Coordinated Needs Management Strategy (CNMS) Technical Reference

CNMS Database User's Guide

November 2019

FEMA

For more information, please visit the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage (www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping). Copies of the Standards for Flood Risk Analysis and Mapping policy, related guidance, technical references, and other information about the guidelines and standards development process are all available here. You can also search directly by document title at www.fema.gov/library.

Implementation Instructions

This version of the Technical Reference must be used on projects as described below. Generally, the changes in this version may also be implemented on any project, in coordination with the FEMA Project and Contracting Officer's Representative.

Revision Date	Implementation
November 2019	Effective November 30, 2019

Table of Revisions

The following summary of changes details revisions to the Coordinated Needs Management Strategy (CNMS) Technical Reference subsequent to its most recent version in February 2019.

Affected Section or Subsection	Revision Date	Revision Description
Section 2, CNMS Data Development and Section 3, Data Entry Process – content revised throughout	November 2019	Reclassified the Tier Inventory. Clarified S_Unmapped_Ln documentation. Revised preliminary guidance, backwater attribution guidance. Removed "POC" from S_Studies_Ln and S_Coastal_Ln. Revised fields, including addition of TOPO_SRC and TOPO_DATE fields, replacement of DATE_EFFECT (date of effective analysis) with HYDRO_DATE_EFFCT, and HYDRA_DATE_EFFCT (to distinguish dates of Hydro and Hydra analysis dates to facilitate validation assessments).

Table of Contents

1 Introduction 1
2 CNMS Data Development 3
2.1 Workflow and Process 3
2.1.1 Pre-Discovery Phase Updates 5
2.1.2 Post-Discovery Meeting Phase Updates 5
2.1.3 Scoping Funded Phase Updates 5
2.1.4 FIRM Production Phase Update 6
2.1.5 Preliminary Issuance Phase Update 6
2.1.6 Revised Preliminary Issuance Phase Update 7
2.1.7 LFD Issuance Phase Update 7
2.1.8 BLE & LSAE Phase Update 8
2.1.9 Tier Inventory 8
2.1.10 Flood Risk Product Tracking 9
2.1.11 LOMA (MT-1) & LOMR (MT-2) Integration Workflow 9
2.1.12 Validation Assessments 10
2.1.13 NVUE Metrics Calculation and Reporting 10
2.1.14 CNMS Requests 10
2.2 Data Input 11
2.2.1 CNMS Data model 11
2.2.2 Flood Insurance Study (FIS) Report 11
2.2.3 LOMRs 12
2.2.4 FEMA Library 12
2.2.5 FIRM Data and Linework Sources 12
2.3 Data Output 12
2.4 Quality 13
3 Data Entry Process 16
3.1 Primary Key Considerations 16
3.2 S_Studies_Ln Feature Class (Polyline) 16
3.2.1 Backwater Attribution 18
3.2.2 BLE & LSAE Study Updates 19
3.2.3 S_Studies_Ln Pre-Discovery Meeting Phase Updates 21
3.2.4 S_Studies_Ln Post-Discovery Meeting Phase Updates 21
3.2.5 S_Studies_Ln Scoping Phase Updates 22
3.2.6 S_Studies_Ln FIRM Production Phase Update 23
3.2.7 S_Studies_Ln Preliminary Issuance Phase Update 23
3.2.8 S_Studies_Ln LFD Issuance Phase Update 23
3.3 S_Studies_Ar Feature Class (Polygon) 25

3.4 S_Requests Feature Classes (Point/Polygon) 26
3.5 S_Unmapped_Ln (Polyline)....26
3.6 Specific_Needs_Info (Table) 28
3.7 County_QC_Status, Coastal_County_QC_Status (Tables) 28
3.8 Point_of_Contact (Table)....28
3.9 S_Coastal_Ln Feature Class (Polyline)....28
3.9.1 S_Coastal_Ln Discovery Phase Updates....29
3.9.2 S_Coastal_Ln Scoping Phase Updates 29
3.9.3 S_Coastal_Ln FIRM Production Phase Update 30
3.9.4 S_Coastal_Ln Preliminary Issuance Phase Update....30
3.9.5 S_Coastal_Ln LFD Issuance Phase Update 31

Appendix A. Validation Assessment Procedures 34
A.1. UNKNOWN Validation Status....35
A.2. UNVERIFIED Validation Status....35
A.3. VALID Validation Status 35
A.4. ASSESSED Validation Status 36
Appendix B. Detailed Study Validation Assessment 38
Appendix C. Zone A Study Validation Assessment....40
C.1. Check for Significant Topography Updates 41
C.2. Check for Significant Hydrology Changes 42
C.3. Check for Significant Development in the Watershed 44
C.4. Check of Studies Backed by Technical Data....44
C.5. Comparison of Refined Zone A Engineering and Effective Zone A....44
Appendix D. Coastal Study Validation Assessment 51
D.1. Critical Check: Gage Analysis 52
D.2. Critical Check: Storm Data 55
D.3. Critical Check: Great Lakes Ice Conditions 57
D.4. Critical Check: Coastal Model Evaluation....59
D.5. Critical Check: FEMA Coastal Modeling and Mapping Procedure Changes or Improvements....61
D.6. Critical Check: Erosion and Long-Term Retreat....63
D.7. Critical Check: Removal or Deterioration of Flood Protection Structures....65
D.8. Secondary Check: Starting Wave Conditions for One-Dimensional Modeling 66
D.9. Secondary Check: Bathymetric and Topographic Data....67
D.10. Secondary Check: Land Use Changes 68
D.11. Secondary Check: Evidence of FIRM Inaccuracy – Repetitive Loss Properties 69
D.12. Secondary Check: Evidence of FIRM Inaccuracy – LOMRs 70
D.13. Secondary Check: Evidence of FIRM Inaccuracy – High Water Marks 71

Appendix E. CNMS Data Model Diagram 73
Appendix F. CNMS Field Descriptions and Data Dictionary 74
F.1. CNMS Feature Class and Table Field Descriptions 74
F.2. Domain Tables 131
Appendix G. CNMS Lifecycle Flow Diagram 145
Appendix H. NVUE Reporting Guidance 146
H.1. Introduction 146
H.2. Understanding the Data Attributes Necessary for NVUE Calculations 147
H.3. NVUE Calculation 149
Appendix I. LOMA (MT-1) & LOMR (MT-2) Integration in CNMS 151
I.1. Identifying Mapping Needs/Requests Because of LOMC Processing 151
I.2. Updating the CNMS Inventory for Approved LOMRs 151
Appendix J. CNMS Quality Management Plan (QMP) 154
J.1. Introduction 154
J.2. Workflow and User Interface 154
J.3. Quality Control Criteria 156
J.4. User's Guide: CNMS FGDB QC Tool 170

List of Figures

Figure 2-1: CNMS Update Touchpoints 3
Figure 2-2: CNMS Update Touchpoints 4
Figure 2-3: CNMS FGDB Components as Seen in Esri ArcCatalog 11
Figure C-1: Validation Procedure for Zone A Studies 41
Figure D-1: Evaluation Process for Gage Analysis 52
Figure D-2: Evaluation Process for Storm Data 55
Figure D-3: Evaluation Process for Great Lakes Ice Coverage 57
Figure D-4: Evaluation Process for One- or Two-Dimensional Models 59
Figure D-5: Evaluation Process for Changes or Improvements to FEMA Coastal Modeling and Mapping Procedures 61
Figure D-6: Evaluation Process for Coastal Erosion and Long-Term Retreat 63
Figure D-7: Evaluation Process for Removal or Deterioration of Coastal Flood Protection Structures 65
Figure D-8: Evaluation Process for Starting Wave Conditions 66
Figure D-9: Evaluation Process for Bathymetric and Topographic Data 67
Figure D-10: Evaluation Process for Land Use Changes 68
Figure D-11: Evaluation Process for Repetitive Loss Properties 69
Figure D-12: Evaluation Process for LOMRs 70
Figure D-13: Evaluation Process for High Water Marks 71
Figure J-1: Add-In Manager 170
Figure J-2: Add-In Controls 171
Figure J-3: CNMS QC Extension 171
Figure J-4: Select FGDB 172
Figure J-5: FGDB Selected 173
Figure J-6: Select Counties 173

Figure J-7: Zoom to Error....174
Figure J-8: Mark as Exception....175
Figure J-9: Exception Entered....175
Figure J-10: Edit Exception....176
Figure J-11: Delete Exception....176
Figure J-12: Validation Complete....177
Figure J-13: Self-Certification Form and resulting updated County_QC_Status table....177
Figure J-14: CNMS FGDB QC Tool Filtering....178
Figure J-15: CNMS FGDB QC Tool Sorting....178

List of Tables

Table 2-1: Riverine CNMS Record Entry Determination....14
Table 2-2: Coastal CNMS Record Entry Determination....15
Table 3-1: S_Studies_Ln Attribute Updates for Backwater....19
Table 3-2: S_Studies_Ln BLE/LSAE Tracking Field Updates....20
Table 3-3: S_Studies_Ln Scoping Phase Updates....22
Table 3-4: S_Studies_Ln FIRM Production Phase Updates....23
Table 3-5: S_Studies_Ln Preliminary Issuance Phase Updates....23
Table 3-6: S_Studies_Ln LFD Phase Updates....24
Table 3-7: S_Unmapped_Ln to S_Studies_Ln Updates....26
Table 3-8: S_Unmapped_Ln Required Attribute Population....27
Table 3-9: S_Coastal_Ln Scoping Phase Updates....29
Table 3-10: S_Coastal_Ln FIRM Production Phase Updates....30
Table 3-11: S_Coastal_Ln Preliminary Issuance Phase Updates....31
Table 3-12: S_Coastal_Ln LFD Phase Updates....31
Table A-1: Critical and Secondary Change Element Thresholds....34
Table A-2: Validation Status Type Descriptions....36
Table B-1: Riverine Validation Checklist for Detailed Studies....38
Table C-1: SID 43 – Vertical Accuracy Requirements....42
Table C-2: Inner and Outer Radius Values....49
Table C-3: SID 113 – Floodplain Boundary Standards Pass Thresholds based on Risk Class....50
Table D-1: Coastal Critical and Secondary Checks....52
Table F-1: S_Studies_Ln (Table ID Code: 01)....74
Table F-2: S_Requests_Ar/S_Requests_Pt (Table ID Code: 03/04)....94
Table F-3: S_Unmapped_Ln (Table ID Code: 07)....99
Table F-4: Specific_Needs_Info (Table ID Code: 06)....103
Table F-5: County_QC_Status....106
Table F-6: Point_of_Contact (Table ID Code: 05)....107
Table F-7: S_Coastal_Ln (Table ID Code: 08)....111
Table F-8: Coastal_County_QC_Status....129
Table F-9: UserRequest_Removal....130
Table J-1: S_Studies_Ln Checks....157
Table J-2: S_Coastal_Ln Checks....161
Table J-3: S_Requests_Ar/Pt Checks....165
Table J-4: Unmapped_Ln Checks....166
Table J-5: County_QC_Status Checks....167
Table J-6: Coastal_County_QC_Status Checks....167
Table J-7: Point_of_Contact Checks....168
Table J-8: Specific_Needs_Info Checks....169

List of Acronyms

BFE	Base Flood Elevation
BLE	Base Level Engineering
CE	Critical Element
CNMS	Coordinated Needs Management Strategy
CTP	Cooperating Technical Partner
Esri	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FGDB	Esri file geodatabase
FIPS	Federal Information Processing Standard
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FY	Fiscal Year
GIS	Geographic Information System
LFD	Letter of Final Determination
LOMR	Letter of Map Revision
LSAE	Large Scale Automated Engineering
MAS	Mapping Activity Statement
MIP	Mapping Information Platform
MSC	Flood Map Service Center
NAIP	National Agricultural Imagery Program
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NUCI	National Urban Change Indicator data
NVUE	New, Validated, or Updated Engineering
OCS	Office of Coast Survey
P4	Risk MAP Project Planning and Purchasing Portal
RSC	Regional Service Center
SE	Secondary Element
SFHA	Special Flood Hazard Area
USGS	United States Geological Survey
WSEL	Water Surface Elevation

Alphabetical List of Definitions

ASSESSED Validation Status	An ASSESSED Validation Status is assigned to flooding source centerlines in unmapped areas considered for a new study. This status is used for: allocation of resources for a new study in the current or a future fiscal year; or a deferment of the new study request. Streams not part of the Federal Emergency Management Agency's (FEMA) Special Flood Hazard Area (SFHA) inventory (e.g., Zone X, Zone D, or Area Not Included), that have been, or are being considered for a new study, would fall under this category.
Bathymetry	The measurement and study of underwater topography.
CNMS	The Coordinated Needs Management Strategy (CNMS) is comprised of processes and data for tracking: New, Validated, Updated Engineering (NVUE); unverified study reaches with identified change characteristics; and requests for the flood mapping program.
CNMS Database	The CNMS database is stored in an Esri File Geodatabase (FGDB) format. The Nov 2016 schema is comprised of the following tables: Studies Inventory (S_Studies_Ln, S_Coastal_Ln), Requests (S_Requests_Pt and S_Requests_Ar), QC Status Tables (County_QC_Status, Coastal_County_QC_Status), contact table (Point_of_Contact) and unmapped streams not in FEMA's SFHA inventory (S_Unmapped_Ln).
CNMS Inventory	The CNMS Inventory includes flooding source centerlines and coastlines representing FEMA's modernized inventory of FIRMs; its unmodernized inventory of FIRMs; and unmapped areas. The centerlines enable calculation of NVUE. The feature classes associated with the CNMS Inventory are S_Studies_Ln, S_Coastal_Ln and S_Unmapped_Ln.
CNMS Request Record	A CNMS Request Record represents either a flood data related, or cartographic, mapping need. Flood data requests may address: the lack of an existing floodplain model; areas that remain unstudied; or SFHAs with approximate designations for which models are not available. The feature classes associated with CNMS Request Records are S_Requests_Ar and S_Requests_Pt.

CNMS Study Record	A CNMS Study Record represents the most current knowledge of a mapped SFHA in FEMA's inventory, or a stream or coastal reach considered for inclusion in FEMA's SFHA inventory.
Critical Element	For Riverine and Coastal studies, one of seven elements documenting Physiological, Climatological and Engineering (PCE) methodology changes reviewed during the engineering study validation process. Individually, if any Critical Element is evaluated to a YES as a result of the identification of a deficiency, it is significant enough to trigger an UNVERIFIED Validation Status.
Raster Data	Data that are arranged in a continuous grid typically associated with imagery or terrain data.
Reach	The geographic extent, or upstream and downstream limits, defined by a CNMS Study Record.
Secondary Element	For Riverine studies, nine additional elements, for Coastal studies six additional elements, secondary to the Critical Elements, which document PCE changes reviewed during the engineering study validation process. These elements, if evaluated to 'YES' as a result of identification of deficiencies, and totaling four or more secondary element deficiencies for Riverine studies, and totaling three or more for Coastal Studies, are significant enough to trigger an UNVERIFIED validation status. A secondary deficiency is considered less impactful than a critical deficiency.
Stream Centerline	A geometric approximation of a flooding source centerline. Stream centerlines in the CNMS Inventory represent non-coastal studies in FEMA's mapped SFHA inventory, or non-coastal flooding sources considered for inclusion in FEMA's SFHA inventory.
Status Type	Status Type records the actions being taken, or that will be taken, once the Validation Status is determined for a study during update and maintenance cycles of the CNMS Inventory. Status types are useful in understanding and tracking map update investment decisions.
Study	A study represents a contiguous extent of FEMA's investment to perform an engineering-based evaluation of potential impacts of a flooding source. A single study in CNMS may be represented by one or more stream or coastal reaches.

UNKNOWN Validation Status	An UNKNOWN Validation Status is assigned to existing detailed and approximate flood hazard studies for which a CNMS evaluation is planned and in queue; currently being assessed under CNMS; or when CNMS evaluation is deferred. An UNKNOWN Validation status is also assigned to those studies for which inaccessibility of information results in an incomplete evaluation of the Critical and Secondary CNMS elements. In such cases, the UNKNOWN Validation Status may only be assigned after due diligence research has been performed.
Unmapped Streams	Flooding sources that have not been included in the FEMA inventory of studied streams in the CNMS Study Records.
UNVERIFIED Validation Status	An UNVERIFIED study has not passed the Critical and Secondary Element checks part of the Validation Checklist and may either be assigned resources for restudy in a future fiscal year or is currently being restudied.
Validation Status	Validation Status characterizes the engineering and mapping data used in FEMA's Flood Insurance Rate Maps (FIRMs) evaluated against the specifications provided in this document. This evaluation could result in a Validation Status of VALID (targeted condition), UNVERIFIED (requires map update investment), or UNKNOWN (needs further investigation). It is assigned for each CNMS Study Record.
VALID Validation Status	All VALID studies are considered NVUE Compliant, and contribute to the NVUE Attained metric calculation. A VALID Validation Status is assigned to CNMS study records based on the standards provided in this document.
Vector Data	Typical forms of Geographic Information Systems (GIS) vector data which include polygons, points, and polylines. Vector data are composed of vertices with relative or geospatially referenced coordinates sometimes containing vertical measurements.

Executive Summary

Under Title 42 of the United States Code, Chapter 50, Subchapter III, Section 4101(e), the Federal Emergency Management Agency (FEMA) is to revise and update all floodplain areas and flood risk zones identified, delineated, or established, based on an analysis of all-natural hazards affecting flood risks on a five-year cycle. Revisions to floodplain risk zones are dependent upon the identification of instances where information on Flood Insurance Rate Maps (FIRMs) does not reflect current risks in flood-prone areas.

The Coordinated Needs Management Strategy (CNMS) is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that will provide support to data-driven planning and the flood map update investment process in a geospatial environment. CNMS tracks the lifecycle of needs, specifying opportunities to capture needs and proposing methods for their evaluation to inform planning, tracking, and reporting processes. CNMS establishes a geospatially enabled effective means for users to enter, monitor, and update their inventory of floodplain studies. In addition, CNMS will be used to document the areas across the Nation where flood studies meet FEMA's current validity standards and, until otherwise noted, do not need to be updated on the FIRM.

Validity of flood hazard studies is determined by identifying study attributes and change characteristics as specified in the Validation Assessment Procedures (Appendix A). Flood hazard studies are evaluated for critical and secondary change indicators of physical environment, climate patterns, and engineering methods (PCE) since the date of the effective analysis. When a study is found to be deficient as a result of this validation process, it is classified as UNVERIFIED in the CNMS database. An UNVERIFIED Validation Status indicates studies for which resources for restudy have been assigned in the current fiscal year (FY) or will be assigned in a future FY, or those that are currently being restudied.

Apart from documenting basic study attributes, critical and secondary elements are evaluated for detailed flood hazard studies and this information including study validity is captured within CNMS Study Records. The CNMS Study Records should also include Validation Status of approximate studies, and those unmapped areas that have been considered for a new study.

FEMA will utilize the CNMS Study Records as the sole mechanism for reporting New, Validated, or Updated Engineering (NVUE) percentage. The NVUE percentage metric helps identify the portion of FEMA's inventory of studies that do not have identified needs that would warrant a re-study. Appendix H provides more information for NVUE calculation.

This CNMS Technical Reference document is to be used by local, state, regional and national users for development, management, tracking, and reporting of data related to suggested improvements and validity of flood hazard data nationwide.

1 Introduction

FIRMs are FEMA's most widely distributed flood hazard identification product. Flood hazard data presented on FIRMs are based on historic, meteorological, hydrologic, and hydraulic data, as well as open-space and land cover conditions, flood control works, and development. Due to the changing nature of the landscape from the influences of physical, engineering, and climatological processes, timely updates to Special Flood Hazard Area (SFHA) information on FIRMs become necessary to maintain accuracy and relevance. For successful maintenance of flood hazard information across the Nation, one must effectively identify and manage flood hazard mapping requirements expressed by individuals at the local, state, regional, and national levels.

FEMA's CNMS is a collection of procedures for the identification and management of flood hazard mapping requirements utilizing a standard database model. In addition to recording and validating studies, CNMS defines an approach for the identification and management of flood hazard mapping needs and requirements that will provide support to data-driven planning and the flood hazard information production planning process. By utilizing and maintaining Geographic Information System and relational database technologies, CNMS has been designed to track the study attributes of the current state of FEMA's study inventory and the lifecycle of studies from origination of a CNMS Study Record as an identified need or a CNMS Request Record to its resolution as a new, valid, or updated study. As such, CNMS allows tracking and management of existing, ongoing, and planned studies. GIS technology adds the capability of spatial analysis allowing communities and FEMA an effective means to visualize, enter, review, and update its study attributes and to visualize how studies relate spatially to other features. The terms and use of CNMS as it relates to other FEMA initiatives will be dictated and directed by FEMA policy.

This document details the FEMA CNMS data model, providing an overview of its purpose and structure. Definitions, examples of all database fields, and population guidelines are included to ensure the database can be populated correctly and accurately, as well as used properly for analysis after it is compiled. The Validation Assessment Procedures (Appendix A) are designed to guide the assessment of the validity FEMA's study inventory. Specific validation assessment checklists and instructions are provided for detailed studies (Appendix B), Zone A studies (Appendix C), and coastal studies (Appendix D).

In order to consolidate the data reporting process, a CNMS database has been created to take advantage of spatial data inventory tools and procedures. By standardizing, centralizing, and storing CNMS data in a geospatial format, FEMA will improve analysis and reporting by maintaining data that are current, readily available, and reliable.

A complete CNMS Study Record holds the validation assessment results. There is potential for an extensive investigative effort to determine appropriate attribute values for a record. Users of CNMS must develop a plan and implement the plan for capturing background information used

in the validation and subsequent attribute determination processes. Appendix A outlines the need for capturing this background information and documenting validation results directly in the CNMS Study Record. Delivery of these summaries to FEMA for all flood hazard studies evaluated is required as part of quarterly National CNMS data consolidation efforts.

A calculation and reporting mechanism for the New, Validated, or Updated Engineering (NVUE) metric is provided in Appendix H. FEMA will utilize the CNMS study records as the basis for reporting NVUE metrics. Appendix I outlines procedures to update CNMS resulting from Conditional Letters of Map Revision (CLOMRs), Letters of Map Revision (LOMRs), and the Letter of Map Amendment (LOMA) process. Appendix J provides the CNMS Quality Management Plan (QMP) currently recommended for all CNMS development teams and includes step-by-step instructions for using the CNMS File Geodatabase (FGDB) Quality Control (QC) Tool.

2 CNMS Data Development

This section identifies the key CNMS data development milestones and the steps needed to populate the CNMS FGDBs appropriately at each milestone. Section 2.1 describes the workflow and process to create and update the CNMS FGDB for each milestone. Section 2.2 describes the data required to make updates to the CNMS FGDBs. Section 2.3 identifies the data that may be created from the CNMS FGDBs. Section 2.4 provides the Quality Assurance/Quality Control (QA/QC) procedures for updating and maintaining CNMS FGDBs.

2.1 Workflow and Process

Figures 2-1 and 2-2, and Sections 2.1.1 through 2.1.13 detail workflows and processes that warrant an update of the Regional CNMS FGDBs. CNMS Data are organized by FEMA Regions and most ongoing update and maintenance is conducted at a Regional level by utilizing the Regional CNMS FGDBs.

Figure 2-1: CNMS Update Touchpoints

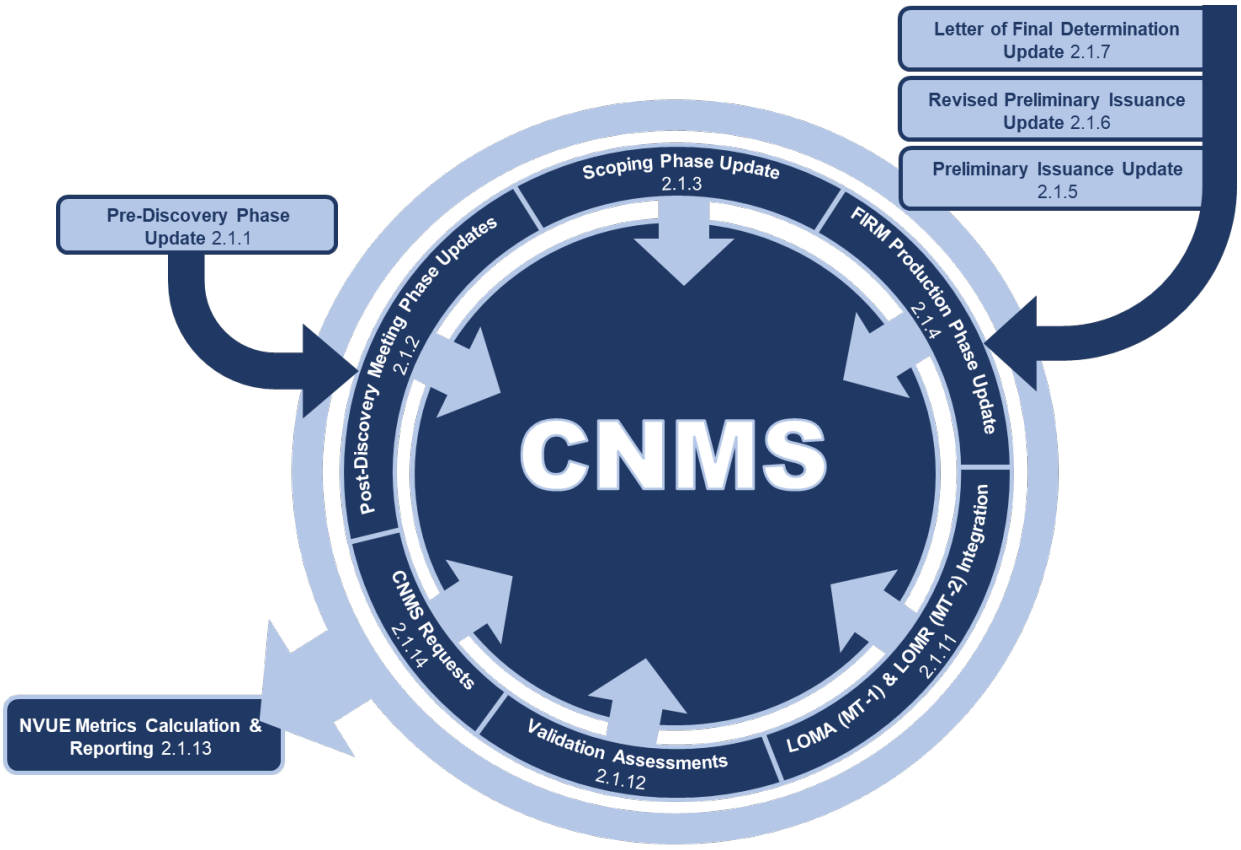


Figure 2-2: CNMS Update Touchpoints

I. Pre-Discovery Phase Updates

- Existing CNMS inventory provided to mapping partner by the respective RSCs
- Mapping partner udpates to reflect:
  - Existing stakeholder requests
  - Present state of mapping/projects
  - Discovery team input
- Output CNMS inventory ready for discovery meeting

II. Post-Discovery Meeting Phase Updates

- Mapping partner to review CNMS inventory with community, FEMA, and other stakeholders
- Mapping partner to input additional requests
- Mapping partner provides output to the RSC CNMS team reflecting Discovery meeting results

III. Funded Phase Updates

- Scope of study is determined by FEMA and stakeholders and communicated to mapping partner
- CNMS updated by mapping partner to reflect project scope including "Being Studied" attribute fields
- Mapping partner informs CNMS team of changes in scope/schedule over the life of the project

IV. Preliminary Issuance Updates

- Mapping partner informs preliminary updates, subsequent appeals
- CNMS updated by mapping partner to reflect Preliminary - "Being Studied" attribute fields
- FBS compliance for ongoing studies indicated in attribute fields

V. Letter of Final Determination Updates

- Mapping partner informs LFD updates
- Validation Date attribute updated
- "Being Studied" attribute fields values moved to corresponding effective attribute fields
- Completed new/updated studies are classified as "VALID - NVUE COMPLIANT"

VI. LOMA (MT-1) & LOMR (MT-2) Integration

- CNMS updated continually with the issuances of LOMAs and LOMRs by the MT-1 and MT-2 mapping partners

VII. 5-Year Validation Assessment

- Flood studies previously validated need to be assessed for validity every 5 years
- When assigned by FEMA Regional Office, the designated mapping partner conducts flood study validation assessment as outlined in Appendix A of this document

2.1.1 Pre-Discovery Phase Updates

Upon initiation of the Discovery phase for a new project, the RSC will export the project area from the Regional CNMS FGDB, and present it to the responsible Mapping Partner for initial review. The Mapping Partner will then provide input regarding the current status of the SFHA inventory for their area of interest, which will be used to update the CNMS Inventory. This will include validation assessment of any studies classified in CNMS as Unknown – To Be Assessed. They will also compile and review existing CNMS Request Records. Once this initial review is complete, the Mapping Partner will use the CNMS FGDB as a resource and repository for Discovery activities, including collection of new community input in the form of CNMS Requests. When Large Scale Automated Engineering (LSAE) or Base Level Engineering (BLE) is being performed as part of Discovery efforts, the BLE/LSAE tracking fields in S_Studies_Ln will be populated by the Mapping Partner according to data entry requirements in Section 3.2, and the CNMS inventory will be assessed and updated accordingly utilizing the Zone A validation procedures (Appendix C).

