMs in countywide format was **To Be Determined**.

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)
Alton, City of	04/16/1976	04/16/1976	N/A	08/05/1985	
Boyden, City of ²	TBD	N/A	N/A	TBD	
Chatsworth, City of	08/13/1976	08/13/1976	09/19/1978	05/01/2011	
Granville, City of ²	TBD	N/A	N/A	TBD	
Hawarden, City of	05/24/1974	05/24/1974	07/30/1976 07/26/1977	01/16/1981	
Hospers, City of	09/26/1975	09/26/1975	N/A	09/18/1985	
Hull, City of ²	TBD	N/A	N/A	TBD	
Ireton, City of ²	TBD	N/A	N/A	TBD	
Matlock, City of ²	TBD	N/A	N/A	TBD	
Maurice, City of ²	03/19/1976	03/19/1976	N/A	TBD	
Orange City, City of ¹	05/01/2011	N/A	N/A	05/01/2011	
Rock Valley, City of	05/13/1977	05/13/1977	N/A	11/01/1985	
Sioux Center, City of	09/26/1975	09/26/1975	N/A	09/02/1988	
Sioux County (Unincorporated Areas)	10/25/1977	10/25/1977	N/A	05/01/2011	

¹ Dates for this community were taken from Sioux County, Unincorporated Areas

² This community did not have a FIRM prior to the first countywide FIRM for Sioux County

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
Big Sioux River	TBD	ATKINS	17ESDLQSR ALS-0002	January 2020	City of Hawarden, Sioux County (Unincorporated Areas)
Dry Creek	TBD	ATKINS	17ESDLQSR ALS-0002	January 2020	City of Hawarden, Sioux County (Unincorporated Areas)
Dry Creek South Breakout	TBD	ATKINS	17ESDLQSR ALS-0002	December 2019	City of Hawarden, Sioux County (Unincorporated Areas)
All Zone A Flooding Sources within Sioux County	TBD	Iowa Flood Center and IIHR Hydroscience and Engineering	17ESDLQSR ALS-0002	February 2014	All communities

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
Alton, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Boyden, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Chatsworth, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Granville, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Hawarden, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
	TBD	12/11/2019	Flood Risk Review	FEMA, Atkins, Iowa DNR, and community officials

Table 29: Community Meetings (continued)

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Hawarden, City of (continued)		TBD	Final CCO Meeting	
Hospers, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Hull, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Ireton, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Matlock, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Maurice, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	

Table 29: Community Meetings (continued)

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Orange City, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Rock Valley, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Sioux Center, City of	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	
Sioux County (Unincorporated Areas)	TBD	09/26/2018	Draft Flood Hazard Product Review Meeting	FEMA, Iowa DNR, and community officials
		TBD	Final CCO Meeting	

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 the City of Hawarden, (FEMA 1980).

Table 30 is a list of the locations where FIRMs for Sioux 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
Alton, City of	City Hall 905 Third Avenue	Alton	IA	51003
Boyden, City of	City Hall 609 East Webb Street	Boyden	IA	51234
Chatsworth, City of	Community Center 225 North Street	Hawarden	IA	51023
Granville, City of	City Hall 740 Broad Street	Granville	IA	51022
Hawarden, City of	City Offices 1150 Central Avenue	Hawarden	IA	51023
Hospers, City of	City Hall 100 Third Avenue South	Hospers	IA	51238
Hull, City of	City Offices 1133 Maple Street	Hull	IA	51239
Ireton, City of	City Offices 502 4th Street	Ireton	IA	51027
Matlock, City of	Fire Department 555 Main Street	Matlock	IA	51244
Maurice, City of	City Offices 315 Pine Street	Maurice	IA	51036
Orange City, City of	City Hall 125 Central Avenue SE	Orange City	IA	51041

Table 30: Map Repositories (continued)

Community	Address	City	State	Zip Code
Rock Valley, City of	City Office 1507 Main Street	Rock Valley	IA	51247
Sioux Center, City of	City Hall 335 First Avenue NW	Sioux Center	IA	51250
Sioux County (Unincorporated Areas)	County Courthouse 210 Central Avenue SW	Orange City	IA	51041

