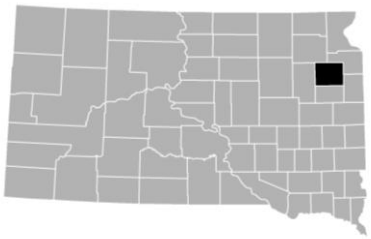
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



CODINGTON COUNTY, SOUTH DAKOTA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CODINGTON COUNTY, UNINCORPORATED AREAS	460260
FLORENCE, TOWN OF	460306
HENRY, TOWN OF	460304
KRANZBURG, TOWN OF	460010
SISSETON WAHPETON OYATE TRIBE	460317
SOUTH SHORE, TOWN OF	460188
WALLACE, TOWN OF*	460243
WATERTOWN, CITY OF	460016

*No Special Flood Hazard Areas Identified

FEMA

REVISED PRELIMINARY 3/29/2024

REVISED:

TBD

FLOOD INSURANCE STUDY NUMBER
46029CV000B
Version Number 2.6.4.6

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Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT
CODINGTON COUNTY, SOUTH DAKOTA

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 Codington County, South Dakota.

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.

Jurisdictions that have no identified SFHAs as of the effective date of this study are indicated in the table. Changed conditions in these communities (such as urbanization or annexation) or the availability of new scientific or technical data about flood hazards could make it necessary to determine SFHAs in these jurisdictions in the future.

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
Codington County, Unincorporated Areas	460260	07020001, 10170201, 10170202	46029C0025E 46029C0050E 46029C0075E 46029C0100E 46029C0125E 46029C0130E 46029C0150E 46029C0155E 46029C0160E 46029C0165E 46029C0170E 46029C0200E 46029C0225E 46029C0230E 46029C0235E 46029C0250E 46029C0265E 46029C0275E 46029C0295E 46029C0300E 46029C0305E 46029C0310E 46029C0315E 46029C0316E 46029C0317E 46029C0318E 46029C0319E 46029C0336E 46029C0337E 46029C0338E 46029C0339E 46029C0341E 46029C0343E 46029C0345E 46029C0350E 46029C0370E 46029C0375E 46029C0380E 46029C0400E 46029C0425E 46029C0450E 46029C0455E 46029C0475E 46029C0500E	

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
Florence, Town of	460306	10170201	46029C0155E 46029C0165E 46029C0170E	
Henry, Town of	460304	10170201, 10170202	46029C0265E 46029C0380E	
Kranzburg, Town of	460010	10170201	46029C0370E	
Sisseton Wahpeton Oyate Tribe	460317	10170201	46029C0075E 46029C0100E 46029C0200E 46029C0225E 46029C0305E 46029C0310E	
South Shore, Town of	460188	07020001	46029C0230E 46029C0235E	
Wallace, Town of [1]	460243	10170201	46029C0130E	
Watertown, City of	460016	10170201	46029C0295E 46029C0305E 46029C0310E 46029C0315E 46029C0316E 46029C0317E 46029C0318E 46029C0319E 46029C0336E 46029C0337E 46029C0338E 46029C0339E 46029C0343E 46029C0450E 46029C0455E	

[1] No Special Flood Hazard Areas Identified

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.