2.1.2 Post-Discovery Meeting Phase Updates

During the Discovery meeting, the mapping partner will review and share the inventory of effective floodplain studies and requests inventoried into CNMS. Stakeholders should evaluate the effective studies and mapping and provide comments for areas where flood risk may not be accurately represented on the Flood Insurance Rate Map (FIRM). After the Discovery meeting, the mapping partner will update the CNMS database to reflect impacts by LSAE/BLE, any missed studies from the effective FIRM, and any new mapping requests. The CNMS update(s) will be submitted back for incorporation into the master Regional CNMS FGDB for FEMA review.

2.1.3 Scoping Funded Phase Updates

Once scope is decided upon by FEMA and other stakeholders, or the Discovery efforts are concluded for the area of interest, the Mapping Partner will gather the data necessary to update the CNMS FGDB to reflect the proposed study scopes and any additional requests identified for the pending Production phase. This includes classifying scoped studies in the CNMS inventory as BEING STUDIED and recording an estimated Preliminary Date. The Mapping Partner will submit back to the RSC for updating the Regional CNMS FGDB, within 30 days of scope finalization.

The Mapping Partner may choose to utilize the CNMS FGDB to capture CNMS Study and Request data during the course of the Discovery effort. The Mapping Partner is required to submit updated CNMS data only at the conclusion of the Discovery effort or at finalization of project scope, whichever is sooner. The minimum required attributes of the inventory file for all scoped engineering study reaches will be updated as outlined in Section 3 and the Validation Procedures in Appendices A through D if study assessments were to be performed as part of Discovery.

Because project scope is prone to change after initiation, it is the responsibility of the Mapping Partner to inform the RSC regarding any subsequent changes in project scope and to maintain

accuracy of the CNMS FGDB. In this way, the inventory may be updated several times between initial project scope and Letter of Final Determination (LFD). For previously unmapped areas where new riverine studies are being proposed and/or incorporated, a new stream centerline feature will be added to the CNMS Study Records and all required attributes will be populated. New additions to the inventory must be topologically correct and maintain the existing database structure. Appendix F indicates which updated values are required or optional for CNMS FGDB feature class attribution.

The Mapping Partner will follow the quality guidelines in Section 2.4 and utilize the CNMS FGDB QC Tool to verify feature attributes. Following receipt of data reflecting project scope from the Mapping Partner, the Region or RSC will perform a review to confirm format consistency and that all required attributes have been populated. The Region will then use this submission to replace CNMS data for the project area of interest in the Regional CNMS FGDB. The version of the CNMS Data for the project area of interest should be archived in a centralized location, typically the RSC, for duration of 3-years from date of extraction.

2.1.4 FIRM Production Phase Update

The Mapping Partner will use the latest version of the CNMS FGDB within the project footprint to track mapping and engineering issues encountered over the course of the production phase. Issues that will not be resolved by the new or updated engineering or mapping study should be documented appropriately in CNMS per guidelines in Sections 3.

2.1.5 Preliminary Issuance Phase Update

When a mapping project is submitted for QR3, the Mapping Partner will submit an updated version of the CNMS FGDB for the project area of interest to the FEMA RSC. If necessary, the Mapping Partner will procure the latest copy of the CNMS data for the area of interest prior to starting this update which is typical when multiple projects are active within the area of interest and the CNMS FGDB is updated quarterly.

For riverine studies, this version will incorporate all new and updated geospatial elements of the vector flooding source centerline data (e.g. Profile Baseline) developed during the production phase, including flooding sources which may not have been updated during the Flood Risk Project, but for which new vector data was produced to align with the current base map. For riverine and coastal studies, all data should be topologically correct and reflect the CNMS Study Record attribute update requirements per guidelines in Sections 3.2 and 3.9.

Other CNMS feature class data should be updated, as needed, to reflect changes in the S_Studies_Ln and S_Coastal_Ln feature classes.

Following creation of the updated CNMS FGDB incorporating data from the Preliminary phase, the Mapping Partner and RSC will perform a review and use the CNMS FGDB QC Tool to confirm format consistency and that all required attributes have been populated as outlined above. The RSC will then query and extract the corresponding geographic extent of CNMS FGDB from the regional CNMS FGDB and replace it with the updated version provided by the

Mapping Partner. The extract of CNMS data from the regional CNMS database will be archived in the same centralized location mentioned in Section 2.1.1. This extract will not replace the prior archived version from the Discovery or Production phase updates. This process should be completed before the mapping project passes QR3.

2.1.6 Revised Preliminary Issuance Phase Update

A revised preliminary project will need to be evaluated during QR3 to see if the revisions impact CNMS. It may be determined that the revised preliminary project does not impact the CNMS database due to the revisions being limited to only cartographic or SFHA redelineation updates. If this is the case, the RSC can document this and the CNMS database will remain unchanged. The BS_PRELM_DATE will continue to reflect the date of the initial preliminary issuance.

If the mapping project is a revised preliminary which impacts the flood engineering study (extents of the study, flood zone, models) then a submission is required from the mapping partner to reflect these changes. Users are encouraged to review the scoping update workflow to make sure the CNMS data is updated properly. The BS_PRELM_DATE for the revised reaches will be updated to reflect the revised preliminary date.

2.1.7 LFD Issuance Phase Update

Within 30 days of issuance of LFD, the Mapping Partner will submit data communicating the effective status of the project area of interest to the RSC for updating the regional CNMS FGDB. These data may simply be correspondence acknowledging no change in the data since Preliminary when applicable. If necessary, the Mapping Partner will procure the latest copy of the CNMS data for the geography of interest prior to starting this update. A final version of the CNMS FGDB for the project will be prepared by the RSC. At a minimum, when there are no changes since preliminary issuance of the FIRM, this version will update the validation date attribute to reflect the effective date established by the LFD. All data should be topologically correct and reflect the CNMS study attribute update requirements per guidelines in Section 3 and 3.2.7 for riverine studies, and Section 3.9.5 for coastal studies. Other CNMS feature class data should be updated, as needed, to reflect changes in the S_Studies_Ln, S_Coastal_Ln, and/or S_Requests feature classes.

Following creation of the updated CNMS FGDB incorporating data from the LFD Issuance phase, the Mapping Partner and RSC will perform a review and use the CNMS FGDB QC Tool to confirm format consistency and that all required attributes have been populated as outlined above. The RSC will then query and extract the corresponding geographic extent of CNMS FGDB from the Regional CNMS FGDB and replace it with the updated version provided by the Mapping Partner. The extract of CNMS data from the Regional CNMS database will be archived in the same centralized location mentioned in Section 2.1.1. This extract will not replace the prior archived version from the Discovery, Production or Preliminary Issuance phase updates. This process should be completed within 30 days following receipt of the updated CNMS FGDB from the Mapping Partner.

2.1.8 BLE & LSAE Phase Update

BLE and LSAE studies will be tracked and updated by the Mapping Partner in the CNMS FGDB similar to typical flood study touchpoints from Discovery through LFD as described in the above Sections 2.1.1 - 2.1.6. Only BLE or LSAE studies that are used to update the regulatory FIRM and counted in the Risk MAP Project Planning and Purchasing Portal (P4) as initiated miles will be treated as initiated miles in CNMS and receive the BEING STUDIED classification. Fully automated LSAE studies not being used to update the regulatory FIRM can be leveraged for assessment work only and may have tracking fields in CNMS populated, but will not receive a BEING STUDIED classification and will not count toward NVUE Initiated. The Mapping Partner will consult with the RSC or FEMA Region to determine whether the BLE or LSAE study is being used to update the regulatory FIRM and counted in P4 as initiated miles. Section 3.2.2 describes specific data entry requirements and business rules for BLE/LSAE tracking in CNMS depending upon if the BLE or LSAE is counting towards NVUE Initiated.

For all BLE or LSAE funded studies, the Mapping Partner performing the study will request an export from the RSC of the Regional CNMS FGDB for the study area. The Mapping Partner will gather the data necessary to update the CNMS FGDB according to Section 3.2.2. For previously unmapped areas where no CNMS S_Studies_Ln records exist for the BLE/LSAE study area, new stream centerline features will be added to the S_Studies_Ln and all required attributes will be populated. New additions to the inventory must be topologically correct and maintain the existing database structure. Suggested sources of new centerline additions are CNMS S_Unmapped_Ln, NHD, or draft output from BLE/LSAE projects, though the Mapping Partner should consult with the RSC on source and scale choice and follow general guidelines for updating S_Studies_Ln as described in Sections 2.2.5 and 3.2. Appendix F indicates which updated values are required or optional for CNMS FGDB feature class attribution. The Mapping Partner will submit back to the RSC for updating the Regional CNMS FGDB within 30 days of scope finalization. Because project scope is prone to change after initiation, it is the responsibility of the Mapping Partner to inform the RSC regarding any subsequent changes in project scope and to maintain accuracy of the CNMS FGDB. In this way, the inventory may be updated several times between initial project scope and completion.

The Mapping Partner will follow the quality guidelines in Section 2.4 and utilize the CNMS FGDB QC Tool to verify feature attributes. Following receipt of data reflecting BLE or LSAE project scope from the Mapping Partner, the Region or RSC will perform a review to confirm format consistency and that all required attributes have been populated. The Region will then use this submission to replace CNMS data for the project area of interest in the Regional CNMS FGDB

2.1.9 Tier Inventory

CNMS includes a Tier classification field that describes the maturity of the flood hazard data product. In addition to the 1.13 million miles within the CNMS inventory (including coastal miles), all 4 million miles of stream as referenced by the USGS that drain greater than 1 square mile should fall into one of these 6 Tiers:

Tier 0: Known to be flood prone (i.e., draining greater than 1 square mile) but not yet identified as SFHA on a regulatory FIRM.

Tier 1: SFHA is not available in digital format.

Tier 2: SFHA is available as a digital product, but not known to be model-backed.

Tier 3: Is available as a digital product, model-backed and may not be consistent with high quality elevation data (utilizes elevation data inferior to USGS Quality Level (QL) 2 equivalence or better).

Tier 4: is available as a digital product, model-backed and consistent with high quality elevation data (USGS Quality Level (QL) 2 equivalence or better). (This tier should serve as meeting all current Risk MAP technical requirements).

Tier 5: SFHA is available as a digital product, and including enhanced analyses such as future land use, or future climate-informed analyses.

Tier classification of study records in CNMS will be reviewed and updated by the RSC on a quarterly basis. The Mapping Partner will update the Tier classification in CNMS at the LFD Issuance Phase Update.

2.1.10 Flood Risk Product Tracking

CNMS includes a mechanism for tracking the availability of water surface elevation (WSEL) grids and depth grids for both the riverine and coastal inventory of flood studies. The WSEL_AVAIL and DPTH_AVAIL fields within the S_Studies_Ln and S_Coastal_Ln feature classes allow the tracking of depth grid and WSEL products. Both fields are domain entry enforced and distinguish products that are compliant with FEMA quality standards (FEMA SID 415 and SID 628) and whether development of the products is under way (funded) or complete. The Mapping Partner will typically update these tracking fields during Scoping Phase Updates, once the scope is confirmed, and again at Prelim or whenever the products are complete. Regions may also choose to populate these tracking fields to record availability of historic depth grid and WSEL products.

2.1.11 LOMA (MT-1) & LOMR (MT-2) Integration Workflow

Apart from gathering and incorporating LOMRs into CNMS during flood study validation as outlined in Appendix I, the efforts of the MT-1 and MT-2 teams within the Production and Technical Services (PTS) firms must be integrated with CNMS efforts to continually update the CNMS Inventory based on LOMR issuance. The Mitigation (MT)-1 & MT-2 teams would incorporate mapping and flood data issues found as CNMS Requests Records using the process described in Section 2.1.13 and Section 3.4.

2.1.12 Validation Assessments

The Validation Assessment Procedures in Appendix A and validation checklists in Appendices B, C, and D guide the assessment of FEMA's study inventory. The central purpose of the Validation Checklists is to outline a consistent process that should be used to determine and document the Validation Status of flood studies and whether they should be categorized as VALID, UNVERIFIED, or UNKNOWN in the CNMS Study Records. The decision to defer CNMS evaluation of flood studies with validation status UNKNOWN shall be coordinated with FEMA Headquarters. Regions will need to re-assess flood studies in the deferred category at least every 5 years with the understanding that such assessment may be required sooner. Flood studies with the validation status of UNVERIFIED are to be prioritized and funded for study updates. Therefore, as the Regional CNMS data are rolled up for quarterly reporting, Regions will need to review the list of newly unverified studies and initiate assessment as to how these studies will be prioritized and funded for updates.

The CNMS data model also provides for storing information for unmapped streams that have been considered for a new study. Such stream centerlines are stored as CNMS Study Records and assigned a Validation Status of ASSESSED to indicate that the stream has been assessed for a new study. The outcome of such consideration may be that resources are allocated in the current or a future FY, or that the request for new study has been deferred. Section 3.2 outlines the attribution policy for CNMS Study Records.

2.1.13 NVUE Metrics Calculation and Reporting

National CNMS data is consolidated on a quarterly basis using the latest Regional CNMS FGDBs to produce the NVUE Summaries reported at local, state, regional and national levels. The process and methodology for NVUE metric calculations and reporting is described in Appendix H.

2.1.14 CNMS Requests

In order to capture flood data and SFHA mapping needs on an ongoing basis from FIRM production teams, MT-1 and MT-2 teams, and local stakeholders, a CNMS Requests dataset within the CNMS FGDB has been included. CNMS Requests Records are typically of the CARTOGRAPHIC type, or FLOOD DATA type.

Users including, but not limited to, Discovery teams, FIRM production teams, MT-1 and MT-2 teams, and local stakeholders will use CNMS Requests as an intermediate state before each CNMS Request Record is reviewed in the making of map update investment decisions. If the issue identified is recognized as warranting action, then a resolution will be put in place that will address the issue. This could lead to a CNMS Study Record update identifying a critical or secondary need, or a decision to issue a new/updated study for the area of interest. Section 3.4 outlines the attribution policy for CNMS Request Records.

2.2 Data Input

2.2.1 CNMS Data model

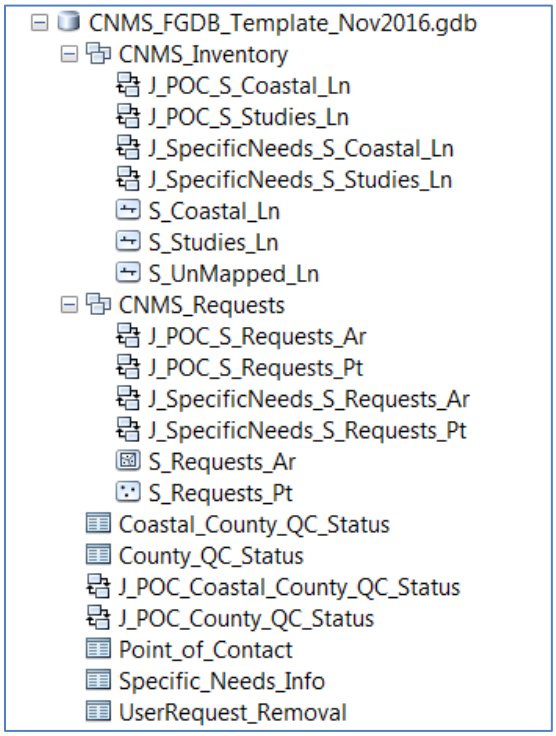
The CNMS Esri file geodatabase template contains all spatial entities defined in the CNMS Entity Relationship Diagram (ERD) with the proper geometry, relationship classes, fields, and domains. The CNMS FGDB contains two feature datasets:

1. CNMS Inventory Feature Dataset [S_Studies_Ln, S_Coastal_Ln, S_Unmapped_Ln], and
2. CNMS Requests Feature Dataset [S_Requests_Pt, S_Requests_Ar].

Figure 2-3 identifies all other tables and relationship classes within the CNMS database. Although CNMS information is stored in an Esri file geodatabase (FGDB) format, information can be extracted for use in other GIS platforms. The CNMS Data Model Diagram in Appendix E is a schematic diagram of the entities in the database and their relationships.

The CNMS Data Dictionary in Appendix F is a comprehensive dictionary with the type, format, domains, and field definitions of every entity in the database.

Figure 2-3: CNMS FGDB Components as Seen in Esri ArcCatalog



2.2.2 Flood Insurance Study (FIS) Report

Study information to be tracked in the CNMS inventory would primarily be obtained from Effective or Preliminary FIS Reports. The Effective and Preliminary FIS text may be procured from the FEMA Flood Map Service Center (MSC) or the Mapping Information Platform (MIP)

File Explorer (K Drive) and Flood Risk Study Engineering Library. The FIS report documents study engineering and mapping methodology and a list of studied streams associated with the geography represented in the FIS report.

2.2.3 LOMRs

LOMR case files may be procured from the MIP and in collaboration with the LOMR/MT-2 teams. The process to be followed to incorporate LOMRs is outlined in Appendix I.

2.2.4 FEMA Library

Some flood insurance studies are digital conversions of historic SFHA maps or redelineation of historic engineering studies to represent those flood hazard areas superimposed upon the best available imagery and topographic data. In such instances, the need may arise to access historic Effective FIS reports and FIRM panels. The FEMA Library is the primary source for accessing such historic data.

2.2.5 FIRM Data and Linework Sources

Sources of polylines to enter into the S_Studies_Ln feature class are varied and are the responsibility of the user to determine, but some potential sources of stream centerlines in a recommended order of priority are: 'S_Profil_Basln' from FIRM Database, 'S_Wtr_Ln' from the FIRM Database; National Hydrography Dataset (NHD) High, Medium, Low resolutions; or heads up digitization of a representative line for the SFHA. Effective FIRM Databases may be procured from the FEMA MSC and Preliminary FIRM Databases may be procured from the MSC and the MIP.

The above guidance is provided for S_Studies_Ln features representing SFHAs that are mapped for riverine flooding sources. Additional details on populating S_Studies_Ln attributes, including mileage calculation guidelines for handling various riverine flood source types, are provided in Section 3.2 and Appendix H.

For Coastal CNMS, a customized "Coast-Detailed" shapefile, originally developed as part of the 2010 FEMA Coastal Demographics Study by Crowell et al, is the foundation line source representing the S_Coastal_Ln feature class. No new or additional linework should be loaded into S_Coastal_Ln as the entire coastal shoreline is already represented in this feature class. The only geometry modifications of S_Coastal_Ln allowed will be splitting or grouping of the existing coastal line segments to represent coastal study extents. Additional details on populating S_Coastal_Ln attributes, including mileage calculations are provided in Section 3.9.

2.3 Data Output

This section lists the most common uses and outputs that may be derived from the CNMS FGDBs.

- For Discovery
  - List of current effective studies with Validation Status
  - List of causes of failure at an element level per study

  - Mileage distribution by study types of current effective data
  - Engineering methodology by study reach
  - Identification of specific study differences along political jurisdiction boundaries
  - Identification of streams with associated repetitive loss properties
  - Visualization of new or removed structures against trends in urbanization
  - Other Critical and Secondary validation element issues
- For CTP regional or national planning and reporting
  - Multi-Year Planning
  - Post-Purchase Management
  - NVUE Attained Metric
  - Life Cycle Cost Model (LCCM)

2.4 Quality

The Mapping Partner is responsible for the implementation of a QMP consistent with Appendix J: CNMS Quality Management Plan (QMP).

To meet the quality standards set forth by FEMA, the Mapping Partner will use this CNMS Database User's Guide to update and maintain the CNMS FGDBs for their area of interest. The FEMA RSCs will make use of the CNMS FGDB QC tool outlined in Appendix J to verify the attribute quality and database integrity of the data submitted for the phases identified in Section 2.1. It is possible for the Mapping Partner to procure the CNMS FGDB QC tool from the FEMA RSC to conduct a final quality review of the CNMS FGDB prior to submission.

The CNMS QMP includes independent quality audits from time-to-time conducted by external entities.

Table 2-1: Riverine CNMS Record Entry Determination

	"The Inventory" of Studied Streams	Streamlines for Unmapped Areas	Mapping Requests Information	Ancillary Information
CNMS Touchpoints	**S_Studies_Ln**	**S_Unmapped_Ln**	**S_Request_Ar / S_Request_Pt**	**Specific_Needs_Info**
Pre-Discovery Meeting (3.2.3)	Review current status of studies within Watershed. Current CNMS inventory status for the Discovery area of interest is presented on Discovery Map	Review unmapped stream reaches within Watershed for awareness purposes. If necessary, unmapped streams are displayed in the Discovery Map.	Review for Request Records on file within the Watershed to consider for inclusion in a study Statement of Work (SOW). Request Records can be included in the Discovery Map (materials) presented at Discovery meetings for refinement and the collection of new Request Records.	Review information contained within to increase working knowledge of watershed being considered for the study update process
Post-Discovery Meeting (3.2.4)	Update as necessary	Update as necessary	Should a production team discover mapping issues through the Discovery process or during production that are not covered by the study MAS/SOW, Request Records should be developed to capture the details of a request. Add new requests from Discovery meeting	
Scoping Phase (3.2.5	Data in S_Studies_Ln are to be updated to reflect extent of floodplain study, that the study process has been initiated, and the estimated Preliminary Issuance and LFD dates are entered	Migrate flooding source centerline data for floodplains being studied but are not yet represented in S_Studies_Ln (the Inventory)	No actions required	Update Specific_Needs_Info information where applicable
Preliminary Issuance (3.2.7)	Set study PRELM_DATE with actual Preliminary Issuance date and revise the estimated LFD date	Suggestion: Delete the study related flooding source centerlines from the S_Unmapped_Ln feature class data (specifically, the lines that were migrated to S_Studies_Ln)	No actions required	Update Specific_Needs_Info information where applicable
Letter of Final Determination (LFD) (3.2.8)	New or Updated studies are to be set to "Valid" at this milestone. Information in the "Being Studied" (BS) Fields is to be migrated to the complimentary S_Studies_Ln fields to indicate that the study is completed once LFD is issued. The actual LFD date is to be recorded, and the "Being Studied" (BS) fields should be cleared after their values are migrated	No actions required	Request_Ar and Request_Pt should be edited to indicate resolution of Request Records that have been addressed during the study process	Update Specific_Needs_Info information where applicable
Post-Production Updates - LOMA, LOMR, 5-Year Revalidation	Use Appendix A and G to address S_Studies_Ln updates during Post-Production Activities	No actions required	Resume/maintain fundamental, ongoing Request capture process	Update Specific_Needs_Info information where applicable

Table 2-2: Coastal CNMS Record Entry Determination

	"The Inventory" of Studied Coastline	Mapping Requests Information	Ancillary Information
CNMS Touchpoints	**S_Coastal_Ln**	**S_Request_Ar / S_Request_Pt**	**Specific_Needs_Info**
Pre-Discovery	Review current status of studies within the coastal project footprint	Review for Request Records on file within the coastal project footprint to consider for inclusion in a study SOW	Review information contained within to increase working knowledge of watershed being considered for the study update process
Discovery Meeting	Current CNMS inventory status for the Discovery area of interest is presented on Discovery Map (Section 3.9.1)	Normal Request Record generation is applied. Should a production team discover mapping issues through the Discovery process or during production that are not covered by the study MAS/SOW, Request Records should be developed to capture the details of a request	No actions required
Post-Discovery (3.9.2, 3.9.3)	Data in S_Coastal_Ln are to be updated to reflect attributes of the ongoing study that the study process has been initiated, and the estimated Preliminary Issuance and LFD dates are entered. (Section 3.9.2)	Request Records can be included in the Discovery Map (materials) presented at Discovery meetings for refinement and the collection of new Request Records.	Update Specific_Needs_Info information where applicable
Preliminary Issuance (3.9.4)	Set study PRELM_DATE with actual Preliminary Issuance date and revise the estimated LFD date (Section 3.9.4). S_Coastal_Ln not receiving new regulatory products attributed with effective study attributes.	No actions required	Update Specific_Needs_Info information where applicable
Letter of Final Determination (LFD) (3.9.5)	New or Updated studies are to be set to "Valid" at this milestone. Information in the "Being Studied" (BS) Fields is to be migrated to the complimentary S_Coastal_Ln fields to indicate that the study is completed once LFD is issued. The actual LFD date is to be recorded, and the "Being Studied" (BS) fields should be cleared after their values are migrated (Section 3.9.5)	Request_Ar and Request_Pt should be edited to indicate resolution of Request Records that have been addressed during the study process	Update Specific_Needs_Info information where applicable
Post-Production Updates - LOMA, LOMR, 5-Year Revalidation	Use Appendix A and G to address S_Coastal_Ln updates during Post-Production Activities	Resume/maintain fundamental, ongoing Request capture process	Update Specific_Needs_Info information where applicable

3 Data Entry Process

This section outlines the workflows and touch points that warrant CNMS data inputs. Structurally, these data inputs are separated into two types of feature classes: the CNMS Inventory feature dataset with feature classes 'S_Studies_Ln', 'S_Coastal_Ln', and 'S_Unmapped_Ln', and the CNMS Requests feature dataset: with feature classes 'S_Requests_Ar ' and 'S_Requests_Pt'. In addition to these feature datasets, several tables within the CNMS FGDB require specific update. Detailed descriptions of each CNMS feature class and table, including field descriptions are provided in Appendix F. Attribute population policies for each feature class and table are outlined in Sections 3.1 through 3.9.