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 VII	11224 Holmes Road Kansas City, MO 64131-3626 Telephone: (816) 283-7003
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Bill Cappuccio Iowa Department of Natural Resources Wallace State Office Building Des Moines, IA 50319 515-281-8942 FAX 515-281-8895 bill.cappuccio@dnr.state.ia.us
State GIS Coordinator	Patrick Wilke-Brown Iowa Department of Natural Resources Wallace State Office Building Des Moines, IA 50319 515-281-6905 patrick.wilke-brown@dnr.iowa.gov

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

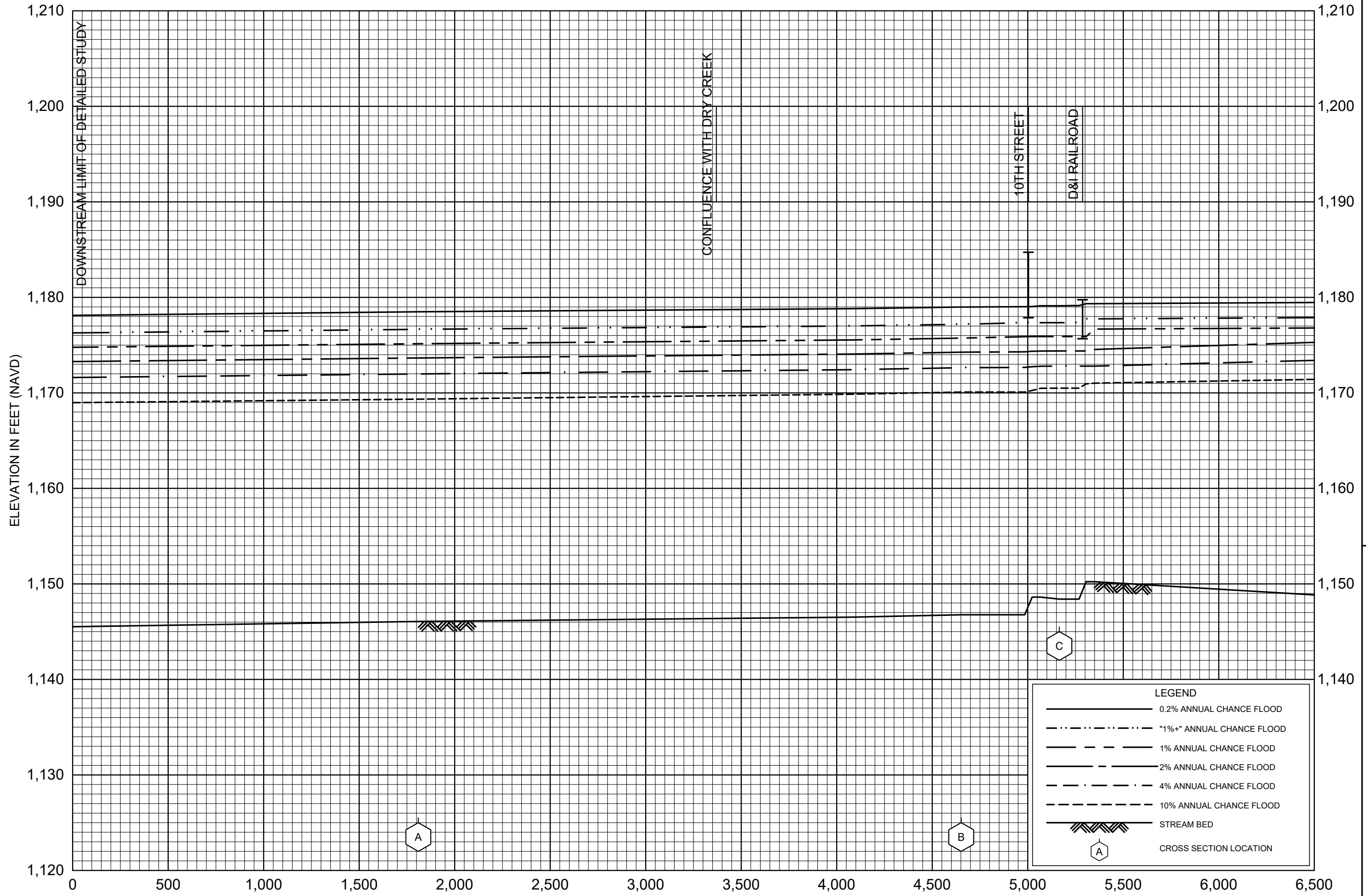
Citation in this FIS	Publisher/ Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
ATKINS 2019	ATKINS	<i>Datum Conversion Points</i>	ATKINS	Calverton, MD	March 2019	http://www.atkinsglobal.com/
ATKINS 2019a	ATKINS	<i>Iowa CTP FY18 Floodplain Delineation Study Hydrology and Hydraulic Report, Sioux County</i>	ATKINS	Calverton, MD	December 2019	http://www.atkinsglobal.com/
FEMA 1980	Federal Emergency Management Agency	<i>Flood Insurance Study, City of Hawarden, Sioux County, Iowa</i>		Washington, D.C.	June 1980	https://msc.fema.gov/portal
FEMA TBD	Federal Emergency Management Agency	<i>FIRM Panel Index</i>	ATKINS	Washington, D.C.	TBD	https://msc.fema.gov/portal
IDNR 1990	Iowa Department of Natural Resources - Iowa Geological Survey	<i>County Boundaries</i>	Iowa Department of Natural Resources	Iowa City, Iowa	November 1990	ftp://ftp.igsb.uiowa.edu/gis_library/IA_State/Admin_Political_Boundary/county.zip
IDNR 1998	Iowa Department of Natural Resources	<i>PLSS Areas</i>	Iowa Department of Natural Resources	Des Moines, Iowa	March 1998	ftp://ftp.igsb.uiowa.edu/gis_library/IA_state/Admin_political_boundary/PLS_S/PLSS_sections.html
IDNR 2007	Iowa Geological and Water Survey, DNR	<i>Digital Orthophoto</i>	Iowa Department of Natural Resources	Iowa City, Iowa	August 2007	