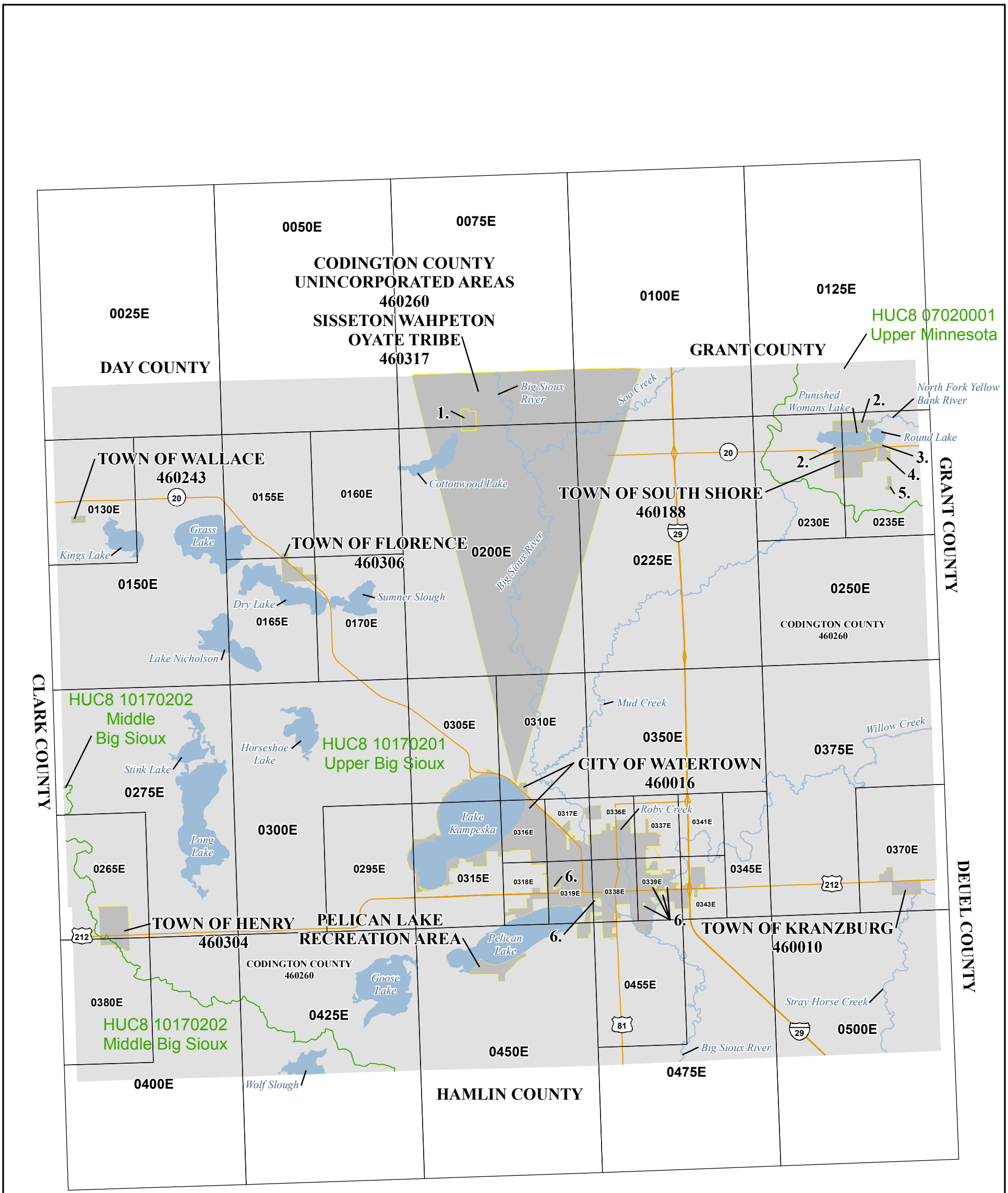
  The initial Countywide FIS Report for Codington County became effective on January 16, 2009. Refer to Table 27 for information about subsequent revisions to the FIRMs.

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

- 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/flood-maps/tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Codington 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



1. Waterfowl Production Area
2. Punished Womans Lake State Public Shooting Area
3. Round Lake State Public Shooting Area
4. Larson State Public Shooting Area
5. Hanson State Public Shooting Area
6. Codington County Unincorporated Areas 460260

N

1 inch = 18,252 feet 1:219,028

0 5,000 10,000 20,000 30,000 40,000 feet

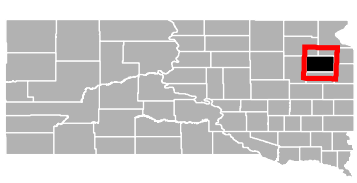
Map Projection:
State Plane Lambert Conformal Conic South Dakota North Zone 4001; North American Datum 1983; Vertical Datum; NAVD88

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

HTTPS://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

CODINGTON COUNTY, SOUTH DAKOTA and Incorporated Areas

PANELS PRINTED:

0025, 0050, 0075, 0100, 0125, 0130, 0150, 0155, 0160, 0165, 0170, 0200, 0225, 0230, 0235, 0250, 0265, 0275, 0295, 0300, 0305, 0310, 0315, 0316, 0317, 0318, 0319, 0336, 0337, 0338, 0339, 0341, 0343, 0345, 0350, 0370, 0375, 0380, 0400, 0425, 0450, 0455, 0475, 0500

REVISED PRELIMINARY 3/29/2024

FEMA

MAP NUMBER
46029CIND0B

MAP REVISED

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

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

For community and countywide map dates, refer to Table 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.

Figure 2. FIRM Notes to Users

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

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Lambert Conformal Conic, South Dakota North Zone 4001. The horizontal datum was the North American Datum of 1983 NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

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

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was derived from digital data obtained from the U.S. Census Bureau, South Dakota Department of Revenue, South Dakota Fish, Game & Parks, U.S. Bureau of Land Management, South Dakota Department of Transportation, Sisseton Wahpeton Oyate Tribe, and the U.S. Geological Survey. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

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

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Codington County, South Dakota, 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.