3.1 Primary Key Considerations

The primary key in a relational database table allows each record to be uniquely identified. When generating primary key values for records within relational database tables it is important that a well-documented methodology be followed for the sake of consistency, and to ensure that any information intended to be imbedded within the primary key is appropriately represented.

CNMS is expected to have many data entry points so special care must be taken to prevent primary key duplication. If there are multiple sources for record generation for a county, coordination between or among the multiple sources will be required prior to consolidation of the two databases. However, if coordination takes place prior to record generation, the parties involved can agree to assigned number ranges and thereby avoid encroachment on the primary keys created by others.

Primary key generation for most tables within CNMS is based upon a standard scheme consisting of the concatenation of the appropriate 5-digit County Federal Information Processing System (FIPS) code, a 2-digit table identification code, and a 5-digit counter in which leading zeros are always populated and serve as place holders. For example, to generate a REACH_ID in S_Studies_Ln, 201190100001 would be an appropriate assignment where 20119 is the county FIPS code, 01 is the table identification code for S_Studies_Ln, and 00001 is the counter value for the first record in S_Studies_Ln for Meade County, Kansas. For tables following the standard scheme and variations thereof, the length of the key is expected to be 12. Tables such as Point_of_Contact allow for variations of the scheme. For example, a state-level POC record might substitute the 2-digit state FIPS followed by three zeros for the 5-digit county FIPS. Two tables within the CNMS data model which do not follow the standard primary key scheme are the County_QC_Status and Coastal_County_QC_Status tables, for which CO_FIPS is the primary key by virtue of its inherent uniqueness.

3.2 S_Studies_Ln Feature Class (Polyline)

The S_Studies_Ln feature class resides in the CNMS Inventory feature dataset. Each feature within S_Studies_Ln is meant to fully encompass the physical extent, upstream and downstream, of a reach that is regulated by an SFHA under the National Flood Insurance Program (NFIP). Records representing unmapped reaches and bodies of water may optionally

be present in this feature class, provided that they have been ASSESSED for new study prioritization.

The database contains polylines for most reaches representing SFHAs, but not all. Issues which may have prohibited the accurate representation of all SFHAs from FEMA's mapped inventory could include: cases where the stream centerlines used to populate the inventory meander in and out of the SFHAs; or where a study is currently underway and digital data does not exist. The first case can occur when several stream centerline sources were leveraged to represent SFHA polygons studied in flood insurance studies. In this instance, one could optionally replace the existing stream centerlines in the CNMS inventory with better quality polyline data. In the second case, the digital data should overlay stream networks to extract the reaches that are regulated by SFHA extents when they become available.

This should not be the case in areas where FIRM data were used to populate CNMS Study Records. It is only anticipated that such inconsistencies with stream centerline representation of SFHAs exist in unmodernized areas and areas where certain early CNMS pilots were conducted. It should be the goal of each user to contribute to the inventory by identifying shortcomings in the CNMS Inventory (particularly in unmodernized areas), providing updates as available, and maintaining the inventory accordingly.

Polyline geometry in the CNMS Studies feature dataset is the result of compilation from various sources and it is intended that augmentations and improvements to linework geometry be an ongoing process. The goal is to have every flood hazard study that is part of FEMA's mapped inventory represented accurately within CNMS – the better the line feature quality, the more accurately the CNMS inventory will be able to inform NVUE reporting. Inventory polylines should be continuous through an SFHA of the same study type (e.g. Zone AE) for individual flooding sources, but split at county or watershed breaks, or within the same SFHA where one study stops and another starts including LOMR extents. Polylines within S_Studies_Ln may also be split at community boundaries. In cases where a watershed or a political boundary may cause a study to be divided into several reaches (each an individual feature), all reaches may be related to one another and linked to external data by using the 'STUDY_ID' field.

New polylines should be included in the Inventory when an SFHA does not currently have a line representing the entire extent of its flood hazard. Sources of stream centerlines entering the inventory are varied and will be the responsibility of the user to determine. Sources for stream centerlines for riverine flooding sources in order of preference include: 'S_Profil_Basln' or 'S_Wtr_Ln' from: FIRM Database studies; NHD High, Medium, Low resolution; and heads-up digitization of a representative line for the SFHA.

Unlike riverine flooding sources, lakes and ponds that are part of FEMA's mapped SFHA inventory are often disconnected from stream centerlines and are two dimensional, making linear representations of these areas a challenge. Ignoring lakes and ponds altogether would underestimate the representative miles used for NVUE percentage calculations while including the entire shoreline of these areas would overestimate the representative miles used. If the stream centerline sources identified above for riverine flooding sources have linework passing through the lakes or ponds, those may be used to represent these flooding sources (this

includes centerline digitization). If none of the datasets has linework usable as described above, the appropriate manner in which to address these flooding sources is to store the actual polyline representing the lake or pond shore in the CNMS Inventory and set the LINE_TYPE field to a value other than 'RIVERINE', such as 'LAKE OR POND'. These shoreline miles will be halved when assessing the mileage for the SFHA study for NVUE calculations.

The S_Studies_Ln feature class is also used to indicate Floodplain Boundary Standard (FBS) compliance for current studies. Studies that meet the FEMA Standard ID (SID) 112, 113, 114, and 115 will have a value of 'YES' in the FBS_CMPLNT field. This value is updated upon Preliminary issuance with information typically received from the Regional Support Centers.

Section 3.2.1 describes how backwater of modeled streams is to be represented and attributed. Sections 3.2.2 through 3.2.7 outlines the updates needed for the S_Studies_Ln table at various Risk MAP phases.

3.2.1 Backwater Attribution

Backwater can be defined as flooding on a tributary channel resulting from the higher water surface elevation of the receiving water body. To ensure stream connectivity, CNMS will inventory linework that is influenced by backwater to avoid gaps in linework geometry. Below are guidelines to follow when attributing backwater within the S_Studies_Ln feature class:

Scenario 1: Approximate study tributaries (Zone A) controlled by backwater effects less than 1 mile in length:

Add and/or merge backwater segment with the upstream study reach. If no upstream study exists, remove linework and make sure it's captured in S_Unmapped_Ln. See Section 3.5 for required fields to populate when adding linework to S_Unmapped_Ln.

Scenario 2: Approximate study tributaries (Zone A) controlled by backwater effects greater than 1 or more miles in length and all detailed study tributaries (Zone AE) controlled by backwater effects regardless of length:

Add new linework to represent backwater or split existing linework at limit of backwater SFHA and associate with the parent flooding source. If both the tributary and receiving water body are detailed studies, users will need to use the regulatory products or engineering judgement to determine the parent flooding source. Table 3-1 is a guide on required fields to populate within S_Studies_Ln when adding backwater for Scenario 2. All other fields in S_Studies_Ln not referenced in this table should have their attributes cleared out. See Appendix F for complete S_Studies_Ln field definitions and data entry descriptions. An exception to this scenario would be detailed tributaries that are a floodway should not be split out as backwater.

Table 3-1: S_Studies_Ln Attribute Updates for Backwater

Field	Description
REACH_ID	Calculate unique identifier
STUDY_ID	Calculate same identifier for related backwater reaches and the parent flooding source
CASE_NO	Optional
CO_FIPS	Populate the 5-digit County FIPS number
CID	Populate the 6-digit Community Identification number
WTR_NM	Populate name of flooding source (name of tributary to parent flooding source)
WTR_NM_1	Optional if there's a second known name
FLD_ZONE	Populate to match parent flooding source
VALIDATION_STATUS	Populate to match parent flooding source
STATUS_TYPE	Populate to match parent flooding source
MILES	Calculate miles to North America Albers Equal Area Conic
SOURCE	Follow Table F-1 guidance
STATUS_DATE	Populate to match parent flooding source
FY_FUNDED	Populate to match parent flooding source
REASON	Populate with “Backwater effects from [parent flooding source WTR_NM]”
HUC8_KEY	Populate the 8-digit Hydrologic Unit Code
STUDY_TYPE	Populate to match parent flooding source
TIER	Populate to match parent flooding source
WSEL_AVAIL	Optional if data exists
DPTH_AVAIL	Optional if data exists
BLE	Optional if data exists
BLE_POC	Optional if data exists
BLE_DATE	Optional if data exists
LINE_TYPE	Follow Table F-1 guidance
FBS_CMPLNT	Populate to match parent flooding source
FBS_CHKDT	Populate to match parent flooding source
FBS_CTYP	Populate to match parent flooding source
DUPLICATE	Follow Table F-1 guidance
COMMENT	Optional

3.2.2 BLE & LSAE Study Updates

When BLE or LSAE is being performed as part of a Risk MAP project, the CNMS inventory can be evaluated at the Region’s request utilizing the Zone A validation procedures (Appendix C) for effective studies. BLE data can be used to complete the A5 comparison check for effective Zone A studies within the BLE project footprint as long as the assessment checks A1-A4 are completed as part of this assessment process. For each element A1-A5, the associated

Comment, Source, and URL fields will be populated as part of standard validation assessment documentation procedures. Even though all checks A1-A5 will be completed, the result of the A5 check may be used to classify the effective Zone A as either Valid or Unverified at the discretion of the Region.

Before reclassifying the validation status of the effective Zone As within the BLE or LSAE project footprint, the Mapping Partner will consult with the RSC to determine whether any effective Zone A studies classified as VALID in the project area should be subject to the A5 assessment results. For example, any recently incorporated LOMRs or other valid Zone A studies with a recent STATUS_DATE should be reviewed prior to updating to UNVERIFIED.

Note that any effective detailed studies (e.g., Zone AE, AO, AH, AR) within the BLE or LSAE project footprint will not be subject to assessment checks A1-A5 and will not have their validation status changed. Validation assessment of any effective detailed studies, which have a unique set of checks described in Appendix B, will not be part of the BLE submittal unless explicitly directed by the Region.

Mapping partners need to pay special attention to attribute updates if there are any ongoing studies (e.g. PMR) within the BLE project footprint. For records with this situation (STATUS_TYPE field in CNMS is already set to BEING STUDIED), the BLE tracking fields should be populated and STATUS_DATE updated. However, the existing BS fields should not be overwritten as those belong to the ongoing regulatory mapping project.

All BLE or LSAE studies will have the tracking fields in S_Studies_Ln populated as indicated in Table 3-2. These fields should be populated for all reaches within the project footprint, including detailed and unmapped reaches, as this information can facilitate the query of BLE extent in CNMS.

Table 3-2: S_Studies_Ln BLE/LSAE Tracking Field Updates

Field	Description
BLE	Distinguishes the category of BLE or LSAE study
BLE_POC	Preferred FEMA Regional contact or project manager to be added to the Point_of_Contact Table.
BLE_DATE	Set the date of the hydraulic analysis of BLE or LSAE if applicable. If unknown, use 1/1/2050.

See Table F-1 (Appendix F) for complete geodatabase field definitions.

Additional business rules for data inputs apply depending on whether the BLE or LSAE is used to update the regulatory FIRM and counted as initiated miles in the P4 tracking database. Only BLE or LSAE studies that are used to update the regulatory FIRM are counted in P4 as initiated miles and will be treated as initiated miles in CNMS by receiving the BEING STUDIED classification. Fully automated LSAE studies not being used to update the regulatory FIRM can be leveraged for assessment work only and may have tracking fields in CNMS populated, but will not receive a BEING STUDIED classification and will not count toward NVUE initiated. Studies that receive the BEING STUDIED classification will count towards NVUE attained at Preliminary issuance. In summary:

BLE or LSAE for regulatory FIRM update:

- Three tracking fields in CNMS populated as indicated in Table 3-2
- Treated as NVUE initiated in CNMS
  - Status type is set to BEING STUDIED
  - Updates to all fields in Table 3-3: S_Studies_Ln Scoping Phase Updates
  - Counts as NVUE attained at Preliminary issuance.
  - No change to validation status unless A1-A4 and/or A5 check is performed or study reaches LFD. Until study reaches LFD, miles remain as BEING STUDIED (even after validation assessment occurs).
  - Where LSAE or BLE does not overlap with existing CNMS inventory (non-SFHA areas), those stream lines get loaded into S_Studies_Ln inventory as ASSESSED – BEING STUDIED, as is done for any non-SFHA initiated mile. Unmapped miles added should be attributed as indicated in Table 3-7: S_Unmapped_Ln to S_Studies_Ln Updates.
  - Where Region decides not to move forward with regulatory products for those unmapped miles, then they become ASSESSED – DEFERRED in CNMS.

BLE or LSAE purchase NOT for regulatory FIRM update and NOT in P4 as initiated miles

- Three tracking fields in CNMS populated as indicated in Table 3-2
- NOT treated as NVUE initiated in CNMS
  - No change to Status Type
  - No change to validation status unless A1-A4 and/or A5 check is performed
  - Where LSAE or BLE does not overlap with existing CNMS inventory (non-SFHA areas), those stream lines get loaded into S_Studies_Ln inventory as ASSESSED-DEFERRED. (These do not count towards NVUE denominator.)

3.2.3 S_Studies_Ln Pre-Discovery Meeting Phase Updates

For Discovery Phase of a project, S_Studies_Ln records will be reviewed, and validation assessment of any studies classified in CNMS as Unknown – To Be Assessed should be performed. When BLE or LSAE is being performed as part of Discovery efforts, the CNMS inventory will be assessed and updated accordingly utilizing the Zone A validation procedures (Appendix C) and S_Studies_Ln records updated according to Section 3.2.2.

3.2.4 S_Studies_Ln Post-Discovery Meeting Phase Updates

The collection of new community input in the form of CNMS Requests will be added to S_Requests_Ar or S_Requests_Pt features. Additionally, comments received during Discovery may provide information about existing studies that could potentially update the validation

elements of a reach (example: known repetitive loss outside the SFHA, stream channelization, hydraulic changes, etc.).

3.2.5 S_Studies_Ln Scoping Phase Updates

When project scope has been funded and specific study reaches have been identified, the following fields within S_Studies_Ln will need to be updated as indicated. It is assumed that any fields not listed here should be updated by the user if more accurate data are available. If the exact Preliminary and LFD dates are unknown, users will use 1/1/2049 for the Preliminary date and 1/1/2050 for the LFD date. When a Scoping update includes new scoped reaches (never shown on an effective FIRM), S_Unmapped_Ln within CNMS can be used for the initial linework geometry. Details for using S_Unmapped_Ln for S_Studies_Ln can be reviewed in Section 3.5.

Reaches scoped for redelineation or digital conversion are to be updated as BEING STUDIED with all scoping fields populated except for BS_HYDRO_M and BS_HYDRA_M. In addition, if the scoped reach is Valid, a note should be added to the REASON field indicating “Reach set to Valid on [existing STATUS_DATE]”, so that this date may be restored at the time of LFD update for the study.

Table 3-3: S_Studies_Ln Scoping Phase Updates

Field	Scoping Phase Updates
REACH_ID	Update Reach_ID of affected features any time a reach is split or added to the Inventory.
	If applicable, update Study_ID to reflect intended cardinality.
STATUS_TYPE	Shall be updated to 'BEING STUDIED' for all scoped reaches, including BLE or LSAE funded in P4 as NVUE initiated miles.
MILES	Recalculate for any Reaches where geometry has been modified.
STATUS_DATE	Set the STATUS_DATE to the current date, which should be the date the other fields were reassigned as well.
REASON	If reach is VALD, add note “Reach set to VALID on [existing STATUS_DATE]”
WSEL_AVAIL	Select the appropriate category of WSEL if applicable.
DPTH_AVAIL	Select the appropriate category of depth grids if applicable.
BLE	Select the appropriate category of BLE or LSAE if applicable.
BLE_POC	Set the POC_ID to reflect the FEMA contact for the BLE or LSAE if applicable.
BLE_DATE	Set the date of the hydraulic analysis of BLE or LSAE if applicable.
BS_CASE_NO	Set the unique project identifier number (MIP Case Number) for the ongoing study.
BS_ZONE	Select the appropriate flood zone type for the ongoing study.
BS_STDYTYP	Select the appropriate study type for the ongoing study.
BS_HYDRO_M	Select the appropriate hydrologic model type being used for the ongoing study.
BS_HYDRO_CMT	Additional comments.
BS_HYDRA_M	Select the appropriate hydraulic model type being used for the ongoing study.
BS_HYDRA_CMT	Additional comments.
BS_FY_FUND	Select the appropriate value for fiscal year funded for the ongoing study.
BS_PRELM_DATE	Update with accurate Preliminary issuance date estimate.
BS_LFD_DATE	Update with accurate LFD issuance date estimate.

3.2.6 S_Studies_Ln FIRM Production Phase Update

Throughout the production phase, it is important that the PRELM_DATE and LFD_DATE fields be kept current. If the exact dates for these fields is unknown users will use 1/1/2049 for the Preliminary date and 1/1/2050 for the LFD date. Should a study scope of work be altered in any way, S_Studies_Ln shall be updated to represent the updated scope using the guidelines in Section 3.2.4. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION_STATUS and STATUS_TYPE values as follows.

Table 3-4: S_Studies_Ln FIRM Production Phase Updates

Validation status - Status Type (Active Study Values)	Validation status - Status Type (De-Scoped Values)
Assessed - Being Studied	Assessed - Deferred
Unknown - Being Studied	Unknown - To Be Assessed
Valid - Being Studied	Valid - NVUE Compliant
Unverified - Being Studied	Unverified - To Be Studied

3.2.7 S_Studies_Ln Preliminary Issuance Phase Update

At Preliminary issuance, all fields attributed through Discovery and Scoping Phase Updates should be checked for accuracy and updated as appropriate. Additionally, where linework in the Preliminary FIRM Database is preferable to (using guidelines established in Section 2.2.5) or of higher quality than linework currently in S_Studies_Ln, the linework in the feature class should be updated, paying strict attention to attribute inheritance within the new line features.

Table 3-5: S_Studies_Ln Preliminary Issuance Phase Updates

Field	Preliminary Issuance Phase Updates
FBS_CMPLNT	Update to indicate FBS compliance of Preliminary studies.
FBS_CHKDT	Date when the FBS audit was performed on the stream. If the report is not dated, use the date the report was delivered to FEMA / Mapping Information Platform or as a last resort the date when the FBS_CMPLNT field was populated.
FBS_CTYPE	Update to reflect FBS compliance check type.
BS_PRELM_DATE	Update with actual Preliminary issuance date.
BS_LFD_DATE	Update with accurate LFD issuance date estimate.

After Preliminary issuance, should it be discovered that the scope of work completed differed in any way from that represented in the polylines, S_Studies_Ln shall be updated to represent the correct scope. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.2.5.

3.2.8 S_Studies_Ln LFD Issuance Phase Update

At LFD issuance, values from the fields populated for scoping and preliminary data will be migrated into the corresponding primary study fields. The Tier classification field will be updated at LFD issuance.

After LFD issuance, should it be discovered that scope of work completed differed in any way from that represented in the linework, S_Studies_Ln shall be updated to represent the correct scope. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.2.5. S_Request_Ar and S_Request_Pt feature classes should also be checked at this time in the new study area to see if any Requests have now been addressed.

Reaches updated by redelineation and digital conversion by the LFD study shall retain existing effective study information as captured by the effective study fields noted in Table 3-6 below. In addition, the STATUS_DATE for all Valid reaches should be restored to the original date.

Table 3-6: S_Studies_Ln LFD Phase Updates

Field	LFD Phase Updates
CASE_NO	This field should inherit the value stored in BS_CASE_NO field.
FLD_ZONE	This field should inherit the value stored in BS_ZONE field.
VALIDATION_STATUS	For reaches representing New or Updated studies, this field shall be set to VALID. For redelineations and digital conversions, this field shall retain its current value.
STATUS_TYPE	For reaches representing New or Updated studies, this field shall be set to 'NVUE COMPLIANT'. For redelineations and digital conversions, this field shall be de-scoped according to Table 3-4.
MILES	Recalculate for any reaches where geometry has been modified.
STATUS_DATE	If reach was Being Studied, set the STATUS_DATE to the actual LFD date. For redelineations and digital conversions, the date should be restored to the last validation date.
FY_FUNDED	This field should inherit the value stored in BS_FY_FUNDED.
REASON	This field should be cleared of all information not pertaining to new effective study.
STUDY_TYPE	This field should inherit the value stored in BS_SDTYTYP.
TIER	Update to reflect Tier category of new effective study.
WSEL_AVAIL	Select the appropriate category of WSEL if applicable.
DPTH_AVAIL	Select the appropriate category of depth grids if applicable.
HYDRO_DATE_EFFCT	This field should be updated to represent the date the hydrology was completed for the reach. For redelineations and digital conversions, this field shall retain its current value.
HYDRO_MDL	This field should inherit the value stored in BS_HYDRO_M. For redelineations and digital conversions, this field shall retain its current value.
HYDRO_MDL_CMT	This field should inherit the value stored in BS_HYDRO_CMT
HYDRA_DATE_EFFCT	This field should be updated to represent the date the hydraulics was completed for the reach. For redelineations and digital conversions, this field shall retain its current value.
HYDRA_MDL	This field should inherit the value stored in BS_HYDRA_M. For redelineations and digital conversions, this field shall retain its current value.
HYDRA_MDL_CMT	This field should inherit the value stored in BS_HYDRA_CMT
TOPO_DATE	Date the topography dataset was collected or completed.
TOPO_SRC	The source of the LiDAR or topography dataset.
C1 through C7	If the reach represents a New or Updated study, this field should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current values.

Field	LFD Phase Updates
S1 through S9	If the reach represents a New or Updated study, this field should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current values.
CE_TOTAL	If the reach represents a New or Updated study, this field should be cleared. For redelineations and digital conversions, this field shall retain its current value.
SE_TOTAL	If the reach represents a New or Updated study, this field should be cleared. For redelineations and digital conversions, this field shall retain its current value.
A1 through A5	If the Reach represents a New or Updated study, these fields should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current values.
BS_CASE_NO	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_ZONE	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_STDYTYP	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_HYDRO_M	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_HYDRO_CMT	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_HYDRA_M	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_HYDRA_CMT	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_FY_FUND	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_PRELM_DATE	This field should be cleared.
BS_LFD_DATE	This field should be cleared.
EC1_UDEF and EC2_UDEF	If the Reach represents a New or Updated study, this field should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current values.
ES1_UDEF through ES4_UDEF	If the Reach represents a New or Updated study, this field should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current values.
E_ELEMDATE	If the Reach represents a New or Updated study, this field should be cleared. For redelineations and digital conversions, this field shall retain its current value.

3.3 S_Studies_Ar Feature Class (Polygon)

The S_Studies_Ar feature class existed in earlier versions of the CNMS data model within the CNMS Studies feature dataset. As of version 5.0 of the CNMS data model, the attributes of this polygon feature class had been moved to the S_Studies_Ln feature class, and all resulting field redundancies removed, thus eliminating the requirement for maintaining 'S_Studies_Ar' within the CNMS database. All validation assessment and evaluation is now performed directly on the lines within S_Studies_Ln. FEMA Regions have the option of maintaining the original 'S_Studies_Ar' feature class within their local CNMS FGDB, however the national version of

CNMS will no longer maintain 'S_Studies_Ar', and it is not a required component of submittals for National roll-up.

3.4 S_Requests Feature Classes (Point/Polygon)

The S_Requests_Ar and S_Request_Pt feature classes reside in the CNMS Requests feature dataset within the CNMS FGDB and are designed to store details concerning update requests from stakeholders. Both feature classes possess the same table structure for data capture and storage, the only schematic difference between them being the name of the primary key fields. For S_Requests_Ar the primary key field is SRA_ID, and for the S_Requests_Pt the primary key field is SRP_ID.

In order to populate the database with either of these record types, a user needs to determine if the community request is better stored as a point or polygon feature. This will vary depending on the specific request type, and the characteristics of the area being identified. Effort should be made to ensure the database populated to the fullest extent practicable, using the comment field to include any additional information that may prove valuable in the future when this request is further analyzed.

3.5 S_Unmapped_Ln (Polyline)

The S_Unmapped_Ln feature class within the CNMS Inventory feature dataset contains linework representing flooding sources that have not been included in the FEMA inventory of studied streams or have not been ASSESSED for new study prioritization. This linework is provided to assist CNMS users in performing scoping calculations, and to serve as an additional source from which to pull linework for population of new studies within S_Studies_Ln. During the Scoping Phase update, users are expected to leverage S_Unmapped_Ln to represent any new funded study that is not represented in S_Studies_Ln. S_Unmapped_Ln and S_Studies_Ln should have no overlap of linework. When removing features from S_Unmapped_Ln for inclusion into S_Studies_Ln, Table 3-7 lists the required attributes of S_Studies_Ln to be populated. When adding new records into S_Unmapped_Ln or removing features from S_Studies_Ln for inclusion into S_Unmapped_Ln, Table 3-8 lists the required attributes of S_Unmapped_Ln to be populated. Refer to tables in Appendix F for complete feature class field descriptions.

Table 3-7: S_Unmapped_Ln to S_Studies_Ln Updates

Field	Description
REACH_ID	Update Reach_ID, coordinate with RSC.
CO_FIPS	Attribute will carry over from S_Unmapped_Ln.
CID	Attribute will carry over from S_Unmapped_Ln.
WTR_NM	Use GNIS_NAME from S_Unmapped_Ln or use local name preference.
FLD_ZONE	Set to "X".
VALIDATION_STATUS	Set to "ASSESSED".
STATUS_TYPE	Set to "BEING STUDIED".
MILES	Attribute will carry over from S_Unmapped_Ln.