Table 32: Bibliography and References (continued)

Citation in this FIS	Publisher/ Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
IDNR 2014	Iowa Department of Natural Resources - Geological and Water Survey	<i>General Structures</i>	Iowa Department of Natural Resources	Des Moines, Iowa	January 2014	
IDNR 2014a	Iowa Department of Natural Resources	<i>Iowa Statewide 1 M LiDAR Collection</i>	Iowa Department of Natural Resources	Des Moines, Iowa	February 2014	
IDNR 2018	Iowa Department of Natural Resources	<i>City Boundaries</i>	Iowa Department of Natural Resources	Iowa City, Iowa	January 2018	
IDOT 2011	Iowa Department of Transportation	<i>Transportation Features</i>	Iowa Department of Transportation	Ames, Iowa	January 2011	http://www.iowadot.gov/gis/downloads/default.aspx
Iowa Flood Center 2011	University of Iowa, Iowa Flood Center	<i>Hydraulic Model -- Rock River, near the City of Rock Valley</i>	Iowa Flood Center and IIHR-Hydroscience and Engineering	Iowa City, Iowa	October 2011	
Iowa Flood Center 2014	University of Iowa, Iowa Flood Center	<i>All Approximate Flooding Sources</i>	Iowa Flood Center and IIHR-Hydroscience and Engineering	Iowa City, Iowa	October 2013	

Table 32: Bibliography and References (continued)