Figure 2. FIRM Notes to Users

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 Codington County.

Figure 3: Map Legend for FIRM

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

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

Figure 3: Map Legend for FIRM

OTHER AREAS OF FLOOD HAZARD

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

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

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

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

OTHER AREAS

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

Unshaded Zone X: Areas of minimal flood hazard.

FLOOD HAZARD AND OTHER BOUNDARY LINES

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

Limit of Study

Jurisdiction Boundary

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

GENERAL STRUCTURES

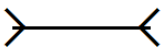
Aqueduct
Channel
Culvert
Storm Sewer

Channel, Culvert, Aqueduct, or Storm Sewer

Dam
Jetty
Weir

Dam, Jetty, Weir

Levee, Dike, or Floodwall



Bridge

Bridge

Figure 3: Map Legend for FIRM

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

Figure 3: Map Legend for FIRM

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

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

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

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

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1-percent and 0.2-percent-annual-chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1-percent-annual-chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Codington 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 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1-percent-annual-chance floodplain corresponds to the SFHAs. The 0.2-percent-annual-chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
All Zone A flooding sources within Codington County	Codington County, Unincorporated Areas; Florence, Town of; Henry, Town of; Kranzburg, Town of; Sisseton Wahpeton Oyate Tribe; South Shore, Town of; Watertown, City of	All within Codington County	All within Codington County	10170201, 10170202, 07020001	1,071	N	A	2020
Big Sioux River	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Willow Creek	0.52 miles upstream of 14th Avenue NW	10170201	5.5	Y	AE	2020
East Branch Roby Creek	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Roby Creek	0.25 miles upstream of 11th Street NE	10170201	0.7	Y	AE	2020
Lake Kampeska	Codington County, Unincorporated Areas; Watertown, City of	Outflow into Big Sioux River	Lake Kampeska shoreline	10170201	13.5	N	AE	2020
Lake Kampeska Outlet	Codington County, Unincorporated Areas; Watertown, City of	Lake Kampeska shoreline	150 feet upstream of 170 ST	10170201	1.1	N	AE	2020
Lake Kampeska Tributary 1	Codington County, Unincorporated Areas	0.25 Miles north of US Highway 212	447 Ave	10170201	3.5	N	AE	2020
Lake Kampeska Tributary 2	Codington County, Unincorporated Areas; Watertown, City of	Lake Kampeska shoreline	167 ST	10170201	2.2	N	AE	2020
Lake Kampeska Tributary 3	Watertown, City of	Lake Kampeska shoreline	0.2 miles Northeast of Golf Course Rd	10170201	1.7	N	AE	2020
Mud Creek Tributary	Codington County, Unincorporated Areas; Watertown, City of	0.3 miles downstream of 455th Ave	0.13 miles upstream of US Highway 81	10170201	3.3	N	AE	2020
Mud Creek Tributary Branch	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Mud Creek Tributary	0.5 miles upstream of US Highway 81	10170201	0.9	N	AE	2020

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)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Pelican Lake	Codington County, Unincorporated Areas; Watertown, City of	Outflow into Big Sioux River	Pelican Lake shoreline	10170201	12.4	N	AE	2020
Pelican Lake Branch	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Big Sioux River	Pelican Lake shoreline	10170201	2.3	Y	AE	2020
Pelican Lake Tributary 1	Codington County, Unincorporated Areas	Pelican Lake shoreline	0.1 miles upstream of 175 St	10170201	0.8	N	AE	2020
Pelican Lake Tributary 2	Codington County, Unincorporated Areas	Pelican Lake shoreline	0.2 miles north of 174 St	10170201	0.7	N	AE	2020
Pelican Lake Tributary 3	Codington County, Unincorporated Areas	Pelican Lake shoreline	0.2 miles upstream of 174 St	10170201	0.5	N	AE	2020
Roby Creek	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Big Sioux River	Intersection of 4th Street NE and 18th Avenue NE	10170201	3.7	Y	AE	2020
Tributary to Pelican Lake Branch	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Big Sioux River	Confluence with Pelican Lake Branch	10170201	0.6	Y	AE	2020
Tributary to Redlin Ponds	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Willow Creek	0.1 miles upstream of SE 33 St	10170201	0.9	N	AE	2020
Unnamed Stream to Mud Creek Tributary	Codington County, Unincorporated Areas	0.2 miles west of I29	0.2 miles west of 459 Ave	10170201	2.5	N	AE	2020
Willow Creek	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Big Sioux River	0.72 miles upstream of 171st Street	10170201	8.0	N	AE	2020
Willow Creek Tributary	Codington County, Unincorporated Areas; Watertown, City of	Confluence with Willow Creek	I-29	10170201	1.5	N	AE	2020