SOURCE	Set to "NATIONAL HYDROGRAPHY DATASET MEDIUM RESOLUTION".
STATUS_DATE	Set to current date.
REASON	Add note explaining reason for addition, e.g., “Unmapped mile for BS#18-06-1872S”
HUC8_KEY	Attribute will carry over from S_Unmapped_Ln.
STUDY_TYPE	Set to "UNMAPPED".
TIER	Set to "TIER 0".
WSEL_AVAIL	Select the appropriate category of WSEL if applicable.
DPTH_AVAIL	Select the appropriate category of depth grids if applicable.
BLE	Select the appropriate category of BLE or LSAE if applicable.
BLE_POC	Set the POC_ID to reflect the FEMA contact for the BLE or LSAE if applicable.
BLE_DATE	Set the date of the hydraulic analysis of BLE or LSAE if applicable. If unknown use 1/1/2050.
LINE_TYPE	Set to "RIVERINE".
FBS_CMPLNT	Set to "Unknown".
FBS_CHKDT	Set to current date.
FBS_CTYP	Set to "INDIVIDUAL REACH ATTRIBUTION".
DUPLICATE	Set to "CATEGORY 3".
COMMENT	Attribute will carry over from S_Unmapped_Ln.
BS_CASE_NO	Set the unique project identifier number (MIP Case Number) for the ongoing study.
BS_ZONE	Select the appropriate flood zone type for the ongoing study.
BS_STDYTYP	Set to "NEW or UPDATED APPROXIMATE" or "NEW or UPDATED DETAILED".
BS_HYDRO_M	Select the appropriate hydrologic model type being used for the ongoing study.
BS_HYDRO_CMT	Hydrology model comment, if applicable.
BS_HYDRA_M	Select the appropriate hydraulic model type being used for the ongoing study.
BS_HYDRA_CMT	Hydrologic model comment, if applicable.
BS_FY_FUND	Select the appropriate value for fiscal year funded for the ongoing study.
BS_PRELIM_DATE	Update with accurate Preliminary issuance date estimate, if unknown use 1/1/2049
BS_LFD_DATE	Update with accurate LFD issuance date estimate, if unknown use 1/1/2050

Table 3-8: S_Unmapped_Ln Required Attribute Population

Field	Description
UML_ID	Calculate unique identifier
COMID	Optional if the COMID can be found in NHDPlusV21 (NHD Medium Resolution) dataset
MILES	Calculate miles geometry using North America Albers Equal Area Conic projection
CO_FIPS	Populate the 5-digit County FIPS number
CID	Populate the 6-digit Community Identification number
HUC8_KEY	Populate the 8-digit Hydrologic Unit Code
GNIS_NAME	GNIS name found in NHD
FEDLAND	Split segment if within federal land
TRIBALLAND	Split segment if within tribal land
DA_G_1SQMI	Determine if drainage area at downstream end of reach is 1 or more square miles
COMMENT	Optional

3.6 Specific_Needs_Info (Table)

The 'Specific_Needs_Info' table includes general information that will be associated, via the 'CNMS_ID' attribute, with every record that is entered into the CNMS database if applicable. The nature of the information stored in the 'Specific_Needs_Info' table is intended to capture CNMS record background information.

3.7 County_QC_Status, Coastal_County_QC_Status (Tables)

The 'County_QC_Status' and 'Coastal_County_QC_Status' tables provide a mechanism to track self-certification when using the CNMS FGDB QC Tool described in Appendix J. These tables may be leveraged for county-level QC tracking purposes in the CNMS FGDB.

3.8 Point_of_Contact (Table)

Point of Contact (POC) information is to be populated at the time of updating the CNMS FGDB for associated CNMS Study and Request records, or during the use of the CNMS FGDB QC Tool (Appendix J). The POC information can change at an organizational level over time. A user should not feel obligated to retroactively update all records submitted by the organization if the primary POCs for CNMS updates change. FEMA ensures that any data provided to the agency that is personal in nature such as POC name, will not be distributed and will be considered private. Should a POC be identified, it is suggested that the individual be knowledgeable about the record and be someone who will be accessible by FEMA for follow-up questions or requests for additional information.

3.9 S_Coastal_Ln Feature Class (Polyline)

The S_Coastal_Ln feature class resides in the CNMS Inventory feature dataset. Each feature within S_Coastal_Ln is meant to fully encompass the physical extent of a coastal reach that is regulated by an SFHA under the National Flood Insurance Program (NFIP). The sole line source used in the S_Coastal_Ln feature class is a derivative of the "Coast-Detailed" shapefile developed as part of a 2010 FEMA Coastal Demographics study by Crowel et al. Originally developed in GIS by converting coastal census block group polygons into polylines, this data has been determined to provide a manageable foundation for a national coastline within the coastal framework of CNMS in addition to best complimenting the existing riverine portion of the CNMS Inventory. The "Coast-Detailed" data set also provides representative coastline coverage for all coastal study transects. The original "Coast-Detailed" shapefile required some updates to include representative coastline segments of U.S. territories and islands (Puerto Rico, U.S. Virgin Islands, Guam, American Samoa, and N. Mariana Islands). Additional minor updates to the original "Coast-Detailed" line source were required to more completely reflect the inventory of counties with coastal studies and coastal transect locations. These updates included a few counties along the east coast, gulf coast, and Pacific Northwest. The data set provides the single representation of the national coastline for purposes of the CNMS Inventory.

Each coastal reach within the S_Coastal_Ln feature class contains a unique CREACH_ID value; this is analogous to the unique REACH_ID values within S_Studies_Ln for riverine features. While a coastal study may involve various hazard analysis methods, identification of

the fact that the analysis was performed as a single coastal study is served by the CSTUDY_ID attribute. A single coastal study may be composed of multiple coastal reaches, each having unique CREACH_ID values and a single CSTUDY_ID value. This is similar to the relationship between REACH_ID and STUDY_ID for riverine features.

With the release of this November 2016 version of the CNMS schema, the S_Coastal_Ln feature class has been populated to reflect ongoing studies funded during Risk MAP (or just prior, as is the case for a handful of counties). These studies represent FEMA's commitment to update studies for the entire populated coastline during Risk MAP. Funding during Risk MAP resulted in all coastal linework within a populated county being set to VALID, as a bulk decision, with attributes of the ongoing study stored in the 'BEING STUDIED' (i.e. BS_xxx) fields.

Sections 3.9.1 through 3.9.5 outlines the updates required for the S_Coastal_Ln feature at various Risk MAP phases. Validation assessment procedures for coastal studies are provided in Appendix D.

3.9.1 S_Coastal_Ln Discovery Phase Updates

For Discovery Phase of a project, S_Coastal_Ln study attributes and validation status will be reviewed. The collection of new community input in the form of CNMS Requests will be added to S_Requests_Ar or S_Requests_Pt features. Additionally, comments received during Discovery may provide information about existing studies that could potentially update the validation elements of a coastal reach (example: significant storm events, changes to coastal structures, repetitive loss patterns outside the SFHA, etc.).

3.9.2 S_Coastal_Ln Scoping Phase Updates

When project scope has been funded and specific coastal study reaches have been identified, the following fields within S_Coastal_Ln will need to be updated as indicated. It is assumed that any fields not listed here should be updated by the user if more accurate data is available. If the exact Preliminary and LFD dates are unknown users will use 1/1/2049 for the Preliminary date and 1/1/2050 for the LFD date.

Reaches scoped for redelineation or digital conversion are to be updated as BEING STUDIED with all scoping fields populated except for BS_SRGMODL through BS_WVDL In addition, if the scoped reach is Valid, a note should be added to the REASON field indicating "Reach set to Valid on [existing Status Date]", so that this date may be restored at the time of LFD update for the study.

Table 3-9: S_Coastal_Ln Scoping Phase Updates

Field	Scoping Phase Updates
CREACH_ID	Update CReach_ID any time on affected features any time a Reach is split.
CSTUDY_ID	If applicable, update CStudy_ID to reflect intended cardinality.
CSTAT_TYPE	Shall be updated to 'BEING STUDIED' for all scoped Reaches.
MILES	Recalculate for any Reaches where geometry has been modified.
STATUS_DATE	Set the STATUS_DATE to the current date, which should be the date the other fields were reassigned as

Field	Scoping Phase Updates
	well.
REASON	If reach is VALD, add note "Reach set to VALID on [existing STATUS_DATE]"
WSEL_AVAIL	Select the appropriate category of WSEL if applicable.
DPTH_AVAIL	Select the appropriate category of depth grids if applicable.
BS_CASE_NO	Set the unique project identifier number (MIP Case Number) for the ongoing study.
BS_STDYTYP	Select the appropriate study type for the ongoing study.
BS_SRGMODL	Select the appropriate surge model for the ongoing study.
BS_STATMETH	Select the appropriate surge statistical method for the ongoing study.
BS_SRG2DW	Select if surge model is coupled with 2-D wave analysis for the ongoing study.
BS_SUPMETH	Select the appropriate setup method for the ongoing study when a 2-D model is not run.
BS_RUPMODL	Select the appropriate Runup model for the ongoing study.
BS_ERSMETH	Select the appropriate Erosion method for the ongoing study.
BS_OVLDMDL	Select the appropriate overland wave model for the ongoing study.
BS_WVMDL	Select the appropriate wave model for the ongoing study.
BS_FY_FUND	Select the appropriate value for fiscal year funded for the ongoing study.
BS_PRELM_DATE	Update with accurate Preliminary issuance date estimate.
BS_LFD_DATE	Update with accurate LFD issuance date estimate.

3.9.3 S_Coastal_Ln FIRM Production Phase Update

Throughout the production phase, it is important that the PRELM_DATE and LFD_DATE fields be kept current. Should scope of work be altered in any way, S_Coastal_Ln shall be updated to represent the updated scope, using the guidelines in Section 3.9.2. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION_STATUS and STATUS_TYPE values as follows.

Table 3-10: S_Coastal_Ln FIRM Production Phase Updates

Validation status - Status Type (Active Study Values)	Validation status - Status Type (De-Scoped Values)
Assessed - Being Studied	Assessed - Deferred
Unknown - Being Studied	Unknown - To Be Assessed
Valid - Being Studied	Valid - NVUE Compliant
Unverified - Being Studied	Unverified - To Be Studied

3.9.4 S_Coastal_Ln Preliminary Issuance Phase Update

At Preliminary issuance, all fields attributed through Discovery and Scoping Phase Updates should be checked for accuracy and updated as appropriate.

In situations where new regulatory products were not created for portions of a county as a result of the restudy, features in S_Coastal_Ln should be split to differentiate between coastlines where new regulatory products were issued as a result of the restudy and where they were not.

Any data in the 'BEING STUDIED' fields will be cleared for any lines representing coast where new regulatory products were not issued, and additional research will be conducted to populate the standard attribute fields of these lines based on the effective study. The VALID bulk decision will remain even for such stretches of coast.

Table 3-11: S_Coastal_Ln Preliminary Issuance Phase Updates

Field	Preliminary Issuance Phase Updates
FBS_CMPLNT	Update to indicate FBS compliance of Preliminary studies.
FBS_CHKDT	Date when the FBS audit was performed on the stream. If the report is not dated, use the date the report was delivered to FEMA / Mapping Information Platform or as a last resort the date when the FBS_CMPLNT field was populated.
FBS_CTYPE	Update to reflect FBS compliance check type.
BS_PRELM_DATE	Update with actual Preliminary issuance date.
BS_LFD_DATE	Update with accurate LFD issuance date estimate.

After Preliminary issuance, should it be discovered that scope of work had differed in any way from that represented in the polylines; S_Coastal_Ln attributes shall be updated to represent the correct scope. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.9.3.

3.9.5 S_Coastal_Ln LFD Issuance Phase Update

At LFD issuance, values from the 'BEING STUDIED' fields populated for scoping and preliminary data will be migrated into the corresponding primary study fields.

After LFD issuance, should it be discovered that scope of work had differed in any way from that represented in the linework, S_Coastal_Ln shall be updated to represent the correct scope. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.9.3.

Reaches updated by redelineation and digital conversion by the LFD study shall retain existing effective study information as captured by the effective study fields noted in Table 3-12 below. In addition, the STATUS_DATE for all Valid reaches should be restored to the original date.

Table 3-12: S_Coastal_Ln LFD Phase Updates

Field	LFD Phase Updates
CASE_NO	This field should inherit the value stored in BS_CASE_NO field.
CVALIDATION	For Reaches representing New or Updated studies, this field shall be set to VALID. For redelineations and digital conversions, this field shall retain its current value.
CSTAT_TYPE	For Reaches representing New or Updated studies, this field shall be set to 'NVUE COMPLIANT". For redelineations and digital conversions, this field shall be de-scoped according to Table 3-10.
MILES	Recalculate for any Reaches where geometry has been modified.
STATUS_DATE	If reach was Being Studied, set the STATUS_DATE to the actual LFD date. For redelineations and digital conversions, the date should be restored to the last validation date.

Field	LFD Phase Updates
FY_FUNDED	This field should inherit the value stored in BS_FY_FUNDED.
STUDY_TYPE	This field should inherit the value stored in BS_SDTYTYP.
REASON	This field should be cleared of all information not pertaining to new effective study.
TIER	Update to reflect Tier category of new effective study.
WSEL_AVAIL	Select the appropriate category of WSEL if applicable.
DPTH_AVAIL	Select the appropriate category of depth grids if applicable.
DATE_EFFCT	This field should be updated to represent the date the analysis was completed for the Reach. For redelineations and digital conversions, this field shall retain its current value.
SURGE_MDL	This field should inherit the value stored in BS_SRGMODL. For redelineations and digital conversions, this field shall retain its current value.
STAT_METH	This field should inherit the value stored in BS_STATMETH. For redelineations and digital conversions, this field shall retain its current value.
SURGE2DW	This field should inherit the value stored in BS_SRG2DW. For redelineations and digital conversions, this field shall retain its current value.
SETUP_METH	This field should inherit the value stored in BS_SUPMETH. For redelineations and digital conversions, this field shall retain its current value.
RUNUP_MDL	This field should inherit the value stored in BS_RUPMODL. For redelineations and digital conversions, this field shall retain its current value.
EROS_METH	This field should inherit the value stored in BS_ERSMETH. For redelineations and digital conversions, this field shall retain its current value.
OVWAVE_MDL	This field should inherit the value stored in BS_OVLDMDL. For redelineations and digital conversions, this field shall retain its current value.
WAVE_MDL	This field should inherit the value stored in BS_WVMDL. For redelineations and digital conversions, this field shall retain its current value.
TOPO_DATE	Date the topography dataset was collected or completed.
TOPO_SRC	The source of the LiDAR or topography dataset.
BATHY_DATE	Date the bathymetry dataset was collected or completed.
BATHY_SRC	The source of the bathymetry dataset.
C_C1 through C_C7	If the Reach represents a New or Updated study, these field should be cleared. For redelineations and digital conversions, these fields shall retain their current value.
C_S1 through C_S6	If the Reach represents a New or Updated study, these field should be cleared. For redelineations and digital conversions, these fields shall retain their current value.
C_CE_TOTAL	If the Reach represents a New or Updated study, the values in this field should be cleared. For redelineations and digital conversions, this field shall retain its current value.
C_SE_TOTAL	If the Reach represents a New or Updated study, this field should be cleared. For redelineations and digital conversions, this field shall retain its current value.
BS_CASE_NO	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_STDYTYP	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_SRGMODL	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_STATMETH	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_SRG2DW	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_SUPMETH	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_RUPMODL	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_ERSMETH	After this value has been migrated to the corresponding effective study field, this field should be cleared.

Field	LFD Phase Updates
BS_OVLDMDL	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_WVMDL	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_FY_FUND	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_PRELM_DATE	This field should be cleared.
BS_LFD_DATE	This field should be cleared.
EC1_UDEF and EC2_UDEF	This field should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current value.
ES1_UDEF through ES4_UDEF	This field should be cleared, as well as associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields shall retain their current value.
E_ELEMDATE	This field should be cleared. For redelineations and digital conversions, this field shall retain its current value.

Appendix A. Validation Assessment Procedures

The validation assessment procedures and checklists outline the information that must be captured to document a condition assessment as being a VALID or UNVERIFIED flood study. Any UNVERIFIED flood study, or the existence of a CNMS Request Record, will warrant a review for inclusion in the map production planning process. For existing floodplain studies, this review will be triggered when the minimum number of critical or secondary change characteristics has been determined to mark the study as having an UNVERIFIED Validation Status.

Just as the individual physical, climatological, and engineering (PCE) change characteristics to be considered when evaluating a flood study differ between coastal and riverine flood studies, so does the threshold for number of critical and secondary changes required for a study to be determined VALID or UNVERIFIED. Table A-1 indicates the number of critical and secondary elements for riverine and coastal studies to trigger an UNVERIFIED status.

Table A-1: Critical and Secondary Change Element Thresholds

Study Type	Elements
Riverine – Detailed Studies (and other non-coastal flood sources)	1 critical element or 4 secondary elements
Riverine – Approximate Studies	1 critical element. All Zone A assessments (A1-A5) are critical elements.
Coastal	1 critical element or 3 secondary elements

While the thresholds in Table A-1 provide a minimum standard, flexibility is allowed in cases where severe secondary change conditions exist. In these situations, secondary change conditions can be elevated and considered critical when risk to life-safety and/or building stock dictates. The decision to elevate a secondary change condition to critical is subjective and the responsibility for doing so rests solely with those making decisions on map update investments. User defined critical and secondary elements can be defined for capturing non-standard issue types. Such user defined elements should be leveraged with permission from the respective FEMA Regional Office.

In summary:

- A floodplain study is assigned a VALID Validation Status if zero critical and fewer than the minimum number of secondary change conditions shown in Table A-1 have been flagged.
- A floodplain study is assigned the UNVERIFIED Validation Status if it has at least one critical change condition flagged, or if a number of secondary change conditions equal to or greater than the minimum number shown in Table A-1 have been flagged.
- When a CNMS study record is checked out for evaluation, or when a CNMS evaluation is planned or in queue, the Status Type is set to BEING ASSESSED.

- If a detailed evaluation based on the Validation Checklist does not lead to a definitive determination of the validity, the UNKNOWN Validation Status is applied to the study.
- If there is a need for re-visiting the validation process as a result of statutory requirements or availability of new data, the Validation Status for all affected studies will be toggled to UNKNOWN. This review process is also triggered 5 years after the initial determination of the Validation Status when the evaluation is considered outdated. Such studies are queued up for a CNMS evaluation based on current conditions.
- If a flooding source centerline in an unmapped area is considered for a new study, a Validation Status of ASSESSED is assigned to indicate that the stream has been assessed for a new study. The outcome of such consideration may be that resources are allocated in the current or future FY, or that the request for new study has been deferred.

The flow chart diagram included in Appendix G is a graphical overview of the study flow process including decision trees that result in one of the four Validation Status classifications. Within the CNMS data model, each of these four Validation Status classes is further categorized by different Status Types. Status Types are tracked using the STATUS_TYPE field in the CNMS data model. Table A-2 summarizes the different Status Types for each of the four possible Validation Status scenarios. Each possible Validation Status and Status Type is further described below.

A.1. UNKNOWN Validation Status

CNMS Study Records are initially given the Validation Status of UNKNOWN and status type of TO BE ASSESSED when the FEMA Regional Office has not yet evaluated the CNMS Study Record to provide input on either deferring or performing a CNMS evaluation. A BEING ASSESSED status type is assigned when Regional allocation to fund CNMS evaluation is established. The UNKNOWN Validation Status may also have a DEFERRED status type where the validity remains unknown after an evaluation or the Region has determined the study to be low priority and CNMS evaluation is deferred. The option to defer an assessment for 5 years must be held to a minimum and requires discussion with FEMA Headquarters during each FY production planning process.

A.2. UNVERIFIED Validation Status

CNMS Study Records categorized as UNVERIFIED may have one of two status types depending upon whether resources can be allocated for a restudy in the current or future fiscal year. UNVERIFIED studies currently being studied or that has been allocated funding for the current fiscal year are given the status type BEING STUDIED. UNVERIFIED studies that need to be addressed and are planned for a future FY will have the status type as TO BE STUDIED.

A.3. VALID Validation Status

CNMS Study Records are categorized as VALID when a new or updated study is performed, or stream/coastline reach level validation was completed, and the study validation checklist flags zero critical and less than the minimum number of secondary elements shown in Table A-1.

These records will have the status type NVUE COMPLIANT and be monitored for re-evaluation every five years. When the five-year validation assessment is underway, these records can be assigned the status type of BEING ASSESSED. Unless validation assessment is underway (BEING ASSESSED), all flood sources classified as VALID will be reclassified as UNKNOWN with a Status Type of TO BE ASSESSED after five years.

A.4. ASSESSED Validation Status

The ASSESSED Validation Status is for unmapped flood sources that have been added into the CNMS Inventory. The status type assigned to these flood sources depends upon if or when funding will be allocated by FEMA to conduct a study. Unmapped flood sources that are currently being studied or planned for the current FY will be assigned BEING STUDIED status type. Unmapped flood sources with studies planned for a future FY will be assigned a status type of TO BE STUDIED. Finally, unmapped flood sources that the Region determines should not be studied will be assigned the status type DEFERRED.

Table A-2: Validation Status Type Descriptions

Validation Status	Status Type	Description
UNKNOWN	TO BE ASSESSED	Requires Regional input to either defer or perform a CNMS stream/coastline reach level validation.
	BEING ASSESSED	Studies currently being assessed per CNMS stream/coastline reach level validation described in this document.
	DEFERRED	Areas that will not be evaluated per CNMS stream/coastline reach level validation. Typically low risk areas. These reaches will be reconsidered in five years.
	BEING STUDIED	Studies that are currently being studied or have been allocated funding for the current FY captured during the Discovery process.
UNVERIFIED	TO BE STUDIED	Studies that need to be studied and are planned for a future FY.
	BEING STUDIED	Studies are currently being studied or have been allocated funding for the current FY captured during the Discovery process.
VALID	NVUE COMPLIANT	New study performed or study passes stream/coastline reach level validation.
	BEING ASSESSED	Studies currently being assessed per CNMS stream/coastline reach level validation.
	BEING STUDIED	Studies that are currently underway or have been allocated funding for the current FY captured during the Discovery process.
ASSESSED	TO BE STUDIED	Unmapped flood sources prioritized to be mapped with an SFHA.
	BEING STUDIED	Unmapped flood sources that are currently being studied or have been allocated funding for the current FY.
	DEFERRED	Unmapped flood sources investigated to be mapped with an SFHA, but analysis resulted in low priority study.

Specific validation assessment checklists and instructions are provided for detailed studies in Appendix B, Zone A studies in Appendix C, and coastal studies in Appendix D.

Some examples of conditions that users might identify and enter into CNMS, after passing them through the validation assessment procedures, include the following:

- Flood zones that have been affected by development since the date of the effective FIRM
- Inadequate flood hazard engineering data in areas with planned development/anticipated growth (i.e., areas that currently reflect approximate flood hazard analyses yet have been slated for upgraded analyses given flood hazard data validation efforts)

Study reaches requiring restudy because the methodologies used do not produce results that comply with quality standards.

Validation process documentation is necessary to ensure that the flooding source being evaluated has a record of the criteria evaluated, and the data used in the evaluation of those criteria. As of the November 2016 update to the CNMS Technical Reference, newly added Comment, Source, and URL fields for every validation element in S_Studies_Ln and S_Coastal_Ln have been created to replace the former external Validation Process Documentation Checksheet (Formerly Appendix B). These fields allow documenting validation assessment decisions and methods directly into each study record in the CNMS database.

Validation process documentation within the Comment, Source, and URL fields for each element will be referred to if FEMA ever has questions about the validity of methods used to evaluate criteria. Information populated in these fields should describe how the criteria were evaluated along with a list of the source and location of the data used in that evaluation. Source data should be documented outlining originator, location (URL, local drives), digital availability, and whether it can be shared or distributed. Data that has been processed such that it cannot be recreated in a reasonable amount of time from source data, or was manipulated once obtained from source, should be stored by its creator.

The need of the user to maintain records is important as the deliverable is subject to scrutiny. The first query under any scrutiny will be on the Comment, Source, and URL entries used for the flooding source. Entries in these fields should answer most, if not all, questions in regard to the decisions that went into the evaluation of the flooding source and its criteria. In extreme circumstances, a second query will be to provide either the unmodified source data evaluated, or the modified data in cases where the source data was manipulated.

Appendix B. Detailed Study Validation Assessment

Table B-1 outlines the checklist elements and background information required for conducting validation assessment of detailed studies stored in S_Studies_Ln.

Table B-1: Riverine Validation Checklist for Detailed Studies

Background Information
Name of Flooding Source:
Date of Effective Analysis: • Determine from effective FIS the most recent date engineering for a flood hazard was updated. This is the date of the underlying engineering of the effective FIRM.
Hydrologic Model Used: • Determine from effective FIS or other source the model (or method) used in the effective engineering.
Hydraulic Model Used and version (if applicable): • Determine from effective FIS or other source model (or method) used in the effective engineering.
Are the models in digital format? If so, can you run the model? • Determine whether the models are in digital format, and if they can be run. • It is suggested that the location of the model be recorded with a description of the amount of effort it will take to prepare the model for a run.
Changes in Physical, Climate, and Engineering Methodologies since Date of Effective Analysis
Critical Elements
(C1) Major change in gage record since effective analysis that includes major flood events • Determine if USGS gage is on stream. • If yes, record the gage Site No. and Site Name from the gages shapefile (add record in external table joined to CNMS database via REACH_ID as necessary). • Determine if a major flood event equal to or greater than the published 1-percent-annual-chance event has occurred since the effective date of the hydro analysis. If yes, this Critical Element set to ”FAIL” and you don’t have to further evaluate gage records.
(C2) Updated and effective peak discharges differ significantly based on confidence limits criteria in FEMA’s G&S • Determine if USGS gage is on stream. • If yes, record the gage Site No. and Site Name from the gages shapefile (add record in external table joined to CNMS database via REACH_ID as necessary). • Compare years of record from effective FIS to years of record now available. • If newer records are available for gage, record the gage Site No. and Site Name as above. • Determine if 100-yr discharge obtained by running PeakFQ at effective date is still within 68% confidence interval of the Bulletin 17B 100-yr estimate using updated gage data and PeakFQ. If not, Critical Element is set to “FAIL”.
(C3) Model methodology no longer appropriate based on Guidelines and Specifications (i.e. one-dimensional vs. two-dimensional modeling; Coastal Guidelines) • This element scrutinizes underlying model methods, rather than modeling software or versions of software. • If effective model methodology is found inappropriate based upon G&S, Critical Element is set to “FAIL”.
(C4) Addition/removal of a major flood control structure • Determine if dam or reservoir, has been added or removed since the effective analysis. • Determine if new/removed levee or seawall, has occurred since the effective analysis. • Determine if levee or seawall’s current accreditation status is reflected in the effective analysis.