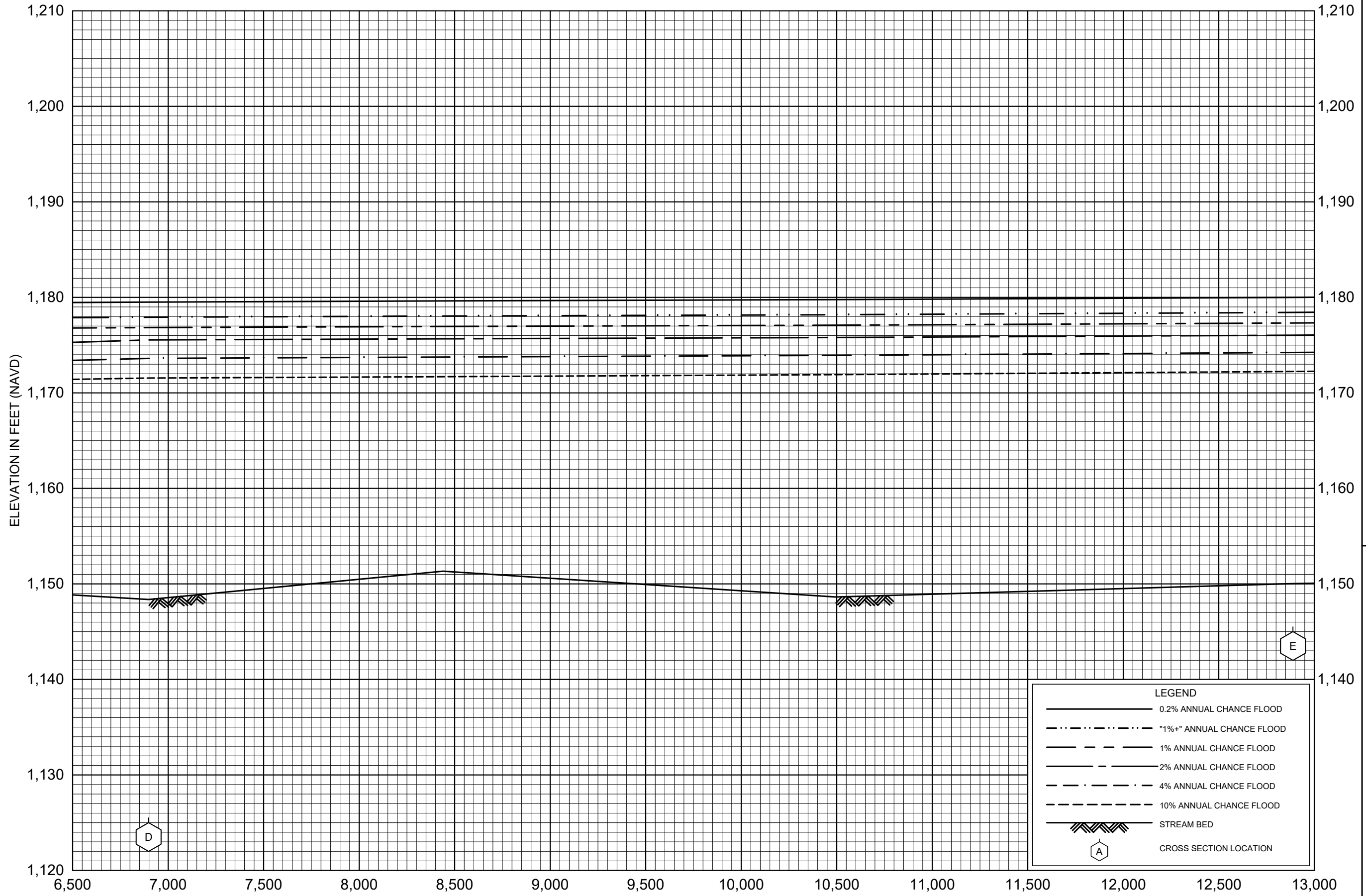
Citation in this FIS	Publisher/ Issuer	<i>Publication Title, "Article,"</i> Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
NRCS 2008	U. S. Department of Agriculture, Natural Resources Conservation Service	<i>HUC-8 Subbasins</i>	NRCS-Iowa, Des Moines, Iowa and EPA Region 5, Chicago, Illinois	Fort Worth, Texas	April 2008	http://datagateway.nrcs.usda.gov



STREAM DISTANCE IN FEET ABOVE LIMIT OF DETAILED STUDY
 {LIMIT OF DETAILED STUDY IS APPROXIMATELY 5000 FEET DOWNSTREAM OF 10TH STREET BRIDGE}