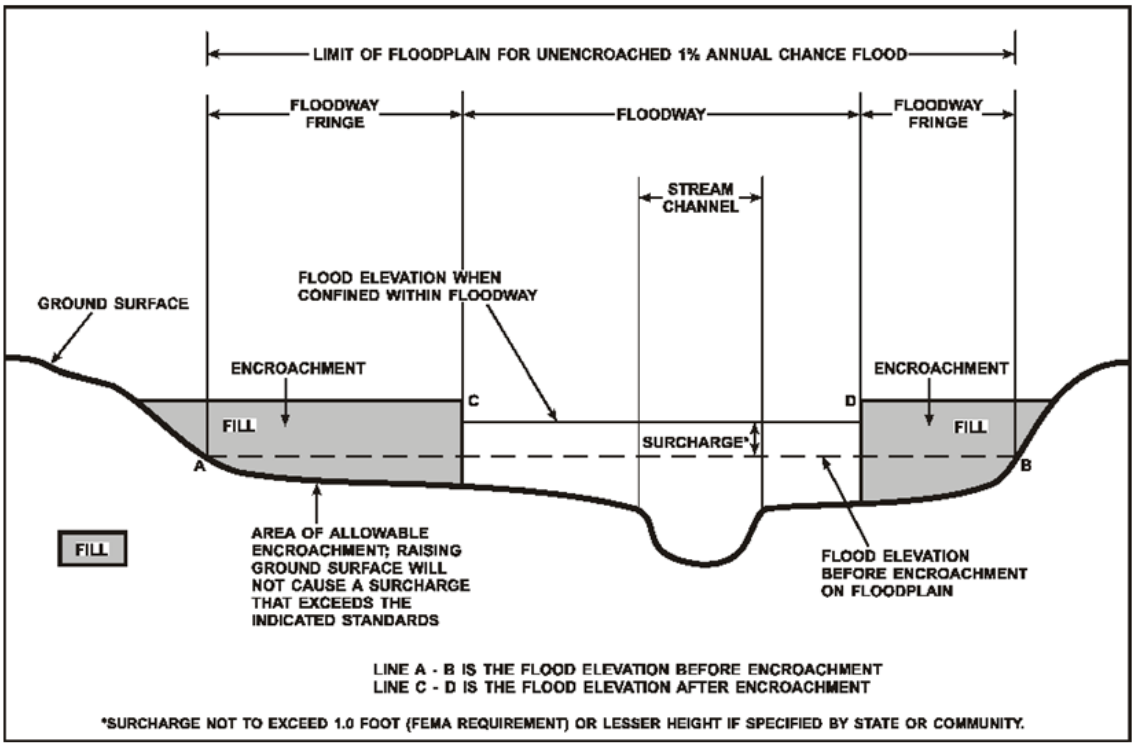
2.2 Floodways

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



2.3 Base Flood Elevations

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

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

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk 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 Codington County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Codington County, Unincorporated Areas	A, AE, X
Florence, Town of	A, X
Henry, Town of	A, X
Kranzburg, Town of	A, X
Sisseton Wahpeton Oyate Tribe	A, X
South Shore, Town of	A, X
Wallace, Town of	X
Watertown, City of	A, AE, 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)
Middle Big Sioux	10170202	Big Sioux River	Located in the southwestern corner of the county	2,114
Upper Big Sioux	10170201	Big Sioux River	Largest watershed within Codington County, encompassing the center of the county	4,230
Upper Minnesota	07020001	Minnesota River	Located in the northeastern corner of the county	2,130

4.2 Principal Flood Problems

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

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
All flooding sources	Most major flooding is the result of spring snowmelt and/or rainfall events. Flooding occurring in the middle and late summer months is associated with high intensity rainstorms.

Table 5: Principal Flood Problems (continued)

Flooding Source	Description of Flood Problems
Big Sioux River	Flood flows from the Big Sioux River are also the source of major problems associated with high lake levels on lakes in the study area; Lake Kampeska and Pelican Lake. Problems include inundation of shoreline homes and erosion of lakefront lands. Additional damage to homes and erosion of shoreline properties occur because of wave action associated with high lake levels and winds.
Roby Creek	Flooding that occurs on Roby Creek is generally shallow and localized at the end of Watertown. The flooding between Arrow Avenue North and US. Highway 212 covers a large area and is difficult to define because of the low relief undersized storm sewers. There is no defined channel to contain the flood along this reach of Roby Creek once the storm sewer capacity is exceeded.