Critical Elements (continued)
(C5) Current channel reconfiguration outside effective SFHA • Compare extents of effective SFHA with channel as shown on latest available aerial imagery. • If channel reconfiguration has occurred, Critical Element is set to “FAIL”. • Some instances of channel outside of SFHA may be minor natural occurrences, and categorized as requests for mapping updates.
(C6) Five or more new or removed hydraulic structures (bridge/culvert) that impact BFEs • Compare effective mapping and profile to latest available imagery and GIS data. • If five or more new or removed hydraulic structures exist along reach, Critical Element is set to “FAIL”.
(C7) Significant channel fill or scour • If hydraulically significant fill or scour occurs along stream reach, Critical Element is set to "FAIL".
Secondary Elements
(S1) Use of rural regression equations in urbanized areas • Determine if rural regression equations were used in an urbanized basin, or if land use has changed from rural to urban since the effective analysis.
(S2) Repetitive losses outside the SFHA • If repetitive loss data is available/accessible, overlay Repetitive Loss spatial dataset with SFHA. • If there are any structures outside of the SFHA for that reach, then you have Repetitive Loss outside of SFHA. • Instances of repetitive losses caused by local drainage issues, rather than the subject flooding source should not be considered.
(S3) Increase in impervious area in the sub-basin of more than 50 percent (i.e., 10 percent to 15 percent, 20 percent to 30 percent, etc.) • Determine increase of impervious area that has occurred since the effective analysis. • If impervious area has increased by 50% or more, Secondary Element is set to “FAIL”. • Consider also meeting minimum impervious threshold to fail element. Consult state’s regression equations.
(S4) One to four new or removed hydraulic structure (bridge/culvert) that impact BFEs • Compare effective mapping and profile to latest available imagery and GIS data. • If one to four new or removed hydraulic structures exist along reach, Secondary Element is set to “FAIL”.
(S5) Channel improvements / Channel outside effective floodway • Determine whether channel improvements have occurred since the effective analysis. This can consist of straightening, rerouting, concrete lining, rip-rap. • Determine if there are sections of channel significantly outside the effective floodway but still within the SFHA
(S6) Availability of better topography/bathymetry • Determine if topo with better resolution and/or being newer than topo used for study exists. • When assessing for redelineated streams, account for topo used during redelineation.
(S7) Changes to vegetation or land use • Determine whether significant vegetation or land use changes have occurred in the drainage area since the effective analysis. • Possible sources include USGS NLCD datasets and any datasets showing large scale land use changes.
(S8) Significant storms with High Water Marks • Determine if HWMs have been recorded on flooding source since the effective analysis.
(S9) New regression equations • If regression equations were used in the effective analysis and new equations now exist, set the Secondary Element to “FAIL”.

Appendix C. Zone A Study Validation Assessment

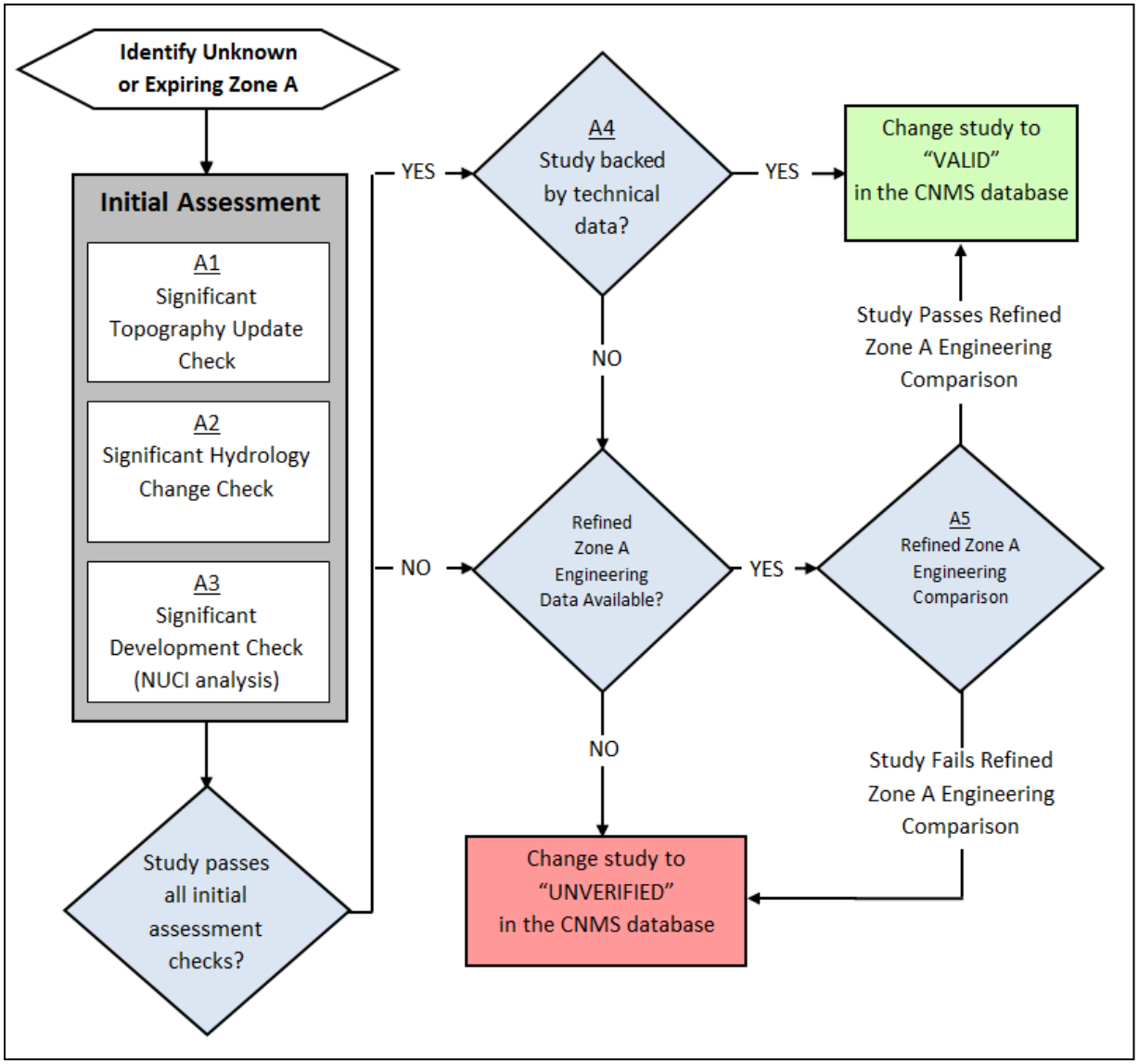
The procedures for evaluating the validity of both model-backed and non-model-backed studies of Zone A flood hazards are presented and described in the sections below.

The Zone A validation process begins with an assessment of three checks (A1-A3) which serve as an initial screening to efficiently categorize some Zone A studies as “Valid” or “Unverified” in the CNMS Inventory. Additional assessments include checking if the effective Zone A study is backed by technical data (A4) and the comparison of the effective Zone A study against a Refined Zone A Engineering study (A5). For the purposes of these Zone A validation assessment procedures, either Large Scale Automated Engineering (LSAE) or Base Level Engineering (BLE) are appropriate sources for a Refined Zone A Engineering study. For regulatory FIRM production work, only Base Level Engineering would be appropriate. As depicted in Figure C-1, the initial assessment checks will result in one of the steps listed below.

1. If the effective Zone A study fails one or more initial assessment checks, then:
    a. Proceed with a Refined Zone A Engineering comparison for further evaluation if such data is available, OR
    b. Categorize the study as “Unverified” in the CNMS inventory if no Refined Zone A Engineering data is available.
2. If the effective Zone A study passes all initial assessment checks and the study is backed by technical data, then:
    a. Categorize the study as “Valid” in the CNMS inventory.
3. If the effective Zone A study passes all initial assessment checks but no technical data backing exists, then:
    a. Proceed with a Refined Zone A Engineering comparison for further evaluation if such data is available, OR
    b. Categorize the study as “Unverified” in the CNMS inventory if no Refined Zone A Engineering data is available.

The initial assessment checks, technical data criteria and Refined Zone A Engineering comparison methods are described in the following sections.

Figure C-1: Validation Procedure for Zone A Studies



The initial assessment checks and all procedures in Figure C-1 are only for Zone A studies (Zone A). These checks do not apply to detailed studies, which must comply with Zone AE validation criteria (16 elements), as described in Appendix B.

C.1. Check for Significant Topography Updates

This check involves determining whether a topographic data source is available that is significantly better than what was used for the effective Zone A modeling and mapping. To conduct this check, a new topographic data source for the study area of the effective Zone A must be available that meets or exceeds the requirements for vertical accuracy described in FEMA Standard ID (SID) 43. These requirements are illustrated in Table C-1. For complete

definitions of Fundamental Vertical Accuracy (FVA) and Consolidated Vertical Accuracy (CVA), refer to SID 43.

Table C-1: SID 43 – Vertical Accuracy Requirements

Level of Flood Risk	Typical Slopes	Specification Level	Vertical Accuracy: 95% Confidence Level FVA/CVA	LiDAR Nominal Pulse Spacing (NPS)
High (Deciles 1,2,3)	Flattest	Highest	24.5 cm / 36.3 cm	≤ 2 meters
High (Deciles 1,2,3)	Rolling or Hilly	High	49.0 cm / 72.6 cm	≤ 2 meters
High (Deciles 2,3,4,5)	Hilly	Medium	98.0 cm / 145 cm	≤ 3.5 meters
Medium (Deciles 3,4,5,6,7)	Flattest	High	49.0 cm / 72.6 cm	≤ 2 meters
Medium (Deciles 3,4,5,6,7)	Rolling	Medium	98.0 cm / 145 cm	≤ 3.5 meters
Medium (Deciles 3,4,5,6,7)	Hilly	Low	147 cm / 218 cm	≤ 5 meters
Low (Deciles 7,8,9,10)	All	Low	147 cm / 218 cm	≤ 5 meters

Zone A studies fail this check if the topographic data used for the effective study does not meet the specifications in SID 43 AND new topographic data is available for the study area that meets or exceeds the SID 43 requirements. If both the effective and the new topographic sources meet the SID 43 requirements, then the effective Zone A study may pass this check.

Data required:

- Streamline from the effective Zone A CNMS inventory (used for documenting results of this assessment): Record or estimation of the topographic data source used for the effective Zone A study.

National Digital Elevation Program status polygon: Consideration of local sources for new topography meeting the SID 43 requirements is encouraged but may be cost prohibitive for some Regions.

C.2. Check for Significant Hydrology Changes

This check involves first determining whether new regression equations have become available from the USGS since the date of the effective Zone A study. If newer regression equations exist for the area of interest, then an engineer must determine whether these regression equations would significantly affect the “1-percent-minus” annual chance flow. The determination of significance can be made by contacting the local USGS Field Office. For example, if a new regression equation was revised solely because of StreamStats compatibility, then the change may not be significant enough to affect flow. However, communication with the local USGS Field Office is important, as some regions of the United States suggest that there may be a +/-30% change between StreamStats and the previous regression equations. If the results of communicating with the USGS are inconclusive, some suggested approaches for determining significance are provided below.

Method 1:

1. Using the old regression equation, the range of acceptable values for the various parameters is used to determine both the maximum and minimum discharges for a representative sub-basin.
2. Using the new regression equation for a representative sub-basin, the maximum and minimum discharges are determined by using the range of acceptable values for the various parameters that are used to determine the maximum discharges for a representative sub-basin.
3. The standard error in the old equation is determined based on documentation.
4. The maximum discharges calculated in steps 1 and 2 are compared, and the minimum discharges calculated in steps 1 and 2 are compared. If the comparisons show that the new discharges are outside the standard error of the old equations, then the equations are significantly different.

Method 2:

If newer regression equations exist, another way to test for significance is to determine whether predictions from the new regression equations fall outside the standard error of the estimates in the original equations. To reduce costs, this may be checked on a county basis, rather than a stream segment basis. In general, if newer equations produce discharges different enough from the original equations to make the results invalid, the problem is more likely to be a basin-wide problem rather than a stream-segment by stream-segment issue.

A check at the basin level may be accomplished by establishing discharges using the new equations at a sample of sites, rather than at all stream segments, through the following process:

- Find parameters of interest in the latest version of the regression equations (e.g., drainage area, stream slope, basin elevation).
- Establish the “1-percent-minus” annual-chance flood event discharge using these parameters for extreme cases (e.g., largest and smallest drainage areas, steepest and mildest slope).
- Establish the acceptable range of effective “1-percent-minus” annual-chance flood event discharges from error estimates provided in USGS reports for the original equations and determine whether the hydrology remains valid.
- Assume that if the “1-percent-minus” annual-chance flood event discharges are acceptable at the extremes, they will be acceptable between extremes.

Designate Zone A hydrology for all stream reaches in the basin as acceptable or not on this basis. (This is not 100% foolproof; if the “1-percent-minus” annual-chance flood event discharges are unacceptable at the extremes, there is still a minimal chance that some will be acceptable away from the extremes.)

Data required:

- Stream line for the effective Zone A CNMS inventory (used for documenting the results of this assessment)
- Date (actual or estimated) of the effective Zone A study

List of the most recent USGS regression equations and effective dates

C.3. Check for Significant Development in the Watershed

This check involves using the National Urban Change Indicator (NUCI) dataset to assess increased urbanization in the watershed of the Zone A study. If the percentage of urban area within the HUC-12 watershed containing the effective Zone A study is 15% or more and has increased by 50% or more since the effective analysis, the study would fail this check. Although the NUCI data provide year-to-year change in urbanization, the NLCD is also needed to establish a baseline of urban land cover for this analysis.

Data required:

- Stream line for effective Zone A CNMS inventory (used for documenting result of this assessment)
- NUCI data
- NLCD

C.4. Check of Studies Backed by Technical Data

Zone A studies that passed all initial assessment checks described above may be categorized as “Valid” in the CNMS Inventory only if the effective Zone A study is supported by modeling or sound engineering judgment and all regulatory products are in agreement. If technical backing aside from model-based data is determined to be sufficient for this check, it should be documented within the CNMS database and summarized in the deliverable report to FEMA for this assessment.

If the effective Zone A study passed all initial assessment checks but is not supported by modeling or if the original engineering method used is unsupported or undocumented, the Refined Zone A Engineering comparison described in Section C.5 should be performed.

Alternatively, if Refined Zone A Engineering data are unavailable and the effective Zone A study passed all initial assessment checks but is not supported by modeling or if the original engineering method used is unsupported or undocumented, then the study may be categorized as “Unverified” in the CNMS inventory.

C.5. Comparison of Refined Zone A Engineering and Effective Zone A

When all other initial Zone A validation checks have been conducted as described in previous sections, Zone A studies may need to be compared to Refined Zone A Engineering results to determine their validation status. For the purposes of these validation assessment procedures,

either Large Scale Automated Engineering (LSAE) or Base Level Engineering (BLE) are appropriate sources for a Refined Zone A Engineering study. The comparison methods described here presumes that the effective Zone A study is of a typical riverine geography and does not include significant areas of ponding, alluvial fans or excessively flat terrain.

There are two alternative comparison methods that can be used for Zone A validation assessment, the “basic method” and “width-based method.” Either one approach or the other should be used for an entire study, one should not alternate between the approaches (unless the study is a mix of 1D and 2D models, then it is permissible to use the width-based method for all the 1D models and the basic method for the 2D models). The basic method is simpler, but will tend to lead to lower passing rates for wider reaches. The width-based method is more complex, and can only be used for 1D models.

Both Refined Zone A Engineering/effective Zone A comparison methods utilize some of the concepts of the existing Floodplain Boundary Standard (FBS) certification procedures described in FEMA SID 113 but is independent of that procedure. This comparison approach uses the “1-percent-plus” and “1-percent-minus” flood profiles data inputs described below.

Data Inputs (required for both methods):

- LSAE/BLE cross section GIS layer attributed with the “1-percent-plus” water surface elevation (WSE), or a water surface raster or TIN interpolated from the “1-percent-plus” cross-sections, or a water surface raster or TIN created otherwise from model results.
- LSAE/BLE cross section GIS layer attributed with the “1-percent-minus” WSEL, or a water surface raster or TIN interpolated from the “1-percent-plus” cross-sections, or a water surface raster or TIN created otherwise from model results.
- Effective Zone A floodplain boundary
- LSAE/BLE topographic data

Vertical tolerance—one-half contour interval of the USGS 24K quadrangle. For example if the contour interval on the quadrangle is 20 feet, the vertical tolerance is 10 feet in the region of that quadrangle.

Validation Using the Basic Method

Steps required for the basic approach are all prefixed with a “B”, and are listed below. Note that steps B1 and B2 are similar to the first steps in the width-based approach, which is explained in Section C.5:

B1. Obtain sampling points on the Effective Zone A floodplain boundary. Each sampling point will require new topography in the vicinity of each point, as well as corresponding water surface elevations from the “1-percent-plus” and “1-percent-minus” models. The sample points and the water surface elevations can be obtained by using one of the following methods:

a. The sampling points can be obtained by utilizing the cross-sections of the LSAE/BLE "1-percent-plus"/"1-percent-minus" hydraulic models. Cross-sections must be identical between the two models if this approach is used. The sampling points would be the intersection of the effective floodplain boundary and the LSAE/BLE cross-sections. If the LSAE/BLE cross-sections do not extend far enough to reach the effective floodplain boundary, they should be extended. The sampling points should be taken only in places where the effective floodplain boundary corresponds to the same flooding source as the model of the LSAE/BLE cross-sections. Note that if a cross-section is in the backwater of another reach, then the higher backwater elevation from the other reach should be used instead of modeled water surface elevation assigned to the cross-section itself.

b. Sampling points may be obtained from evenly spaced points around the boundary of the effective floodplain (both exterior and interior boundaries, e.g. islands). The points will be spaced at a maximum of 200 feet apart but can be closer. The LSAE/BLE "1-percent-plus" and "1-percent-minus" minus water surface elevations are then assigned to the point by using an interpolated water surface elevation from the LSAE/BLE models, either at the point itself (from interpolated or otherwise modeled water surface features) or optionally, if the point is outside one or both of the LSAE/BLE floodplains, from a nearby representative point when an interpolated water surface is available, and which corresponds to approximately the same river station as the sampling point.

B2. Check if "1-percent-plus" WSE >= "1-percent-minus" WSE. In very rare cases this might not be true. In these rare cases, switch the two water surface elevations: always use the higher WSE when the "1-percent-plus" WSE is referenced, and use the lower WSE when the "1-percent-minus" WSE is referenced in the steps below.

B3. Vertical check. Check if the following is true:

"1-percent-minus" WSE – vertical tolerance <= topographic elevation at point <= "1-percent-plus" WSE + vertical tolerance.

If the point fails the vertical check, then the point fails and is assigned a score of 0.

B4. Horizontal check: Check if the following is true:

"1-percent-plus" WSE >= minimum topographic elevation within a 75-foot radius of the validation point AND "1-percent-minus" WSE <= maximum topographic elevation within a 75-foot radius of the validation point.

If the point fails the horizontal check, then the point fails and is assigned a score of 0.

B5. If the point passes both the vertical check AND the horizontal check then the point passes and is assigned a score of 1. If either the vertical check or the horizontal check fails, then the point fails and is assigned a score of 0.

After all points have been scored, proceed to the grouping phase (see Section C.5).

Validation Using the Width-based Method

The width-based approach can be used instead of the basic approach method, but only if the reach was modeling using a 1D model. The steps required for the width-based method, all prefixed with an "W", are:

W1. Obtain sampling points on the Effective Zone A floodplain boundary. Each sampling point will require new topography in the vicinity of each point, as well as corresponding water surface elevations from the "1-percent-plus" and "1-percent-minus" models. The sample points and the water surface elevations can be obtained by using one of the following methods:

a. The sampling points can be obtained by utilizing the cross-sections of the LSAE/ BLE "1-percent-plus"/"1-percent-minus" models. Cross-sections must be identical between the two models if this approach is used. The sampling points would be the intersection of the effective floodplain boundary and the LSAE/BLE cross-sections. If the LSAE/BLE cross-sections do not extend far enough to reach the effective floodplain boundary, they should be extended. The sampling points should be taken only in places where the effective floodplain boundary corresponds to the same flooding source as the model of the LSAE/BLE cross-sections. Note that if a cross-section is in the backwater of another reach, then the higher backwater elevation from the other reach should be used instead of modeled water surface elevation assigned to the cross-section itself.

b. Sampling points may be obtained from evenly spaced points around the boundary of the effective floodplain (both exterior and interior boundaries, e.g. islands). The points will be spaced at a maximum of 200 feet apart but can be closer. The LSAE/BLE "1-percent-plus" and "1-percent-minus" minus water surface elevations are then assigned to the point by using an interpolated water surface elevation from the LSAE models, either at the point itself (from interpolated or otherwise modeled water surface features) or optionally, if the point is outside one or both of the LSAE/BLE floodplains, from a nearby representative point when an interpolated water surface is available, and which corresponds to approximately the same river station as the sampling point.

W2. Check if "1-percent-plus" WSE >= "1-percent-minus" WSE. In very rare cases this might not be true. In these rare cases, switch the two water surface elevations in the following steps e.g. always use the higher WSE when the "1-percent-plus" WSE is referenced, and use the lower WSE when the "1-percent-minus" WSE is referenced in the steps below.

W3. Evaluate the validation point using an FBS-like check:

Determine if the maximum topographic elevation within a 37.5-foot radius of the validation point is less than the "1-percent-minus" water surface elevation minus the half contour interval, or if the minimum topographic elevation in a 37.5 radius of the

validation point is greater than the “1-percent-plus” water surface elevation plus the half-contour interval. If either of these criterion is true, then the point fails immediately and is assigned a score of zero.

Inputs: Minimum and maximum topography elevations within a 37.5-foot radius of the validation point, “1-percent-plus” and “1-percent-minus” water surface elevations for the point

Outputs: Score determination of 0 or continue to next step.

W4. For each validation point, determine the “1-percent-plus” and “1-percent-minus” active floodplain widths (active means excluding ineffective flow areas). If the validation points were obtained using the cross-section approach, the active floodplains widths should be taken from that model’s cross-section. This width will be used even if the cross-section is in the backwater of another model.

If the validation points were obtained by evenly spaced points along the effective floodplain boundary, the validation point may already be associated with a particular reach and cross-section station number that was used to obtain the “1-percent-plus” and “1-percent-minus” water surface elevations (before consideration of backwater). If the reach and station has not been assigned, it can be assigned at this point; however, consistency with the location that was used to obtain the modeled water surface (before considering any backwater) would be needed. Normally the point will be assigned to a station which is between cross-sections. The active top widths from the upstream and downstream cross-sections should be interpolated (for both the “1-percent-plus” and “1-percent-minus” models), to assign “1-percent-plus” and “1-percent-minus” floodplain widths. The interpolated active top width can be calculated using the following formulas:

Interpolated Top Width=

$$\frac{\text{(dist. To u/s section) x (d/s active top width)+ (dist.to d/s section) x (u/s active top width)}}{\text{distance between bounding sections}}$$

(where dist. Or distance means “distance determined by river station”, d/s means “downstream”, and u/s means “upstream”).

W5. Determine which modeled top width is the “final topwidth”. Determine the maximum topographic elevation within a 37.5-foot radius from the validation point. If this elevation is less than the “1-percent-minus” WSE, this means that the point is well inside the “1-percent-minus” floodplain. If this is the case, then let “final topwidth” equal the “1-percent-minus” interpolated active topwidth calculated previously. If the maximum elevation is greater than or equal to the “1-percent-minus” interpolated active topwidth, let “final topwidth” equal the “1-percent-plus” interpolated topwidth calculated previously.

Inputs: Minimum and maximum topographic elevations within a 37.5-foot radius of the validation points.

Output: Determination whether the “final topwidth” should be from the “1-percent-plus” or the “1-percent-minus” active topwidth.

W6. Use the following table to determine and inner and outer radius values.

Table C-2: Inner and Outer Radius Values

Final topwidth condition	Inner radius, feet	Outer radius, feet
topwidth <= 100	25	37.5
100 < topwidth <=200	37	50
200 < topwidth <= 400	50	75
400 < topwidth <=600	75	100
600 < topwidth <= 900	100	150
900 < topwidth <= 1200	150	200
1200 < topwidth	200	300

Inputs: “final topwidth” from the previous step (first column).

Outputs: Radius of inner circle, radius of outer circle (second and third columns).

W7. Perform inner-radius horizontal check on the point. Check if either of these conditions hold:

i. Maximum topography elevation within the inner radius < “1-percent-minus” water surface elevation

ii. Minimum topography elevation within the inner radius > “1-percent-plus” water surface elevation

If either condition is true, the point fails the inner radius horizontal check and proceed to next step. If both conditions are false, the point passes the inner radius horizontal check (and has also previously passed the FBS-like check), the point receives a score of 1 and scoring for the point is complete. If the point does not meet these conditions proceed to the next step.

Inputs: Minimum and maximum water surface elevation using inner circle, “1-percent-plus” water surface elevation, “1-percent-minus” water surface elevation

Outputs: Score determination of 1 or continue to next step.

W8. Perform outer-radius horizontal check on point. If the point failed the inner horizontal check in the previous step, a horizontal check using the outer radius is needed. Check if either of these conditions are true:

i. Maximum topography elevation in the outer radius < “1-percent-minus” water surface elevation

ii. Minimum topography elevation in the outer radius > “1-percent-plus” water surface elevation

If either condition is true, then the point fails the check using the outer radius and receives a score of zero. If both conditions are false, then the point passed the outer horizontal check and receives a score of 0.5 (e.g. partial credit).

Inputs: Minimum and maximum water surface elevation using outer circle, “1-percent-plus” water surface elevation, “1-percent-minus” water surface elevation

Outputs: Score determination of 0.5 or zero.

After all points have been score, proceed to the grouping phase (Section C.5).

Grouping Phase (for both basic and width-based methods)

Once all points have been assigned a score of 0 or 1 (or possibly 0.5 if the width-based has been used), they must be grouped. The groups consist of geographic regions which encompass the points, and the effective floodplains being evaluated. The groups may be based on HUC-12 areas or refined down to the reach level. At least 20 points should be in each group.

The pass percentage is computed for each group using the points located in that group. The total score of all point in each group are divided by the number of points in the group, and expressed as a percentage. The streams that are located in the group are assigned that pass percentage. Each stream is categorized as “Valid” or “Unverified” based on the risk class in which it is primarily located (see Table C-3 below: SID 113 – Floodplain Boundary Standards Pass Thresholds based on Risk Class).

Table C-3: SID 113 – Floodplain Boundary Standards Pass Thresholds based on Risk Class

Risk Class	Characteristics	Total score as percentage of the total points for Stream Reaches to be called “Valid”
A	High population and densities in the floodplain and/or large amount of anticipated growth	95%
B	Medium population and densities in the floodplain and/or modest anticipated growth	90%
C	Low population and densities in the floodplain and little or no anticipated growth	85%

Appendix D. Coastal Study Validation Assessment

The coastal validation checks are meant to capture a broad range of topics or study elements that have the potential to impact coastal floodplain boundaries, zone designations and/or Base Flood Elevations (BFEs). This includes changes to the mapped primary frontal dune delineation, the VE/AE Zone boundary, etc. The coastal checks are also meant to capture changes that may occur during the different phases of a coastal flood study, such as determination of the 1-percent-annual-chance stillwater elevations (SWEL) or determination of wave impacts including wave setup, wave runup, storm-induced erosion, overland wave propagation, wave overtopping, and tsunami runup. The coastal validation checks also captures other factors that may invalidate a coastal study such as long-term shoreline movement, the existence of repetitive loss structures, or new high water marks (HWMs) from recent major flooding events.