FLOOD PROFILES
 BIG SIOUX RIVER

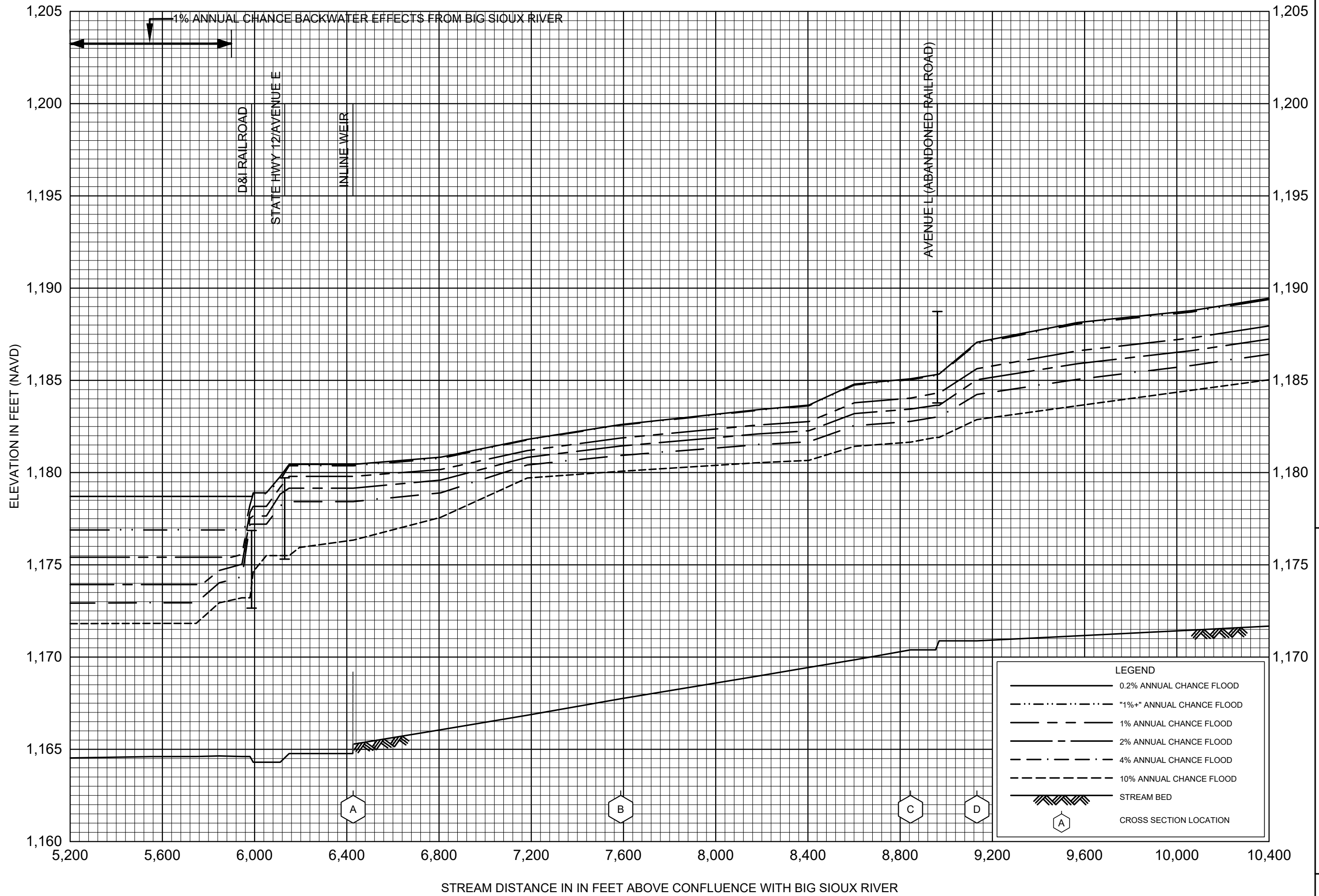
FEDERAL EMERGENCY MANAGEMENT AGENCY
 SIOUX COUNTY, IA
 AND INCORPORATED AREAS



STREAM DISTANCE IN FEET ABOVE LIMIT OF DETAILED STUDY
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FLOOD PROFILES
 BIG SIOUX RIVER