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

This section is not applicable to this Flood Risk Project.

Table 8: Levees

[Not Applicable to this Flood Risk Project]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled 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 stillwater elevations developed for non-coastal flooding sources is provided in Table 10. Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

[Not Applicable to this Flood Risk Project]

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lake Kampeska	Codington County, Unincorporated Areas; Watertown, City of	*	*	*	1720.5	*
Pelican Lake	Codington County, Unincorporated Areas; Watertown, City of	*	*	*	1711.8	*

*Not calculated for 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	06479438	USGS	Big Sioux River near Watertown, SD	525	10/01/1972	01/19/2021
Big Sioux River	06479500	USGS	Big Sioux River at Watertown, SD	806	10/01/1945	01/19/2021
Big Sioux River	06479525	USGS	Big Sioux River near Castlewood, SD	1,096	10/01/1976	01/19/2021
Willow Creek	06479515	USGS	Willow Creek near Watertown, SD	109	09/01/1971	10/16/2018
Mud Creek	06479490	USGS	Mud Creek near Rauville, SD	28.7	03/26/1998	08/02/2019
South Branch Mud Creek Tributary	06479498	USGS	South Branch Tributary Mud Creek near Rauville, SD	15.2	04/21/2000	03/27/2019

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.

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
All Zone A flooding sources within Codington County	All within Codington County	All within Codington County	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	A	2D hydraulic modeling
Big Sioux River	Confluence with Willow Creek	0.52 miles upstream of 14th Avenue NW	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE w/ Floodway	2D hydraulic modeling
East Branch Roby Creek	Confluence with Roby Creek	0.25 miles upstream of 11th Street NE	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE w/ Floodway	2D hydraulic modeling
Lake Kampeska	Outflow into Big Sioux River	Lake Kampeska shoreline	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Lake Kampeska Outlet	Lake Kampeska shoreline	150 feet upstream of 170 ST	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Lake Kampeska Tributary 1	0.25 Miles north of US Highway 212	447 Ave	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Lake Kampeska Tributary 2	Lake Kampeska shoreline	167 ST	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Lake Kampeska Tributary 3	Lake Kampeska shoreline	0.2 miles Northeast of Golf Course Rd	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Mud Creek Tributary	0.3 miles downstream of 455th Ave	0.13 miles upstream of 26th Avenue NE	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Mud Creek Tributary Branch	Confluence with Mud Creek Tributary	0.92 miles upstream of 19th Street NE	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Pelican Lake	Outflow into Big Sioux River	Pelican Lake shoreline	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

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
Pelican Lake Branch	Confluence with Big Sioux River	Pelican Lake shoreline	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE w/ Floodway	2D hydraulic modeling
Pelican Lake Tributary 1	Pelican Lake shoreline	0.1 miles upstream of 175 St	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Pelican Lake Tributary 2	Pelican Lake shoreline	0.2 miles north of 174 St	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Pelican Lake Tributary 3	Pelican Lake shoreline	0.2 miles upstream of 174 St	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Roby Creek	Confluence with Big Sioux River	Intersection of 4th Street NE and 18th Avenue NE	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE w/ Floodway	2D hydraulic modeling
Tributary to Pelican Lake Branch	Confluence with Big Sioux River	Confluence with Pelican Lake Branch	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE w/ Floodway	2D hydraulic modeling
Tributary to Redlin Ponds	Confluence with Willow Creek	0.1 miles upstream of SE 33 St	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Unnamed Stream to Mud Creek Tributary	0.2 miles west of I29	0.2 miles west of 459 Ave	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Willow Creek	Confluence with Big Sioux River	0.72 miles upstream of 171st Street	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling
Willow Creek Tributary	Confluence with Willow Creek	I-29	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	9/30/2020	AE	2D hydraulic modeling

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Big Sioux River	0.035-0.045	0.035-0.160
East Branch Roby Creek	0.035-0.045	0.035-0.160
Lake Kampeska	0.033	0.035-0.160
Mud Creek Tributary	0.035-0.045	0.035-0.160
Mud Creek Tributary Branch	0.035-0.045	0.035-0.160
Pelican Lake	0.033	0.035-0.160
Roby Creek	0.035-0.045	0.035-0.160
Willow Creek	0.035-0.045	0.035-0.160
Willow Creek Tributary	0.035-0.045	0.035-0.160

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% 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 Codington County are provided in Table 19.

Table 19: Countywide Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

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/flood-maps/guidance-partners/guidelines-standards.