When a study is under review, care needs to be taken to understand the unique elements and study process that may exist in any given coastal study area. Some of the checks apply to large geospatial areas, such as a state or a region, whereas others are locally specific, such as coastal structure impacts. For the most part the coastal validation checks do not call out specific regional differences in coastal flood studies except for the consideration of ice impacts on the Great Lakes and areas impacted by tropical cyclones

The coastal validation checks proposed for inclusion in Coastal CNMS are shown in Table D-1 and discussed further in the following sections. For each check, the central question is posed, a flow chart for evaluation of that question is provided, and further discussion elaborates on the nuances of the check.

Sensitivity tests are incorporated into checks 1, 2, 5, and 6. At the conclusion of some checks, further sensitivity analysis may be necessary once the shoreline miles have been classified as UNVERIFIED. This sensitivity analysis will need to be prioritized by the Region, and will help the Region to determine if a restudy is needed and if so, to what technical and geographical extent. Presently, FEMA does not have Guidance or Best Practices for these sensitivity analyses, which will be an area of future development in the coming years.

In the following checks, the study area for each effective study undergoing CNMS evaluation should be defined within the effective study results, documentation, and flood maps. The CNMS evaluation is typically applied to a single county, and in these instances the study area refers to the county boundaries. One notable exception is critical check 2, which is applied to a regional or complete coastal flood study.

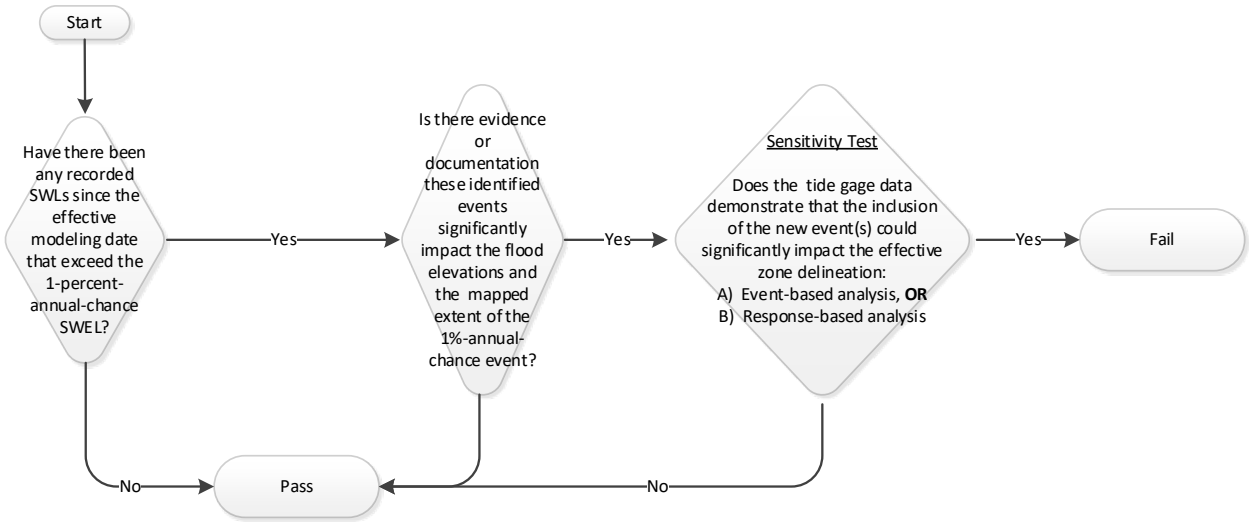
Table D-1: Coastal Critical and Secondary Checks

Criteria	Critical or Secondary
1. Have there been any recorded storm events from tide gages since the effective modeling date, where the SWL exceeds the 1-percent-annual-chance SWEL (i.e., the 100-year SWEL)?	Critical
2. Are there any potentially statistically significant storm intensity data since the effective modeling?	Critical
3. Are there changes in ice coverage data for the Great Lakes?	Critical
4. Is there documented evidence that any of the models used in the effective study are inaccurate?	Critical
5. Have there been any FEMA coastal modeling changes, mapping procedural changes, or general improvements since the effective study that could impact the coastal flood hazard mapping?	Critical
6. Has shoreline erosion occurred since the effective modeling date that could impact the coastal flood hazard mapping?	Critical
7. Have any existing coastal structures, shown as providing flood protection in the effective mapping, been removed or has their condition deteriorated such that they are no longer adequate in providing protection?	Critical
8. Are the effective methods for determining starting wave conditions no longer appropriate and do they no longer meet FEMA model criteria?	Secondary
9. Do the bathymetric and topographic data used in the effective study no longer meet FEMA standards?	Secondary
10. Have there been significant changes to land use or vegetation coverage in the coastal SFHA that could impact coastal floodplain mapping?	Secondary
11. Do patterns of repetitive loss properties from coastal flooding exist outside of the coastal SFHA?	Secondary
12. Do patterns of LOMRs indicate that the present BFEs, zone delineations, or floodplain boundaries may not be correct?	Secondary
13. Have high water marks (HWMs) been collected that exceed mapped BFEs and/or the inland extent of mapped SFHAs?	Secondary
Total	7 critical; 6 secondary

D.1. Critical Check: Gage Analysis

Question: Have there been any recorded storm events from tide gages since the effective modeling date, where the SWL exceeds the 1-percent-annual-chance SWEL (i.e., the 100-year SWEL)?

Figure D-1: Evaluation Process for Gage Analysis



*Sensitivity Test – when there is evidence or events that have occurred after the effective study, these reaches will be marked as **Unverified**. When there is no evidence or events after the effective study, these reaches will be marked as **Valid**. In both cases, details will be provided in the specific check's comment field and left up to the FEMA Region to pursue further sensitivity analysis.

The statistically derived 1-percent-annual-chance SWEL is a fundamental component of a Flood Insurance Study. It is critical that the effective coastal analyses and FIRM accurately capture the 1-percent-annual-chance SWEL. A large storm with a significantly high stillwater level (SWL) might strike a particular region of the coast after the effective modeling date. If the SWL is high enough, it is possible that the effective flood maps do not accurately reflect the current coastal flood hazard. The incorporation of the new storm SWL data could impact the statistical determination of the water levels resulting in a change of the 1-percent-annual-chance SWEL and associated flood zone boundaries. This critical check is designed to identify this situation and ensure that the effective FIRM accurately captures the current 1-percent-annual-chance SWEL.

Throughout this critical check, the reviewer will examine specific items to determine if they have a significant impact on the 1-percent-annual-chance SWEL, which would be indicated by an overall increase in the 1-percent-annual-chance SWEL of 1 foot or greater. This check applies to studies where a tide gage analysis was used to determine the 1-percent-annual-chance SWEL. This check does not apply to studies where a numerical model (e.g., the Advanced Circulation (ADCIRC) model) was used to determine the 1-percent-annual-chance SWEL. Studies which utilized data from a numerical model to determine the 1-percent-annual-chance SWEL will automatically pass this critical check. These include studies in Regions III, IV, and VI.

To begin this critical check, a reviewer will first review tide gage data that has been collected *after* the effective modeling date for an effective study. The relevant tide gages to check will include those used in the effective modeling and any that have captured the SWL record from large coastal storm events impacting the area of interest. The reviewer will examine the tide gage data to look for any SWL records that exceed the 1-percent-annual-chance SWEL. SWL events equal to or less than the 1-percent annual SWEL are not likely to significantly impact the effective flood zone mapping. This critical check item is illustrated in the first box of the workflow diagram above. If there are no SWL records that exceed the 1-percent-annual-chance SWEL, the effective study passes this critical check. If there are SWL records that exceed the 1-percent annual chance SWEL, the reviewer moves to the next question in the critical check (the second box in the workflow diagram). Tide gages can sometimes fail during large coastal storm events. If all available tide gages have failed to capture any SWL records from a potentially large storm event or multiple events, the study automatically passes this critical check. In this scenario, any storm that would be large enough to impact the effective 1-percent-annual-chance SWELs would most likely leave HWMs which are evaluated in Secondary Check 3.1.13.

In the second question, the reviewer looks for any documented evidence that suggests that a large coastal storm could significantly impact the effective 1-percent-annual-chance SWEL determination and mapping. The documented evidence could be in the form of an engineering summary or technical report of subsequent technical analysis or research of the storm event in

question. The documentation might include technical reports or records of HWMs, which are often prepared by NOAA. The documentation should clearly show that the storm SWLs are large enough to significantly impact the 1-percent-annual-chance SWEL. Documentation is required in this question because it is initially assumed that the floodplain mapping accurately reflects the 1-percent-annual-chance SWEL and there must be clear evidence to suggest otherwise for a study to potentially fail this check. If there is no documented evidence, the effective study passes this critical check. If there is documented evidence, the reviewer moves to the next question in the critical check (the third box in the workflow diagram).

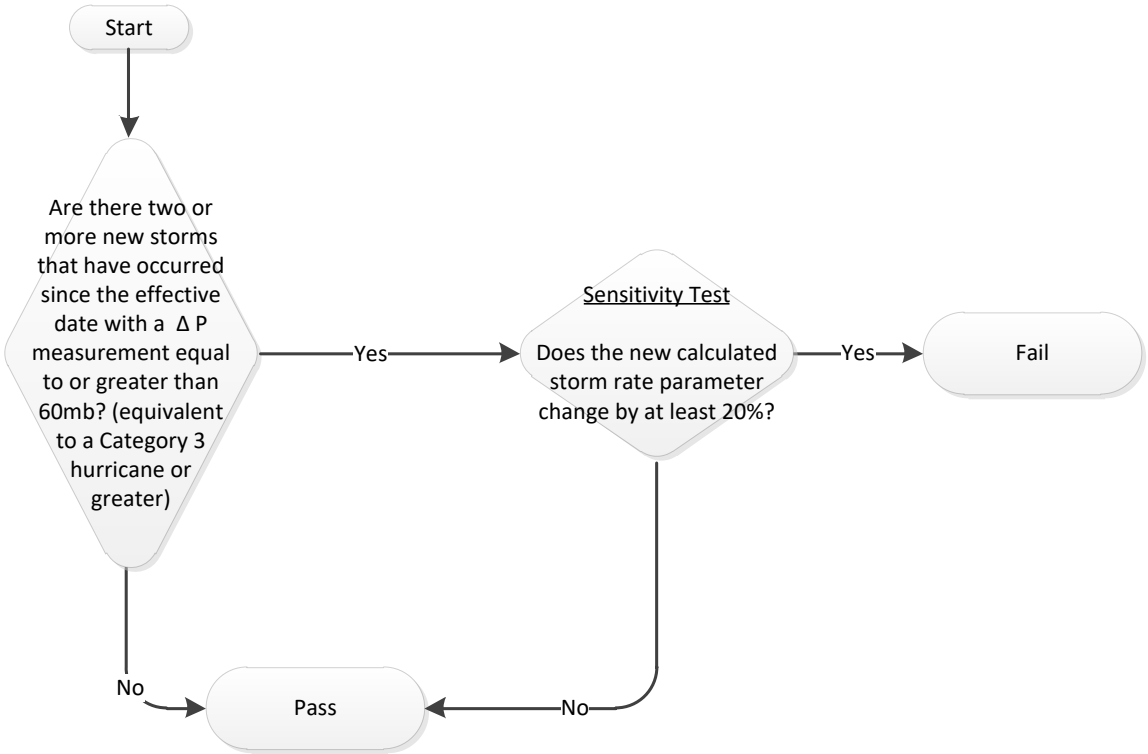
In the third question, the reviewer conducts a sensitivity test to determine if the effective study passes or fails this critical check. This limited analysis includes an extreme value analysis (EVA) of tide gage data. There are two general types of technical analysis in FEMA coastal flood studies: event-based analysis and response-based analysis. Although there are exceptions, event-based analysis is typically applied along the Atlantic and Gulf coasts while response-based analysis is typically applied along the Pacific coast and Great Lakes. The two approaches differ enough so that there is a separate sensitivity test for each. Details on the two different approaches are presented in the FEMA Atlantic Guidelines and FEMA Pacific Guidelines. Differences between the two sensitivity tests are described below.

1. Event-Based Analysis: In this test the reviewer will construct a time series of tide gage data. The time series will include all data used for the effective study and the additional data up to and including the storm SWL record(s). The reviewer will then conduct an EVA on the time series using the same statistical approach (both EVA model and associated parameters) as the effective study. If the calculated 1-percent-annual-chance SWEL is greater than the effective 1-percent-annual-chance SWEL by at least 1 foot, the effective study fails this critical check. If the calculated 1-percent-annual-chance SWEL is not greater than the effective 1-percent-annual-chance SWEL by at least 1 foot, the effective study passes this critical check.
2. Response-Based Analysis: In this test the reviewer will construct a time series of tide gage data. The time series will include all data used for the effective study and the additional data up to and including the storm SWL record(s). The reviewer will then conduct an EVA on the time series using the same statistical approach (both EVA model and associated parameters) as the effective study. If the calculated 1-percent-annual-chance SWEL is greater than the effective 1-percent-annual-chance SWEL by at least 1 foot, the effective study fails this critical check. However, in the Pacific coast this case only applies to the mapping of sheltered areas, which typically consist of lagoons, inland bays, and other protected areas mapped with the 1-percent-annual-chance SWEL, would need to be re-studied. Areas of the open coast, where the 1-percent-annual-chance TWL is mapped, would not need to be re-studied or mapped. If the calculated 1-percent-annual-chance SWEL is not greater than the effective 1-percent-annual-chance SWEL by at least 1 foot, the effective study passes this critical check.

D.2. Critical Check: Storm Data

Question: Are there any potentially statistically significant storm intensity data since the effective modeling?

Figure D-2: Evaluation Process for Storm Data



*Sensitivity Test – when there is evidence or events that have occurred after the effective study, these reaches will be marked as **Unverified**. When there is no evidence or events after the effective study, these reaches will be marked as **Valid**. In both cases, details will be provided in the specific check's comment field and left up to the FEMA Region to pursue further sensitivity analysis.

This critical check applies only to coastal flood studies that have been completed in certain regions where tropical cyclones largely determine coastal vulnerability. Generally, these include coastal study areas along the Atlantic and Gulf coasts. Specifically, these include coastal study areas in FEMA Regions II, III, IV, VI, and Region IX. In these regions, multiple intense tropical cyclones that have occurred since the effective modeling date could impact the effective flood mapping. In this scenario, the effective flood maps might be underestimating the risk posed by the 1-percent-annual-chance event. This critical check is designed to prevent this scenario and to identify coastal flood studies that need to be updated in this regard. This critical check does not apply to the Pacific coast or Great Lakes. If the coastal flood study under CNMS evaluation is a Pacific coast or Great Lakes study, the study shall automatically pass this critical check.

To initiate this critical check, a reviewer first reviews the pressure drop (ΔP) data for the geographic area that includes the study area under CNMS evaluation. ΔP is defined as the

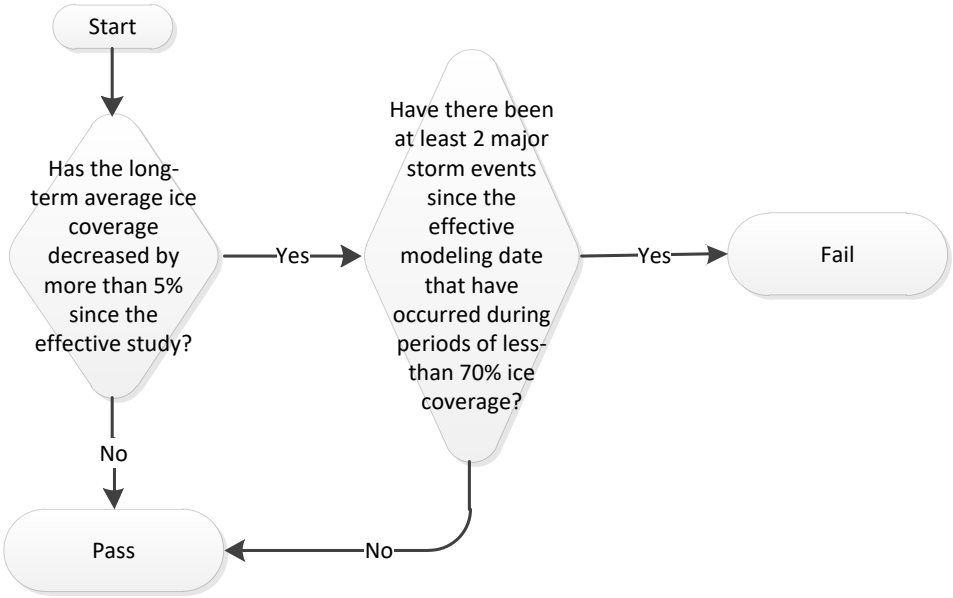
difference in atmospheric pressure between the center of a tropical cyclone and an area outside the storm. It is a parameter that categorizes the intensity of a tropical cyclone. Intense tropical cyclones have low atmospheric pressures and *ΔP* values equal to or greater than 60 mb typically indicate Category 3 or greater storms. *ΔP* data are available to the public and provided by NOAA's Hurricane Research Division (http://www.aoml.noaa.gov/hrd/hurdat/Data_Storm.html). The reviewer will look for two or more tropical cyclones that have occurred since the effective modeling date and have *ΔP* values equal to or greater than 60 mb. The reviewer should look for these storms within the same search radius that was used in the effective study. This search radius should be specified in the effective study documentation. Previous sensitivity analysis has indicated that two or more storms of this magnitude could significantly impact the flood zone mapping for a particular area of the coast. Although there are other variables that characterize the intensity of tropical cyclones, including maximum wind speeds, storm track, and radius, the *ΔP* variable is sufficient to identify significant storms and to complete this critical check. If there are no storms that meet this criterion, the study passes this critical check. If there are two or more storms that meet this criteria, the reviewer moves to the next question (second box) in the critical check. As hurricanes typically cover large geographic regions and have variable impacts along the coast, the reviewer will need to determine if the identified storms impact the particular study area undergoing evaluation. This critical check will most likely be applied to a large, regional study area.

In the next question, the reviewer conducts a sensitivity test to determine if the study passes or fails this critical check. In this sensitivity test, the reviewer compiles the *ΔP* data used in the effective modeling and the new *ΔP* data that includes the new intense tropical cyclones. The reviewer then conducts the Joint-Probability Method – Optimal Sampling (JPM-OS) statistical analysis with the compiled data. This analysis yields a storm rate parameter, which is subsequently used to characterize the 1-percent-annual-chance event for a particular area. Previous sensitivity analysis has indicated that a change in the storm rate parameter by at least 20% could significantly impact the flood zone mapping for a particular area of the coast. The reviewer compares this newly calculated storm rate parameter to the storm rate parameter calculated in the effective modeling. If the storm rate parameter has changed by less than 20%, the study passes this critical check. If the storm rate parameter has increased by at least 20%, the effective study fails this critical check.

D.3. Critical Check: Great Lakes Ice Conditions

Question: Are there changes in ice coverage data for the Great Lakes?

Figure D-3: Evaluation Process for Great Lakes Ice Coverage



In the Great Lakes, wind-driven waves largely determine coastal vulnerability and the extent and magnitude of coastal flooding. The presence of ice sheets and the extent of ice coverage can have a significant influence on wave generation and propagation. Greater ice coverage can dampen surge and wave generation, limit wave propagation, and subsequently reduce coastal vulnerability to flooding and erosion. Conversely, lower ice coverage increases fetch and can increase wave generation and propagation, and increase vulnerability to flooding and erosion.

Ice coverage is accounted for in the technical analysis of a coastal flood study, particularly wave setup and runup calculations, which utilize the starting wave conditions. In the modeling of starting wave conditions, when the ice coverage reaches more than 70%, the starting wave heights are set to zero. Because of this, it is important to review ice coverage data collected since the effective modeling date to confirm that the effective flood zone maps depict the current level of risk. If ice coverage has significantly decreased since the effective modeling date, the effective flood zone maps might underestimate the risk. This check is designed to prevent this scenario and identify coastal flood studies in the Great Lakes that need to be updated in this regard. Coastal flood studies of the Atlantic, Gulf, and Pacific coasts will automatically pass this critical check.

Ice coverage in the Great Lakes fluctuates annually, hence the first question asks about the long-term trend as an indicator that the effective study is still accurate. Generally, a 5% change in the long-term average is not considered to be significant for this check. The first question asks if the long-term average ice coverage has decreased by more than 5% since the effective

study. Only decreases to the ice coverage are considered, as increases in coverage may only reduce the flood risk temporally. Furthermore, adding storms to the statistical analysis that do not produce waves will not impact the BFEs. If the long-term average has not decreased by at least 5%, the effective study passes this critical check. If the long-term average has decreased by at least 5%, the reviewer moves to the next question (the second box in the workflow diagram).

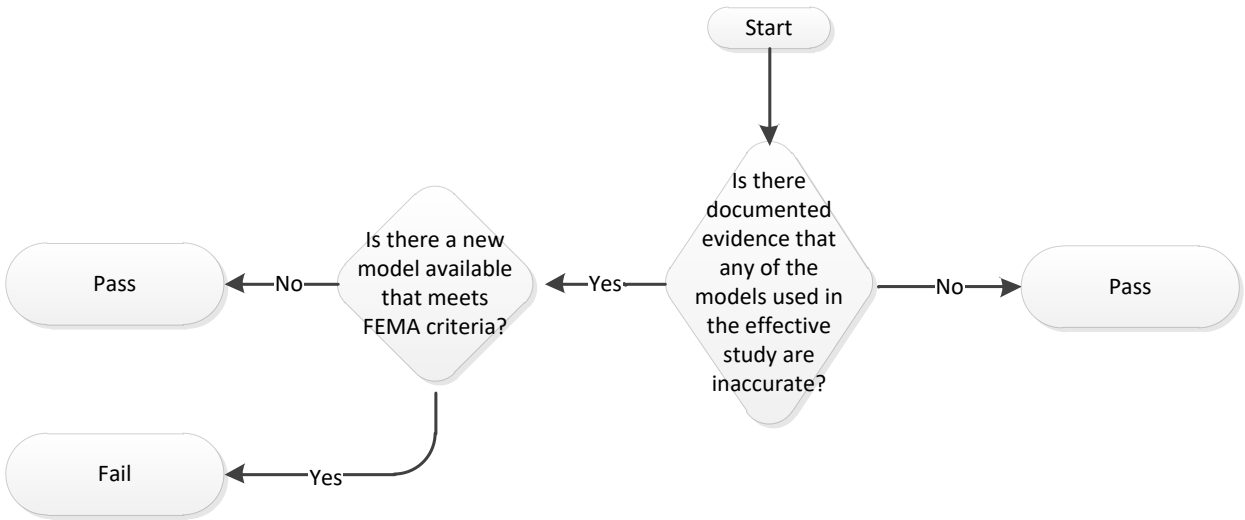
Once it has been established that the ice coverage has decreased by more than 5%, the reviewer looks for two major storm events that have occurred during a period of less than 70% ice coverage. A major storm event during this period of low ice coverage is expected to have an impact on the mapped BFEs. A major storm on the Great Lakes can either be an event that has large wave heights with low storm surge or high storm surge with small wave heights. Technical analysis on the Great Lakes is conducted with the 20 largest historical wave or SWL events for a particular area. The reviewer must check wave and SWL records to determine if any storms have occurred since the effective study with wave heights or SWLs that exceed the lowest values of the 20 events used in the effective study. If any wave heights or SWLs exceed the lowest values used in the effective study, it is considered a major event for this check. The second question asks if there have been at least two major storm events since the effective modeling date that have occurred during a period of 70% or less ice coverage. If the answer is yes to this question, the study fails this critical check. If the answer is no to this question, the study passes this critical check.

Ice coverage information and data for the Great Lakes can be found from the Great Lakes Environmental Research Laboratory, Great Lakes Ice Cover Data, at https://www.glerl.noaa.gov/data/ice/. On this site there are plots of yearly ice coverage for each Great Lake that can be used for this critical check. As an example, the long-term average ice coverage over all the Great Lakes between 1973 to 2015 is 53.3 %. Other data sources may become available and should be consulted as appropriate.

D.4. Critical Check: Coastal Model Evaluation

Question: Is there documented evidence that any of the models used in the effective study are inaccurate?

Figure D-4: Evaluation Process for One- or Two-Dimensional Models



One-dimensional (1-D) and two-dimensional (2-D) models are used in many aspects of coastal flood studies. These include the determination of storm surge and initial wave conditions, overland wave propagation, dune erosion, wave setup and runup, wave overtopping, and tsunami runup. The science and engineering community continuously works to update these existing models to improve efficiency and accuracy. Occasionally, fundamental problems with models are identified and they are no longer considered accurate for coastal flood analysis. These problems may be fixed though subsequent updates, or the models might be replaced with new models. It is critical that the models used in an effective coastal flood study are still accurate and considered standard practice in the science and engineering community. This critical check is designed to ensure this.

The first question asks if there is any documented evidence that any of the models used in the effective study are no longer accurate. The documentation might include technical reports or research articles that detail fundamental problems with a particular model, and demonstrate why the model is no longer appropriate for a coastal flood study. Fundamental problems include technical errors that yield inaccuracies in the results and final floodplain mapping. They do not include any minor technical issues, such as modeling speed or efficiency, which might be addressed in subsequent versions of the model. It is likely that a model with documented, fundamental problems has been updated and is no longer considered standard practice within the science and engineering community. If the answer is “No” to this question, the study passes this critical check. If the answer is “Yes”, the reviewer moves to the second question in the workflow diagram. Even if there are updated versions of a particular model used in the effective study, or there are newer, alternative models available for the analysis in the effective study

area, the answer to the first question may still be “No”. If there are newer or updated models available, but the models used for the effective study are still considered to be accurate, then the answer to the first question is “No” and the study still passes this critical check.

The second question asks if there are any replacements (i.e., new or improved models) available that are considered to be accurate and meet FEMA criteria. FEMA criteria means that the model meets Paragraph 44 Code of Federal Register 65.6(a)(6) of the National Flood Insurance Program (NFIP) regulations. The regulation paragraph explains the conditions under which a computer model can be used for flood hazard mapping in the NFIP including:

1. The model must be reviewed;
2. Tested and accepted by a government agency;
3. Well documented; and
4. Available to FEMA and all stakeholders.