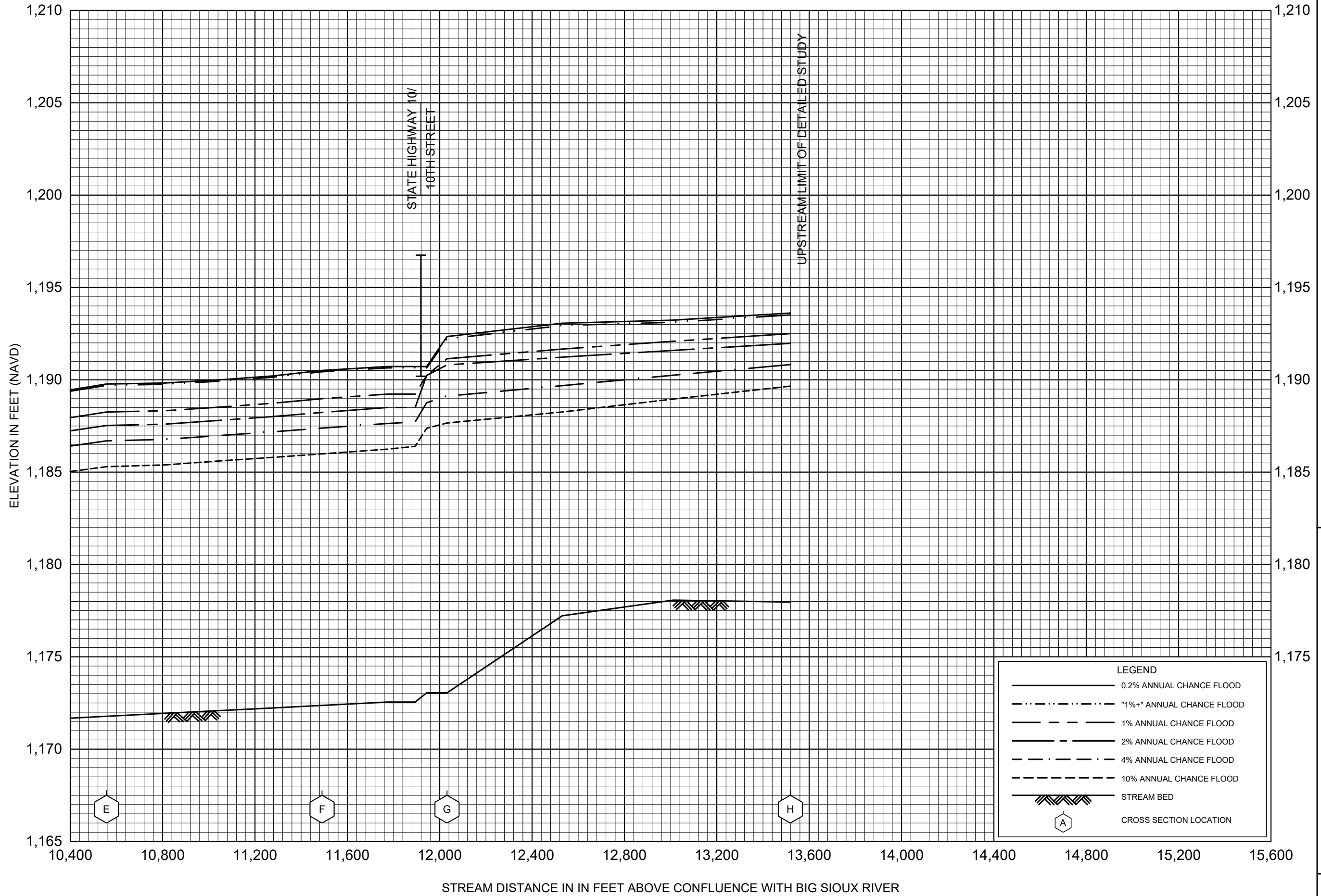
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