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
County Boundary	U.S. Census Bureau	2019	*	County boundary
Municipal Boundaries	South Dakota Department of Revenue	2021	*	City and town area boundaries
Public Land Survey System (PLSS)	U.S. Bureau of Land Management	2021	*	PLSS grid data
Road Features	South Dakota Department of Transportation	2020	*	Road center lines
Railroad Features	South Dakota Department of Transportation	2019	*	Railroads
Surface Waterbody Features	South Dakota Fish, Game & Parks	2021	*	Lake and pond areas
Surface Waterline Features	U.S. Geological Survey	2020	1:24,000	Streams and rivers derived from NHD data
Tribal Boundaries	Sisseton Wahpeton Oyate Tribe	2013	*	Tribal land area boundaries
Watershed Boundaries	U.S. Geological Survey	2015	1:24,000	Watershed area boundaries

*Data not available

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 ponding areas, flood elevations were determined at each junction of the model; between junctions, boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Codington County, Unincorporated Areas; Florence, Town of; Henry, Town of; Kranzburg, Town of; Sisseton Wahpeton Oyate Tribe; Wallace, Town of; Watertown, City of	All within HUC 10170201, 10170202	Eastern South Dakota LiDAR	12.8 cm RMSEz at 95% confidence level	1.04 m RMSE at 95% confidence level	FEMA/SDSLI/ USGS, 2012
Codington County, Unincorporated Areas; South Shore, Town of	All within HUC 07020001	Minnesota River Basin LiDAR	2.94 cm RMSEz at 95% confidence level	9 cm RMSE	MNDNR, 2010

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. Rounded whole-foot elevations may be shown on the FIRM in areas of ponding and other areas with static base flood elevations.

Table 23: Floodway Data

[Not Applicable to this Flood Risk Project]

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/flood-maps/change-your-flood-zone 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/flood-maps/tutorials.

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

6.5.2 Letters of Map Revision Based on Fill

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

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

A tutorial for LOMR-F is available at www.fema.gov/flood-maps/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/flood-maps/change-your-flood-zone and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Mapping and Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Codington 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 Codington County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

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

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

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

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.
- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.
- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as PMRs of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Codington County FIRMs in countywide format was 01/16/2009.

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)
Codington County, Unincorporated Areas	01/24/1978	01/24/1978	N/A	02/01/1986	TBD 01/16/2009
Florence, Town of [2]	01/16/2009	N/A	N/A	01/16/2009	TBD
Henry, Town of [2]	01/16/2009	N/A	N/A	01/16/2009	TBD
Kranzburg, Town of [2]	01/16/2009	N/A	N/A	01/16/2009	TBD
Sisseton Wahpeton Oyate Tribe [2]	TBD	N/A	N/A	TBD	N/A
South Shore, Town of [2]	01/16/2009	N/A	N/A	01/16/2009	TBD
Wallace, Town of [1,2]	01/16/2009	N/A	N/A	01/16/2009	TBD
Watertown, City of	06/28/1974	06/28/1974	12/26/1975	07/04/1989	TBD 01/16/2009 09/28/2007

[1] No Special Flood Hazard Areas Identified
[2] This community did not have a FIRM prior to the first countywide FIRM for Codington 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
All Zone A flooding sources within Codington County	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Florence, Town of; Henry, Town of; Kranzburg, Town of; Sisseton Wahpeton Oyate Tribe; South Shore, Town of; Watertown, City of
Big Sioux River	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
East Branch Roby Creek	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Lake Kampeska	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Lake Kampeska Outlet	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Lake Kampeska Tributary 1	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas
Lake Kampeska Tributary 2	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Lake Kampeska Tributary 3	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Watertown, City of
Mud Creek Tributary	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Mud Creek Tributary Branch	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Pelican Lake	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Pelican Lake Branch	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of

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

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Pelican Lake Tributary 1	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas
Pelican Lake Tributary 2	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas
Pelican Lake Tributary 3	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas
Roby Creek	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Tributary to Pelican Lake Branch	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Tributary to Redlin Ponds	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Unnamed Stream to Mud Creek Tributary	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas
Willow Creek	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of
Willow Creek Tributary	TBD	Compass PTS JV	HSFE60-15-D-0003	September 2020	Codington County, Unincorporated Areas; Watertown, City of

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
Codington County, Unincorporated Areas	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
Florence, Town of	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
Henry, Town of	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
Kranzburg, Town of	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
Sisseton Wahpeton Oyate Tribe	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
South Shore, Town of	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
Wallace, Town of	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor
Watertown, City of	TBD	11/16/2016	Project Discovery	FEMA, the State of South Dakota, and Codington County
		11/02/2020	Flood Risk Review	FEMA, the State, the community, and the study contractor
		TBD	Final CCO Meeting	FEMA, the State, the community, and the study contractor

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.