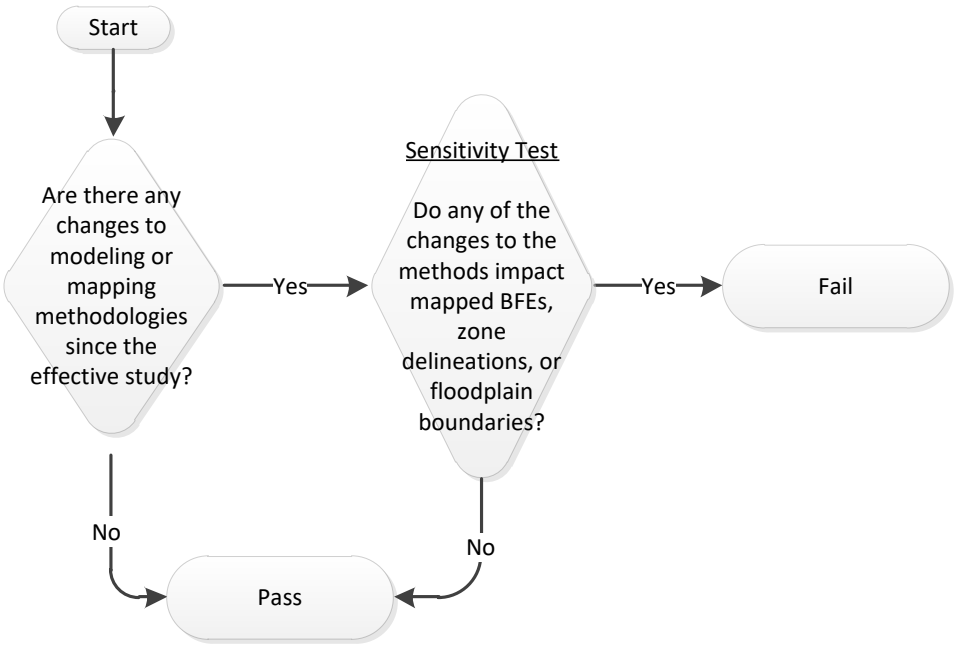
If a new or improved model is available that meets FEMA criteria, then the effective study is invalid and fails this check. If no new or improved models that meet FEMA criteria are available, the effective study is still considered valid and passes this critical check. The study passes because there are no alternatives that can be used to update and improve the coastal flood maps. When new or improved models do become available, it will be necessary to re-evaluate the effective study to determine if it passes or fails this critical check.

This critical check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries. For these studies, the reviewer evaluates the tsunami runup models using the same criteria and overall process described for this check. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.5. Critical Check: FEMA Coastal Modeling and Mapping Procedure Changes or Improvements

Question: Have there been any FEMA coastal modeling changes, mapping procedural changes, or general improvements since the effective study that could impact the coastal flood hazard mapping?

Figure D-5: Evaluation Process for Changes or Improvements to FEMA Coastal Modeling and Mapping Procedures



*Sensitivity Test – when there is evidence or events that have occurred after the effective study, these reaches will be marked as **Unverified**. When there is no evidence or events after the effective study, these reaches will be marked as **Valid**. In both cases, details will be provided in the specific check's comment field and left up to the FEMA Region to pursue further sensitivity analysis.

Coastal modeling procedures and coastal flood hazard mapping guidance are continuously evolving. If FEMA has issued new guidelines, standards, or best practices since the effective study, there is potential that these updates may impact coastal flood maps. Even if the physical environment or natural flooding forces within the study area in question have not changed, a change in methodology for modeling and/or mapping coastal flood hazards can result in a revised estimate of BFEs, zone designations, and/or SFHA delineations for the 1-percent-annual-chance event. In order for a methodology change to trigger a new study, it has to have broad impacts throughout the study area that show changes in mapped BFEs or floodplain boundaries.

The first question asks if there are any methodology changes since the effective study. To answer "Yes" to this question, there has to be a FEMA guidance change. FEMA typically issues methodology changes with standards, guidance or best practice documents. A reviewer can

check the documentation in the FEMA guidance library (https://www.fema.gov/media-library/) and the FEMA Knowledge Sharing Site (KSS - https://riskmapportal.msc.fema.gov/). If the answer is “No” to this question, the effective study passes this critical check. If the answer is “Yes”, the reviewer moves to the next question.

If there are changes to methodology, the second question asks if the changes impact the 1-percent-annual-chance floodplain boundaries, zone delineations, or mapped BFEs of the effective study undergoing CNMS evaluation. It should be apparent from the methodology changes which components of the analysis and mapping are affected. For some methodology changes, the impacts will be known without performing a sensitivity analysis. Details will most likely be found within FEMA documentation. If the impacts to the study are not directly known or understood, sensitivity analyses may be necessary to determine the level and scope of impact. Because future guidance changes are not yet known, a specific sensitivity test cannot be described in this document. However, the reviewer can test for any significant impacts that change the mapped floodplain boundaries, the zone delineations, or the BFEs by more than 1 foot. If any of these changes occur the study is invalid and fails this check.

Changes in guidelines, standards, or best practices may only apply to specific regions, water body types, or specific coastal hazards (e.g., surge, erosion, overland wave propagation, wave runup and overtopping, or tsunamis). If the study undergoing CNMS evaluation is outside the region where changes apply or lack hazards for which guidance regarding modeling and mapping methods has changed, the effective study will pass this critical check. Some methodology changes could include changes to methods for developing model inputs or changes to the erosion methodologies. Other mapping methodologies could cause changes in how VE zones are defined or how the limit of moderate wave action (LiMWA) is being mapped.

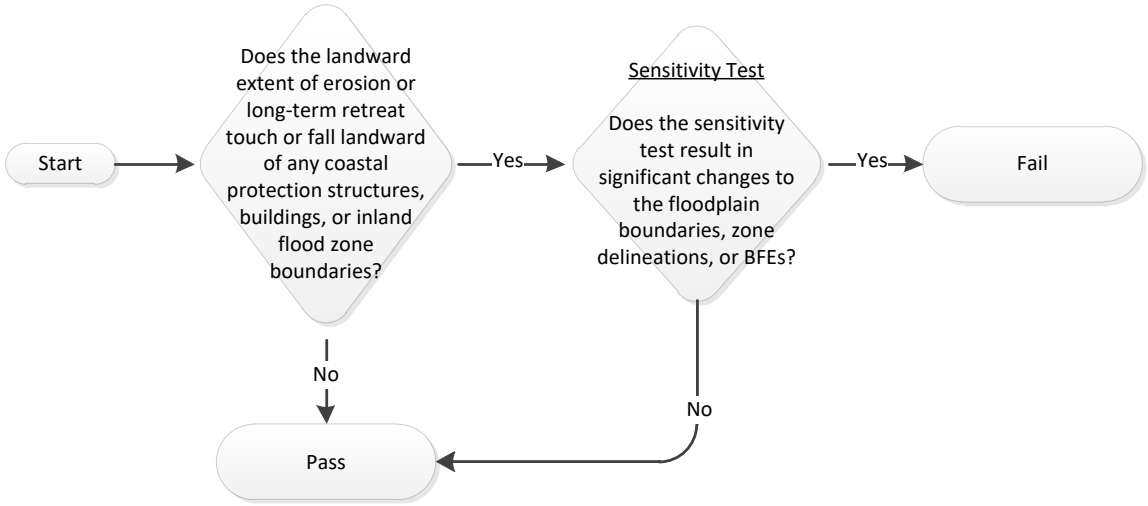
This critical check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries. In specific areas, tsunami runup analysis may have been conducted as part of the effective study but not included in the effective mapping due to mapping limitations and restrictions. The reviewer should carefully evaluate these studies and determine if subsequent changes in FEMA modeling and mapping procedures would allow for tsunami runup analysis to be incorporated into the flood zone maps.

In areas where tsunami runup is incorporated into the effective mapping, the reviewer should look for areas where the tsunami flood zone boundaries and BFEs do not match the underlying bathymetry and topography. The reviewer should pay particular attention to this in counties where the effective study has failed the secondary bathymetric and topographic data check (Secondary Check 3.1.9). If there are significant mismatches between the effective mapping and the underlying terrain data, the effective study fails this check. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.6. Critical Check: Erosion and Long-Term Retreat

Question: Has shoreline erosion occurred since the effective modeling date that could impact the coastal flood hazard mapping?

Figure D-6: Evaluation Process for Coastal Erosion and Long-Term Retreat



*Sensitivity Test – when there is evidence or events that have occurred after the effective study, these reaches will be marked as **Unverified**. When there is no evidence or events after the effective study, these reaches will be marked as **Valid**. In both cases, details will be provided in the specific check's comment field and left up to the FEMA Region to pursue further sensitivity analysis.

There are two distinct types of erosion that can impact coastal communities. Event-based erosion is caused by a particularly severe coastal storm. One example, dune erosion, is accounted for in coastal flood studies by the application of various dune erosion models. Long-term or chronic retreat happens over longer time frames and is not directly attributable to one particular storm. Long-term retreat is not accounted for in coastal flood studies. Both types of erosion, if they have occurred after the effective study date, can impact the effective coastal floodplain boundaries, zone delineations, and BFEs. For example, a dune and beach may have experienced extensive erosion for a recent storm event or due to long-term retreat. Persistent changes in the dune position or volume can impact the identification of the Primary Frontal Dune (PFD), which may have an impact on the VE Zone designation. This critical check is designed to identify these scenarios. Both erosion and long-term retreat can occur on all shore types: sandy beach, coastal dune, erodible bluffs, and even armored shorelines.

In the first question, the reviewer evaluates GIS data of the study area to determine if erosion or long-term retreat that has occurred since the effective modeling date is impacting developed areas. In GIS, the reviewer compares the effective mapping to current aerial photography or orthoimages, bathymetric and topographic data, and shoreline and PFD shapefiles. If the landward extent of erosion or long-term retreat touches or falls landward of any coastal protection structures, buildings, or the mapped flood zone boundaries for a substantial portion of the study area, the reviewer moves to the next question in the workflow. At beaches backed by

coastal dunes, the reviewer should pay particular attention to determine if the landward extent of erosion or long-term retreat touches or falls landward of the PFD line. If this is not observed for a substantial portion of the study area, the study passes this critical check. Small, localized areas of coastal erosion (i.e., erosion hotspots) are typically not considered large enough to fail an effective study and might be handled through the LOMR process.

The reviewer can also use technical reports which document substantial, event-based erosion for a particular study area to answer the first question in this critical check. The United States Geological Survey (USGS), NOAA, and other agencies often publish post-storm technical reports that document erosion from significant storm events. If a report documents wide-scale, storm-induced erosion for a particular study area, the reviewer moves to the next question in the workflow.

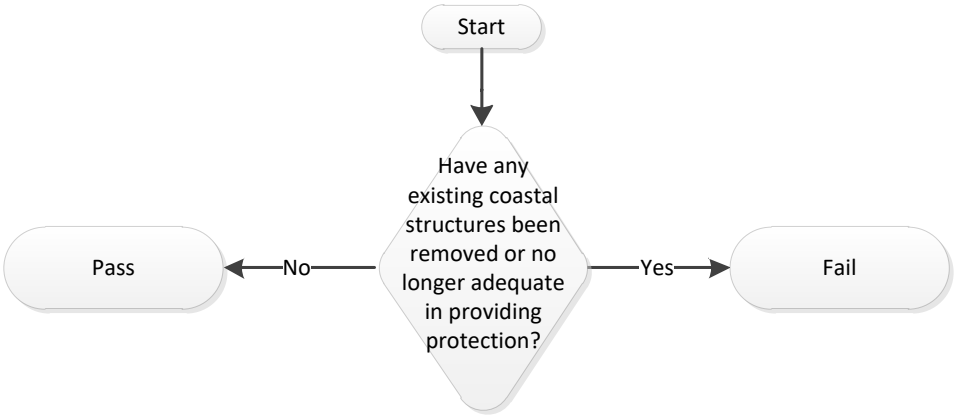
In the next step, the reviewer conducts a sensitivity test. The test should be conducted in an area that has significantly eroded where re-analysis would most likely impact the BFEs, zone delineations, or flood zone boundaries. New bathymetric and topographic data are required in order to conduct this sensitivity test. The sensitivity test should include re-running the dune erosion and wave modeling that was used in the effective study with the new bathymetric and topographic data. The test should follow the effective study methods for event-based erosion, overland wave propagation, and calculations of wave setup, runup, and overtopping. If the analysis results in changes to the 1-percent-annual-chance floodplain boundaries, the zone designations, or the BFEs, the effective study will be considered invalid and fails this check. If no new data are available, the study passes this critical check.

This critical check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries. For these studies, the reviewer evaluates the shoreline erosion using the same criteria and overall process described for this check. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.7. Critical Check: Removal or Deterioration of Flood Protection Structures

Question: Have any existing coastal structures, shown as providing flood protection in the effective mapping, been removed or has their condition deteriorated such that they are no longer adequate in providing protection?

Figure D-7: Evaluation Process for Removal or Deterioration of Coastal Flood Protection Structures



This critical check assesses the impacts that removal or deterioration of coastal protection structures has on the effective flood hazard mapping. Coastal protection structures consist of seawalls, revetments, coastal levees, or other structures that can provide flood protection during the 1-percent-annual-chance flood event. If large-scale structures have been removed or have deteriorated since the effective mapping and no longer provide flood protection, the effective maps most likely underestimate the flood risk for the affected area. There can be a significant impact on the modeled BFEs, zone designations, and SFHA extent for that area. This critical check is designed to identify this scenario.

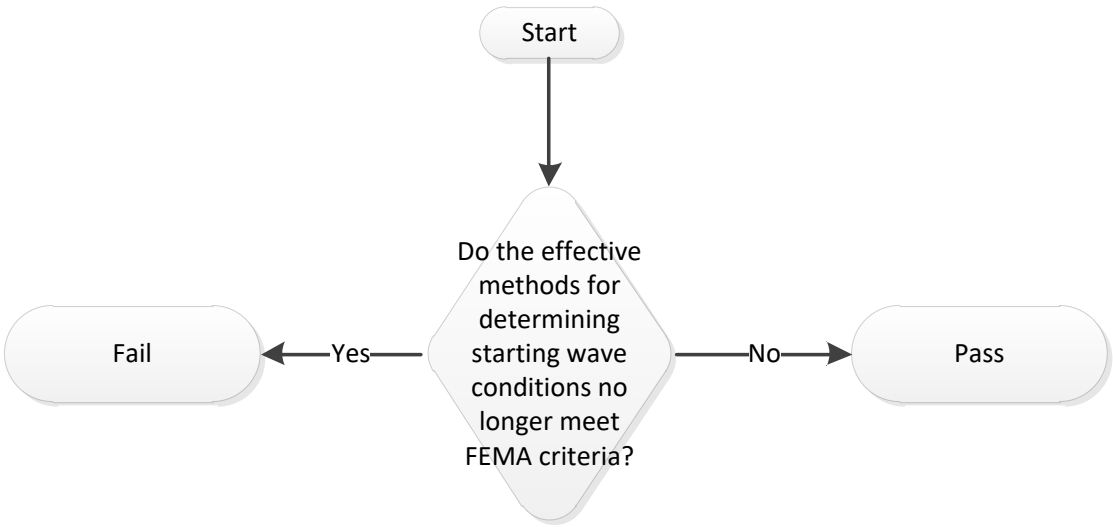
In this check, the reviewer looks for coastal structures that are shown providing protection in the effective mapping, and which have been subsequently removed or are critically deteriorated. The best source of information on the condition of any coastal protection structure will come from the communities within the study area. GIS data and aerial images of the study can also be reviewed. If a reviewer determines that a critical structure is no longer providing flood protection for a substantially developed area, the study fails this critical check. Structure failures may only impact localized areas and may not necessarily invalidate an entire study area.

It is assumed that accredited structure(s) which have been damaged during storm events are under a maintenance plan and will be fixed in the future. These should not be evaluated within this check unless a community has indicated otherwise. Approved Letters of Map Revision (LOMRs) and Certified Letters of Map Revision (CLOMRs) typically address the inclusion of new, accredited structures and the resulting mapping changes. This critical check does not evaluate the inclusion of new structures from LOMRs and CLOMRs.

D.8. Secondary Check: Starting Wave Conditions for One-Dimensional Modeling

Question: Are the effective methods for determining starting wave conditions no longer appropriate and do they no longer meet FEMA model criteria?

Figure D-8: Evaluation Process for Starting Wave Conditions



Similar to 1- and 2-D models, the science and engineering community is continuously working to improve the technical methods for determining wave conditions. Once wave conditions are determined for a particular study, they are subsequently used in models and calculations of overland wave propagation, wave setup and runup, overtopping, and dune erosion. Therefore they are essential to accurate analysis and mapping of the 1-percent-annual-chance event.

This secondary check is designed to ensure that the technical methods used to determine the wave conditions for an effective study still meet FEMA criteria. For modeling, FEMA criteria means that the model meets Paragraph 44 Code of Federal Register 65.6(a)(6) of the National Flood Insurance Program (NFIP) regulations. The regulation paragraph explains the conditions under which a computer model can be used for flood hazard mapping in the NFIP including:

1. The model must be reviewed;
2. Tested and accepted by a government agency;
3. Well documented; and
4. Available to FEMA and all stakeholders.

For other aspects of the technical methodology, meeting FEMA criteria means that the methodology is still standard practice in the science and engineering community.

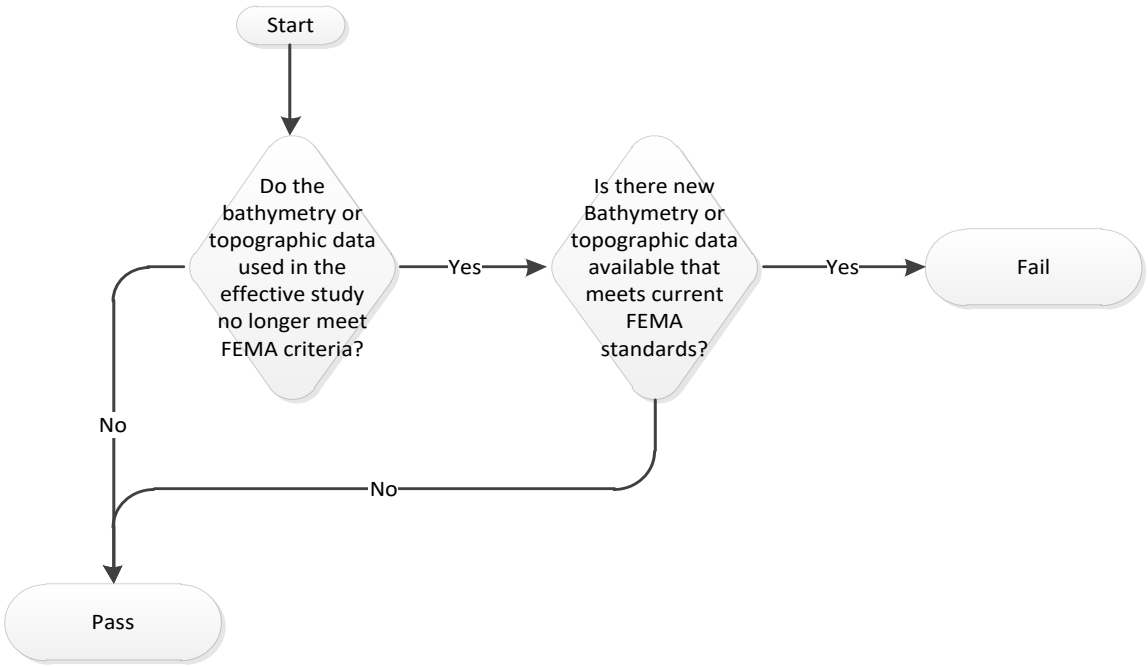
To complete this check, a reviewer determines if the technical methods used in the effective study no longer meet the current FEMA criteria. The technical methods may include but are not limited to numerical models (either local or regional scale), statistical analyses, and wave buoy

observations. A reviewer can check the technical methods used in the effective study against documentation in the FEMA guidance library (https://www.fema.gov/media-library/) and the FEMA Knowledge Sharing Site (KSS - https://riskmapportal.msc.fema.gov/). If the technical methods used in the effective study still meet FEMA criteria, the study passes this secondary check. If the technical methods used in the effective study do not meet FEMA criteria, the study fails this secondary check. This check applies to both event- and response-based studies. It applies to studies on all coasts: Atlantic, Pacific, Gulf, and Great Lakes.

D.9. Secondary Check: Bathymetric and Topographic Data

Question: Do the bathymetric and topographic data used in the effective study no longer meet FEMA standards?

Figure D-9: Evaluation Process for Bathymetric and Topographic Data



The use of accurate bathymetric and topographic data is critical to developing accurate coastal flood hazard maps. The accuracies of bathymetric and topographic surveying, post-survey data processing, and terrain surface modeling (e.g., a digital elevation model (DEM)) are continuously improving. FEMA has developed and maintains specific requirements on the accuracy of bathymetric and topographic data that can be used for coastal flood studies. This secondary check is designed to ensure that an effective coastal flood study utilized data that meet these current standards.

To begin this check, a reviewer checks the accuracy specifications on the data used for the effective study and compares them to the current FEMA data accuracy standards. The data accuracy standards can be found in current FEMA guidance. If the data meet current standards,

the study passes this secondary check. If the data do not meet current standards, the reviewer moves to the next question in the workflow diagram.

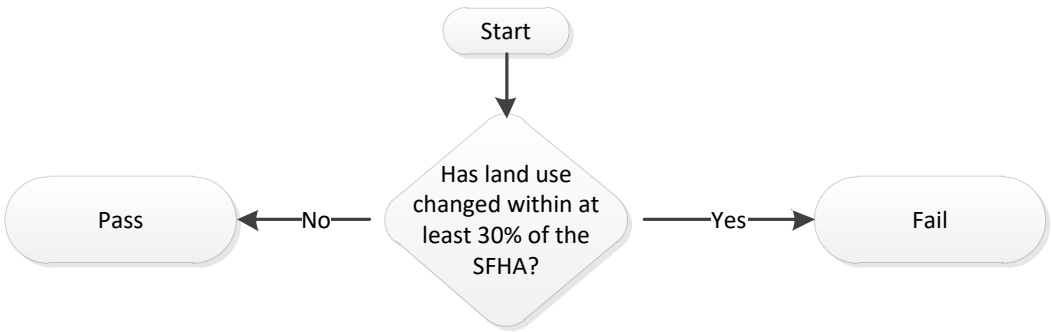
In the second question, the reviewer looks for newer bathymetric and topographic data sets that meet current FEMA standards and can be used to update the study. If no new data exist, the study passes this secondary check. If new data exist, the study fails this secondary check.

This secondary check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.10. Secondary Check: Land Use Changes

Question: Have there been significant changes to land use or vegetation coverage in the coastal SFHA that could impact coastal floodplain mapping?

Figure D-10: Evaluation Process for Land Use Changes



Land use is an important factor in both overland coastal storm surge modeling and overland wave propagation modeling. Specifically, it is used to determine drag and friction coefficients in the modeling and has an impact on the 1-percent-annual-chance flood zone mapping. If there have been large land use changes to a coastal floodplain since an effective study was completed, the effective flood zone maps may no longer accurately represent the flood risk. This secondary check is designed to identify these situations.

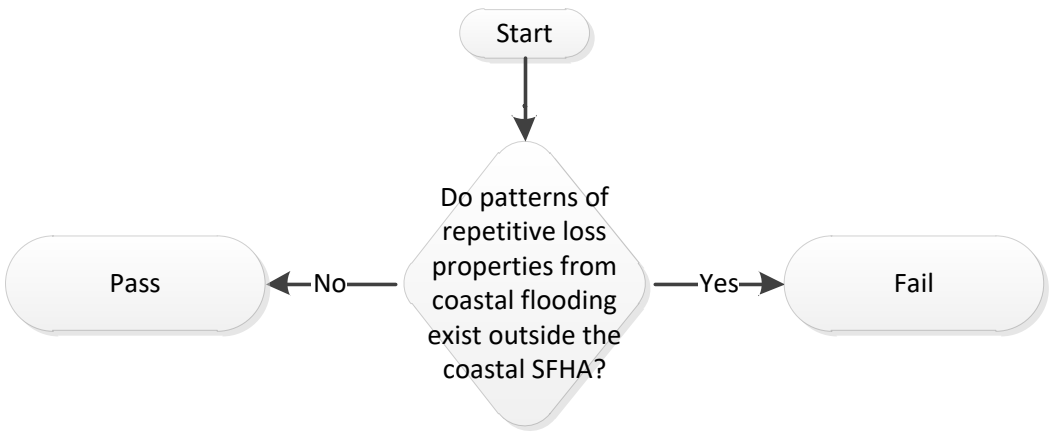
To complete this secondary check, a reviewer checks to see if at least 30% of the area within the SFHA undergoing CNMS evaluation has changed in land use. This is evaluated by reviewing GIS data of the study area. A potential source for this data is the National Land Cover Dataset developed by the Multi-Resolution Land Characteristics Consortium (MRLC - www.mrlc.gov). This dataset is utilized by ADCIRC developers. The MRLC compiles land use change surfaces in addition to land use coverage surfaces. Examples of a land use change include developing an area that was previously undeveloped and vegetated. Areas to check within the SFHA include all coastal flood zones (e.g., VE, AE, AO, and X Zones). If less than 30% of the SFHA has switched land use, the study passes this check. If 30% or more of the SFHA has switched, the study fails this check.

This secondary check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries. Tsunami runup analysis is typically dependent upon bottom friction which is largely influenced by land use. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.11. Secondary Check: Evidence of FIRM Inaccuracy – Repetitive Loss Properties

Question: Do patterns of repetitive loss properties from coastal flooding exist outside of the coastal SFHA?

Figure D-11: Evaluation Process for Repetitive Loss Properties



The effective FIRM panels for each region of the coast accurately portray the risk of coastal flooding due to the 1-percent-annual-chance event. If multiple properties and structures are repeatedly flooded by coastal storms and not included within an effective SFHA, the coastal flood maps are potentially inaccurate. This check helps a reviewer determine if there are general patterns in repetitive loss properties, due to coastal flooding, outside of the effective coastal SFHA from coastal flooding that indicate the SFHA should include more vulnerable areas.

Using available repetitive loss data, the reviewer should compare coastal repetitive loss property locations with the effective coastal SFHA. If there are general patterns of coastal repetitive loss properties that are excluded from the coastal SFHA, the study fails this secondary check. These patterns will likely exist as clusters or linear patterns in areas along the edge of the SFHA extent, but may include areas inland of the SFHA extent. If there are no general patterns of coastal repetitive loss properties that are excluded from the coastal SFHA, the study passes this critical check.