Table 30 is a list of the locations where FIRMs for Codington 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
Codington County, Unincorporated Areas	Codington County Extension Complex 1910 West Kemp Avenue	Watertown	SD	57201
Florence, Town of	City Finance Office 220 Main Street	Florence	SD	57235
Henry, Town of	Town Hall 210 Main Street	Henry	SD	57243
Kranzburg, Town of	Town Hall 202 Hastings Avenue NW	Kranzburg	SD	57245
Sisseton Wahpeton Oyate Tribe	SWO Emergency Management Office 114 Lake Traverse Drive	Sisseton	SD	57262
South Shore, Town of	Codington County Extension Complex 1910 West Kemp Avenue	Watertown	SD	57201
Wallace, Town of [1]	Codington County Extension Complex 1910 West Kemp Avenue	Watertown	SD	57201
Watertown, City of	City Hall 23 2nd Street NE	Watertown	SD	57201

[1] No Special Flood Hazard Areas Identified

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/flood-maps/products-tools/know-your-risk/engineers-surveyors-architects
NFIP website	www.fema.gov/flood-insurance
NFHL Dataset	msc.fema.gov
FEMA Region VIII	Denver Federal Center Building 710, Box 25267 Denver, CO 80225-0267 (303) 235-4800
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Marc Macy, CFM South Dakota Division of Emergency Management 118 West Capitol Avenue Pierre, South Dakota 57501 (605) 773-3231 marc.macy@state.sd.us
State GIS Coordinator	Chris Marsh Statewide GIS Coordinator South Dakota Bureau of Information and Telecommunication 700 East Broadway Avenue Pierre, South Dakota 57501 Phone: (605) 773-6701 chris.marsh@state.sd.us

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

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

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
BLM 2021	U.S. Bureau of Land Management	*Public Land Survey System (PLSS)*	BLM	Lakewood, CO	April 22, 2021	https://gis.blm.gov/EGISDownload/LayerPackages/BLM_National_PLSS.zip
Compass 2017	Compass PTS JV	*Codington County, South Dakota: 2D Large Scale Automated Engineering*	Compass	Arlington, Virginia	January, 27 2017	https://msc.fema.gov/
Compass 2020	Compass PTS JV	*Codington County, South Dakota: 2D Large Scale Automated Engineering Survey*	Compass	Arlington, Virginia	January, 27 2017	https://msc.fema.gov/
Compass 2021	Compass PTS JV	*Codington Couty, South Dakota: 2D Enhanced Methods and Results*	Compass	Arlington, Virginia	March 2021	https://msc.fema.gov/
FEMA 2009	Federal Emergency Management Agency	*Flood Insurance Study, Codington County, South Dakota, and Unincorporated Areas*	FEMA	Washington, D.C.	January 16, 2009	https://msc.fema.gov/
FEMA 2016	Federal Emergency Management Agency	*FEMA Policy Standards for Flood Risk Analysis and Mapping*	FEMA	Washington, D.C.	November 1, 2016	https://www.fema.gov/media-library-data/
FEMA 2017	Federal Emergency Management Agency	*Best Practice for Flood Risk Analysis and Mapping 2D Modeling: Zone AE Upgrades and Floodways*	FEMA	Washington, D.C.	March 1, 2017	

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
FEMA/SDSLI/USGS 2012	FEMA/SDSLI/ USGS	*Eastern South Dakota LiDAR*	GeoDigital	Lompoc, CA	January 13, 2012	https://coast.noaa.gov/data/Documents/Metadata/USIEI/2012EasternSouthDakotalidarProjectReport.pdf
MNDNR 2010	Minnesota Department of Natural Resources	*2010 Minnesota River Basin LiDAR*	AeroMetric	Sheboygan, WI	December 31, 2010	ftp://ftp.gisdata.mn.gov/pub/gdrs/data/pub/us_mn_state_mngeo/elev_lidar_swmn2010/metadata/metadata.html
NLCD 2015	U.S. Geological Survey	*Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354*	Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K.	Washington, D.C.	2011	http://bit.ly/1K7WjO3
NOAA 2008	National Oceanic and Atmospheric Administration	*Atlas-14, Volume 8, Hydrometeorlogical Design Studies, Precipitation Frequency Data Server*	NOAA	Washington, D.C.	2013	http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume8.pdf
SDDOT 2019	South Dakota Department of Transportation	*Railroads*	Kimberly Zerr	Pierre, SD	April 15, 2019	https://opendata2017-09-18t192802468z-sdbit.opendata.arcgis.com/datasets/SDBIT::railroads/about

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
SDDOT 2020	South Dakota Department of Transportation	*Downloadable Local Roads*	Greg Pollreisz	Pierre, SD	January 1, 2020	https://opendata2017-09-18t192802468z-sdbit.opendata.arcgis.com/datasets/SDBIT::downloadable-local-roads/about
SDDR 2021	South Dakota Department of Revenue	*South Dakota City Boundaries*	SDDR	Pierre, SD	May 28, 2021	https://opendata2017-09-18t192802468z-sdbit.opendata.arcgis.com/datasets/2cd90ee06cf04a3bb685927e776ff7b2_0/about
SDFGP 2021	South Dakota Fish, Game & Parks	*Statewide Waterbodies*	SDFGP	Pierre, SD	March 23, 2021	https://opendata2017-09-18t192802468z-sdbit.opendata.arcgis.com/datasets/052112ac4fce4489a55c7da9aa9a702c_0/about
SWO 2013	GIS Department – Sisseton Wahpeton Oyate Tribe	*SWO Districts Map*	Michael LaBatte	Agency Village, SD	2013	https://swo.mapping-online.com/gis-maps
USACE 2000	U.S. Army Corps of Engineers, Hydrologic Engineering Center	*Hydrologic Modeling System HEC-HMS, Technical Reference Manual*	Hydrologic Engineering Center	Davis, CA	March 2000	https://www.hec.usace.army.mil/software/hec-hms/documentation/HEC-HMS_Technical%20Reference%20Manual_(CPD-74B).pdf
USACE 2012	U.S. Army Corps of Engineers, Hydrologic Engineering Center	*HEC-GeoRAS, GIS Tools for Support of HEC-RAS using ArcGIS 10*	Hydrologic Engineering Center	Davis, CA	May 1, 2012	http://www.hec.usace.army.mil/software/hec-georas/downloads.aspx

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
USACE 2016	U.S. Army Corps of Engineers, Hydrologic Engineering Center	*HEC-RAS River Analysis System, User's Manual, Version 5.0*	Hydrologic Engineering Center	Davis, CA	February 1, 2016	http://www.hec.usace.army.mil/
USACE 2017	U.S. Army Corps of Engineers, Hydrologic Engineering Center	*HEC-RAS River Analysis System, version 5.0.5*	Hydrologic Engineering Center	Davis, CA	April 4, 2016	http://www.hec.usace.army.mil/
USCB 2019	U.S. Census Bureau	*TIGER/Line Shapefile, South Dakota, Current County Subdivision State-based*	USCB	Washington D.C.	2019	
USGS 1982	U.S. Geological Survey	*Guidelines for Determining Flood Flow Frequency, Bulleting #17B of the Hydrology Subcommittee*	Interagency Advisory Committee on Water Data	Washington, D.C.	March 1, 1982	http://water.usgs.gov/osw/bulletin17b/dl_flow.pdf
USGS 1998	U.S. Geological Survey	*Techniques for Estimating Peak Flow Magnitude and Frequency Relations for South Dakota Streams; WRIR 98-4055*	Steven K. Sando	Washington, D.C.	1998	http://pubs.water.usgs.gov/wri984055
USGS 2015	U.S. Geological Survey	*National Watershed Boundary Dataset (WBD)*	USGS	Reston, VA	December 16, 2015	ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Hydrography/WBD/National/GDB/National_WBD.zip

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
USGS 2017a	U.S. Geological Survey	*USGS WaterWatch Toolkit, Flood Table & Rating Curve Builder*	USGS	Washington, D.C.	May 1, 2017	https://waterwatch.usgs.gov/
USGS 2017b	U.S. Geological Survey	*Peak Streamflow for South Dakota Streams*	USGS	Washington, D.C.	2017	https://nwis.waterdata.usgs.gov/nwis/peak?state_cd=SD&format=station_list
USGS 2020	U.S. Geological Survey	*National Hydrography Dataset (NHD) for South Dakota State or Territory Shapefile*	USGS	Reston, VA	June 16, 2020	http://nhd.usgs.gov/
USGS 2021	U.S. Geological Survey	*Stream Gage Data for Codington County, SD*	USGS	Washington, D.C.	January 19, 2021	https://nwis.waterdata.usgs.gov/nwis/peak?state_cd=SD&format=station_list
WISE 2004	Watershed Concepts	*WISE (Watershed Information System)*	Watershed Concepts	Greensboro, NC	2004	