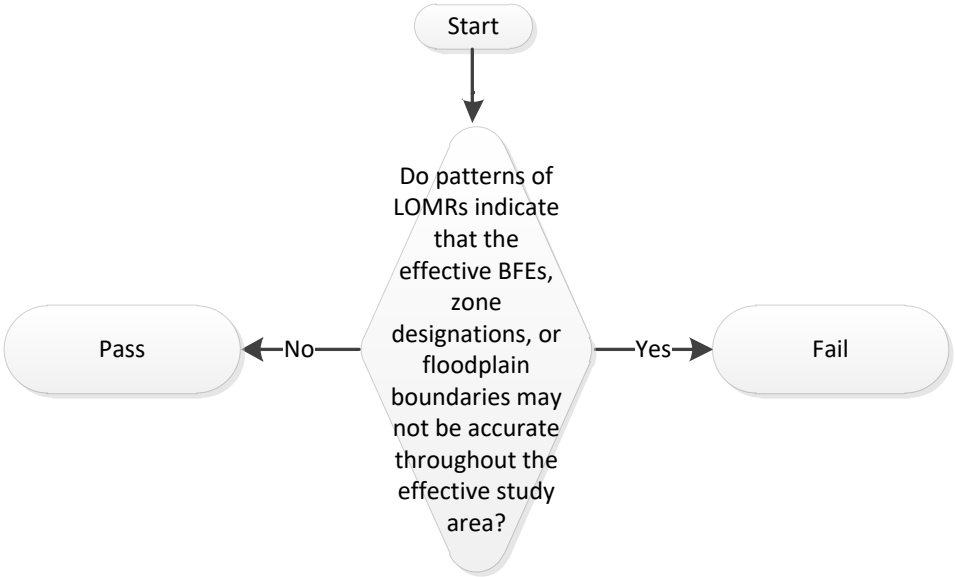
Instances of repetitive losses caused by local drainage issues, riverine flooding, or any other flooding besides coastal flooding, should not be considered.

This secondary check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries, and there are repetitive loss properties due to tsunamis outside of the effective flood zone. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.12. Secondary Check: Evidence of FIRM Inaccuracy – LOMRs

Question: Do patterns of LOMRs indicate that the present BFEs, zone delineations, or floodplain boundaries may not be correct?

Figure D-12: Evaluation Process for LOMRs



Over time, new evidence may indicate that the flood risk shown on the FIRM is no longer accurate. If there is sufficient evidence, the study should be classified as UNVERIFIED. This check determines if there are general patterns of LOMRs due to coastal flooding which indicate that the effective BFEs, zone designations, or floodplain boundaries may not be accurate.

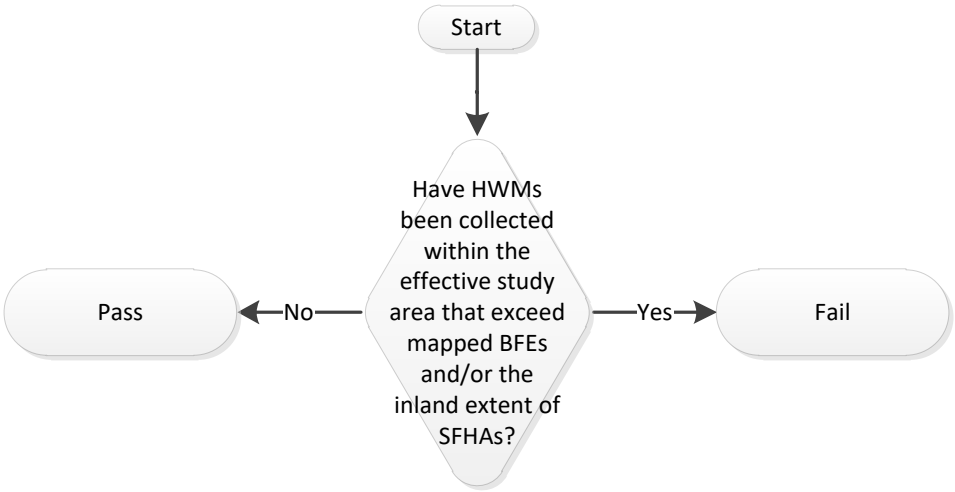
Using available MT-2 location data, the reviewer should compare LOMR locations with the effective floodplain mapping. Care should be used to evaluate only MT-2s subject to coastal flooding against the portion of the SFHA from the same coastal flooding source. If there are general patterns of LOMRs throughout the majority of the effective study area, it is likely that there is a larger, systematic issue with the analysis and mapping and the study fails this check. There is no specific number of LOMRs which would cause a study to fail this check, but a consistent pattern may emerge during a detailed evaluation. If there are no general patterns of LOMRs, the study passes this check. Isolated instances of LOMRs do not indicate that there is a larger, systematic issue with the effective analysis and mapping. These are best addressed through the LOMR process.

This secondary check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

D.13. Secondary Check: Evidence of FIRM Inaccuracy – High Water Marks

Question: Have high water marks (HWMs) been collected that exceed mapped BFEs and/or the inland extent of mapped SFHAs?

Figure D-13: Evaluation Process for High Water Marks



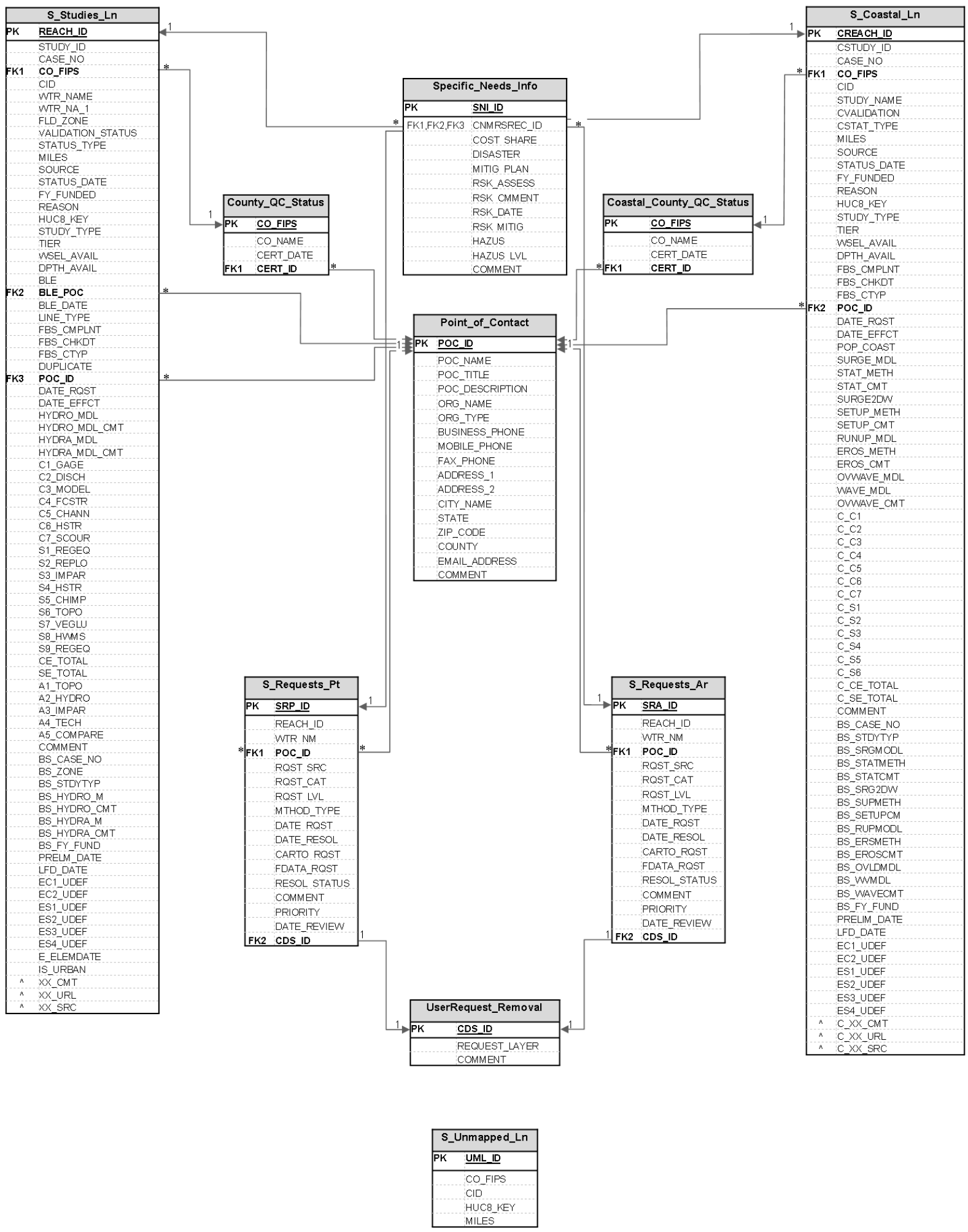
Over time, new evidence may indicate that the flood risk shown on the FIRM is no longer accurate. The collection of HWMs after a significant storm event will indicate varying flood impacts across a large geographic area.

If HWMs collected after the effective modeling date exceed the mapped BFEs for a particular study area, the coastal flood maps may not accurately characterize the risk due to the 1-percent-annual-chance event. In this check, a reviewer looks for HWM data that exceed the mapped BFEs for the study under CNMS evaluation. Federal agencies, such as the USGS and NOAA, as well as state and local databases (e.g., state climatology offices) should be searched to determine availability of new HWMs since the effective analysis. On the Pacific coast and Great Lakes, HWMs would exceed the mapped 1-percent-annual-chance TWLs. On the Atlantic and Gulf coasts, the HWMs would exceed the 1-percent-annual-chance SWELs. If HWMs exceed the mapped flood elevations, the study fails this check and more detailed analysis is required to determine if the HWMs are representative of the 1-percent-annual-chance flood elevations for the study area. A reviewer should also look for HWMs that exceed the inland extent of mapped SFHAs. If no HWMs exceed the mapped flood elevations, the study passes this check.

This secondary check applies to effective studies where tsunami runup analysis has been used to determine the BFEs, flood zone delineations, and flood zone boundaries, and HWMs have

been used to establish the maximum tsunami runup elevations and extents of inland inundation from a particular tsunami event. Study areas that incorporate tsunami analysis include but might not be limited to the Hawaiian Islands and Pacific coast.

Appendix E. CNMS Data Model Diagram



Appendix F. CNMS Field Descriptions and Data Dictionary

F.1. CNMS Feature Class and Table Field Descriptions

S_Studies_Ln Feature Class (polyline)

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
REACH_ID	Primary key for table. Assigned by table creator.	Yes	String	12	—
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.				
Potential source to obtain	A programmatic approach that prefixes five record counting digits with the 5-digit County FIPS code and a 2-digit feature class ID will produce a number like 201190100001 (20119 is the county FIPS code, 01 is the feature class ID for S_Studies_Ln and 00001 represent record counting digits) for the first record in S_Studies_Ln for Meade County, Kansas. No repeat counting digits should be used within the same county.				
Anticipated use for attribute	Unique identification of each individual CNMS record.				
STUDY_ID	Internal key used to establish relationship between reaches.	No	String	12	—
Type of data expected	This field will be a 12-digit string.				
Potential source to obtain	The value in this field will typically represent the existing REACH_ID of a single reach amongst a group of related reaches.				
Anticipated use for attribute	Key field used to link multiple reaches which represent segments of the same study. This field can also be used to link multiple reaches to external supporting data which is common among them. The expected relationship between this field and individual S_Studies_Ln features in one to many, with a single STUDY_ID being represented by one or more features.				
CASE_NO	A unique project identifier number (MIP Case Number) used for FEMA tracking purposes.	Yes	String	12	—
Type of data expected	E.g. 10-05-3616S. This case number should be that of the effective study.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data.				
CO_FIPS	Federal Information Processing Standard code.	Yes	String	12	—
Type of data expected	5-digit Federal Information Processing Standard code which uniquely identifies state and counties, or the equivalent. The first two digits are the FIPS state code and the last three are the county code within the state or possession.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
Potential source to obtain	Countywide FIRM or FIS; U.S Department of Commerce, Bureau of the Census, Geography Division is the maintenance agency. Many departments within the U.S. government maintain references back to this standard, including the Natural Resources Conservation Service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_013697				
Anticipated use for attribute	Establishes a unique identifier for determining the state and/or county within which the data resides.				
CID	Community Identification Number.	Yes	String	12	—
Type of data expected	A unique 5- or 6-digit number assigned to each community by FEMA and used for identity in computer databases; it is shown on the FIS, FIRM, and in the Q3 Flood Data files. The first two digits of the number are always the state FIPS code.				
Potential source to obtain	FEMA is the source. The CID is obtainable from multiple sources; Community Information System, Flood Insurance Studies, FIRM panels, FIRM indexes.				
Anticipated use for attribute	Catalog and referencing.				
WTR_NM	Name of flooding source.	No	String	50	—
Type of data expected	Water feature name (ex. Mississippi River, Lake Superior, Pacific Ocean).				
Potential source to obtain	The name of the flooding source should come from the FIS, FIRM, FIRM DB, or source stream network, and should be given that order of importance. The FIS lists profiles in alphabetical order in the table of contents and usually discusses them in other FIS sections in that same order. Section 1.2 should list all of these streams and the dates they were studied. Section 2.1 should also list all the streams studied by detailed methods, and should also list all the streams studied by approximate methods. Note that the FIRM Database should not be the sole source of information that is used to evaluate stream reaches. Often times there are graphic features or annotation on the PDF map panel that will help identify a stream reach.				
Anticipated use for attribute	This attribute provides a geographic place name reference.				
WTR_NM_1	Alternate name of flooding source.	No	String	50	—
Type of data expected	Water feature name (ex. Mississippi River, Lake Superior, Pacific Ocean).				
Potential source to obtain	If an alternative name of a flooding source is identified from the sources identified for the 'WATER_NAME' field, which will be stored here. Any other indications of an alternate name will also be captured in this field.				
Anticipated use for attribute	This attribute provides a geographic place name reference.				
FLD_ZONE	Zone type of the SFHA the polyline represents (ex. Zone AE, Zone A).	Yes	String	50	D_ZONE
Type of data expected	Entry from domain lookup table D_ZONE.				
Potential source to obtain	Flood zones depicted in the FIRM and/or FIRM Database of the NFIP.				
Anticipated use for attribute	Query into the characteristics of the inventory: type of study, Validation Status, mileage				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
VALIDATION_STATUS	This attribute establishes the latest evaluation condition of a flooding source centerline in relation to the criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.	Yes	String	50	D_VALID_CAT
Type of data expected	Entry from domain lookup table D_VALID_CAT.				
Potential source to obtain	Current entry; or user assessed entry based on evaluation of criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.				
Anticipated use for attribute	Used to categorize the Inventory for the purposes of planning, study selection, tracking and reporting.				
STATUS_TYPE	This attribute establishes the sub-categories for each of the Validation Status classes of a flooding source centerline in relation to the criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.	Yes	String	100	D_STATUS_TYPE
Type of data expected	Entry from domain lookup table D_STATUS_TYPE.				
Potential source to obtain	Current entry; or user assessed entry based on evaluation of criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.				
Anticipated use for attribute	Used to further define the Validation Status type to categorize the Inventory for the purposes of planning, study selection, tracking and reporting.				
MILES	An attribute of the calculated miles of the data record entry.	Yes	Number (double)	8	—
Type of data expected	A number corresponding to the length of the inventory polyline segment.				
Potential source to obtain	In feature class format, and if projection is in feet or meters permanent length field of feature class can be used to populate this field by applying the appropriate conversion to miles. Otherwise, make a field calculation using field calculator and convert to miles. Be sure to understand the units the projection is in and how it will influence any resulting calculations. The CNMS FGDB is provided in the NAD 1983 Geographic Coordinate System, at the Regional level, the length of the polyline segments can be calculated in local or state projections. During National data consolidation and analysis, the projection will be standardized across all Regions and mileage recalculated to a National standard.				
Anticipated use for attribute	Quantifies the CNMS Inventory in stream miles for reporting (ex. NVUE, quarterly reports).				
SOURCE	Source of polyline segment represented in the inventory.	Yes	String	100	D_SOURCE
Type of data expected	Entry from domain lookup table D_SOURCE.				
Potential source to obtain	User sourced dataset used for the polyline entry (ex. NFHL, RFHL, FIRM Database, NHD).				
Anticipated use for attribute	Verify source of polyline used, and also determine whether it could be updated to a more accurate polyline feature if one becomes available.				
Domain Table	D_SOURCE.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
STATUS_DATE	Date to track the status of the study within the CNMS inventory. The STATUS_DATE can only be changed as a result of one of the following conditions: 1. When a new or updated study has reached LFD issuance resulting in a study becoming VALID – NVUE COMPLIANT, the STATUS_DATE will be set to the LFD issuance date. 2. When the validation assessment of a study has been completed, the STATUS_DATE will be set to the date the assessment was completed (current date). 3. When a new or updated study is initiated, the STATUS_DATE is updated (current date) at each of the various CNMS touchpoints (scoping, production, Prelim, and LFD issuance). When a CNMS record is set to VALID – NVUE COMPLIANT as a result of validation assessment or LFD issuance, the STATUS_DATE marks the beginning of the 5-year clock and must not be changed until the next validation assessment is completed or updated study is initiated.	Yes	Date	8	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	Calendar, RSC Management.				
Anticipated use for attribute	Determine the most recent analysis and condition of the polyline. Will track and maintain the currency of the inventory, to insure all requirements are being adhered to according to mandates set forth within the NFIP.				
FY_FUNDED	Attribute of the most recent effective FEMA fiscal year funding applied to the stream reach at the time of study (ex. Watershed, county).	Yes	String	25	D_FY_FUNDED
Type of data expected	Entry from domain lookup table D_FY_FUNDED.				
Potential source to obtain	MIP case numbers (as they are associated with fiscal year first funded), RSC Management.				
Anticipated use for attribute	Determine the latest FEMA funding year for the underlying SFHA study.				
REASON	Attribute allows for user input of detailed description of considerations or special circumstances when determining attributes VALIDATION_STATUS, SOURCE, or any pertinent information in the data creation process.	Null	String	255	—
Type of data expected	Preferably user defined template “canned” descriptors of their data entry process and considerations.				
Potential source to obtain	Criteria evaluated and considered in the bulk validation of CNMS Study Records, ancillary information presented by the regions or other parties, data used that is not readily available, etc.				
Anticipated use for attribute	Attribute will document more details about the underlying considerations of other attributes contained in the CNMS database. This will serve as a first stop when questions arise about the attribution contained in the database without going back to the criteria, check sheets, or intermediate datasets. By choosing to use template “canned” entries, query of such entries will be streamlined. A useful example might be the need to query a specific consideration that based on current business rules is attributed a certain way, but based on new information might need to be queried and reattributed a different way.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
HUC8_KEY	8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds knows as hydrologic cataloging units. This can be obtained by overlaying the HUC spatial files with the polyline information to determine which cataloging unit the polyline resides in.	Yes	String	8	—
Type of data expected	8-digit Hydrologic Unit Code.				
Potential source to obtain	Originator: United States Geological Survey (USGS): https://nhd.usgs.gov/data.html; or EPA surf your watershed: https://cfpub.epa.gov/surf/locate/index.cfm				
Anticipated use for attribute	Provides an attribute to determine what HUC 8 sub-basin the polyline resides in.				
STUDY_TYPE	Study type of the SFHA represented by the reach based on the current effective FIS text.	Yes	String	40	D_STUDY_TYPE
Type of data expected	Entry from domain lookup table D_STUDY_TYPE.				
Potential source to obtain	FIS Text, Study Manager Input, etc.				
Anticipated use for attribute	Query into the characteristics of the inventory: type of study, Validation Status, mileage.				
TIER	A tracking method within CNMS on program “maturity” curve.	Yes	String	12	D_TIER
Type of data expected	Tier 0, 1, 2, 3, 4 or 5 entry from domain lookup table D_TIER Tier 0: Known to be flood prone (i.e. draining greater than 1 square mile) but not yet identified as SFHA on a regulatory FIRM Tier 1: SFHA is not available in digital format. Tier 2: SFHA is available as a digital product, but not known to be model-backed. Tier 3: Is available as a digital product, model-backed and may not be consistent with high quality elevation data (utilizes elevation data inferior to USGS Quality Level (QL) 2 equivalence or better). Tier 4: is available as a digital product, model-backed and consistent with high quality elevation data (USGS Quality Level (QL) 2 equivalence or better). (This tier should serve as meeting all current Risk MAP technical requirements). Tier 5: SFHA is available as a digital product, and including enhanced analyses such as future land use, or future climate-informed analyses.				
Potential source to obtain	Determination may be made by query of attributes in CNMS and/or referencing the effective FIS.				
Anticipated use for attribute	To categorize CNMS studies into 5 Tiers.				
WSEL_AVAIL	Tracks availability of Water Surface Elevation (WSEL) grids and if they are compliant with FEMA SID 415.	No	String	50	D_WSEL_AVAIL
Type of data expected	Entry from domain lookup table D_WSEL_AVAIL.				
Potential source to obtain	Flood Risk Database, RSC or Study Manager input.				
Anticipated use for attribute	Tracking mechanism for availability of WSEL grids and whether or not they meet FEMAs quality standards.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
DPTH_AVAIL	Tracks availability of depth grids and if they are compliant with FEMA SID 628.	No	String	50	D_DEPTH_AVAIL
Type of data expected	Entry from domain lookup table D_DPTH_AVAIL.				
Potential source to obtain	Flood Risk Database, RSC or Study Manager input.				
Anticipated use for attribute	Tracking mechanism for availability of depth grids and whether or not they meet FEMAs quality standards.				
BLE	Base Level Engineering (BLE) or Large Scale Automated Engineering (LSAE) study.	No	String	20	D_BLE
Type of data expected	Entry from domain lookup table D_BLE.				
Potential source to obtain	RSC, Study Manager input.				
Anticipated use for attribute	Tracking mechanism for availability of BLE or LSAE. Refer to FEMA Base Level Engineering Analysis and Mapping Guidance for BLE classification descriptions.				
BLE_POC	Foreign key to join to 'Point_of_Contact' table. ID for Point of Contact for BLE or LSAE study.	If BLE_LSAE field is populated, Yes	String	12	—
Type of data expected	This field, if populated, should have a matching record in the 'Point_of_Contact' table.				
Potential source to obtain	Establishing the relationship of 'S_Studies_Ln' records and 'Point_of_Contact' records is user controlled.				
Anticipated use for attribute	This field is used to establish a database relationship with records in the 'Point_of_Contact' table. The supporting idea is to relate record ownership information to specific CNMS records.				
BLE_DATE	Date of the completed hydraulic analysis of BLE or LSAE study. If study is ongoing or recently funded use 1/1/2050 until analysis is completed.	Yes	Date	—	—
Type of data expected	This field is of the type date. Data should be entered in MM/DD/YYYY format.				
Potential source to obtain	RSC or Study Manager input.				
Anticipated use for attribute	Provides users with sense of time from when modeling inputs were performed. If BLE_LSAE field is populated, blanks in this field would imply study is funded or in progress. Records with a date would imply analysis complete.				
LINE_TYPE	Attribute provides description of flooding source line type as being Riverine, Lake, Pond, Playa, Ponding, or Other.	Yes	String	40	D_LINE_TYPE
Type of data expected	Entry from domain lookup table D_LINE_TYPE.				
Potential source to obtain	Current entry or user assessed entry based on line geometry source.				
Anticipated use for attribute	Attribute will allow for the identification of non-riverine flooding sources which do not fit well with the linear riverine model for calculating NVUE mileage. This attribute is to be used to equate the level of effort associated with each of line type relative to the level of effort associated with Riverine studies.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
FBS_CMPLNT	Is the floodplain represented by this feature FBS Compliant? (False (NO) / True (YES) / UNKNOWN). LOMRs do not apply, set to UNKNOWN.	Yes	String	10	D_TrueFalse
Type of data expected	This field is based upon domain lookup table D_TrueFalse.				
Potential source to obtain	Regional Support Centers and /or TSDN. This is typically submitted around QR3 and no later than 30 days after Preliminary issuance.				
Anticipated use for attribute	Tracking FBS compliance stream by stream.				
FBS_CHKDT	Date when the FBS audit was performed on the stream. If the report is not dated, use the date the report was delivered to FEMA / Mapping Information Platform or as a last resort the date when the FBS_CMPLNT field was populated. LOMRs do not apply, set to STATUS_DATE	Yes	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	Calendar.				
Anticipated use for attribute	Tracks attribution of latest FBS compliance value.				
FBS_CTYP	FBS compliance check type – bulk attributed at project level (e.g., county-wide, watershed, PMR) or attributed individually. LOMRs do not apply, set to INDIVIDUAL REACH ATTRIBUTION.	Yes	String	50	D_FBS_CTYPE
Type of data expected	This field will hold a user selected value from domain table D_FBS_CTYP.				
Potential source to obtain	Entered by user when FBS_CMPLNT field is populated, based upon check type.				
Anticipated use for attribute	Indicator of the type of FBS check recorded for this reach.				
DUPLICATE	Is there a second line representing an SFHA across a political boundary, for a second study on the same extent of the reach (CATEGORY 1, CATEGORY 2, or CATEGORY 3)?	Yes	String	20	D_DUPLICATE

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
Type of data expected	Where a stream defines a county boundary, and there are two SFHA studies on the same reach of the stream, there will be two lines representing the same reach. One line will be set to 'CATEGORY 1' and the other line for the same reach extent will be set to 'CATEGORY 2'. All other streams on the interior of county boundaries, and for which only one study exists for that stream along a county boundary, will have the value set to ''CATEGORY 3' by default. An exception to this is that two lines are to always be shown at Regional boundaries, even when the same study is used for both entities. Ideally, the line set to 'CATEGORY 1' will be the one with a better Validation Status and a more detailed study out of the two that represent two studies performed on the same reach. This way, while considering stream miles for a watershed-based scoping, the better study could be hidden by a query, and the mapping needs will become more apparent. The hierarchy for determining the 'better' of the two studies is defined as follows and ranked numerically, meaning the criteria in item 1 supersedes ones below it for defining a better study. Legend: '>' = 'better than'. 1. Detailed study > Approximates (regardless of Validation Status or study type) 2. Valid study > Unknown' study > UNVERIFIED study (assuming both studies in question are detailed, or both are approximate) 3. Redelineated > Digital Conversion > Non-digital (assuming level of detail and Validation Status is the same for the 2 studies in question) 4. Effective date of engineering study or number of failed elements can be used to further differentiate between two of the same study types. (Newer studies are better. Lesser elements failing is better. Secondary elements failing is better than critical ones). If effective date of engineering study is the same for both counties, priority can be determined by most recent date of published effective flood insurance study.				
Potential source to obtain	While completing this field, one must check the same stream on the neighboring county to see if there is a second study for the same reach extent.				
Anticipated use for attribute	Provides input that helps determine double lines representing the same stream when two studies have been conducted for that stream on either landward side. This situation occurs when community boundaries are defined by a stream and each community performs independent studies to map the SFHA on either side of the county boundary. If the stream segment with a better Validation Status and a more detailed study, is set to 'CATEGORY 1,' while considering stream miles for a watershed-based scoping, the better study can be hidden by a query, and the mapping needs will become more apparent.				
HYDRO_DATE _EFFCT	Date of effective hydrology analysis.	Yes	Date	—	—
Type of data expected	This date field will be used to document when the hydrology effective study was produced because there can be much time between when the study was created and when it went effective. Age of maps does not adequately reflect the age of the analysis as a study can be published on multiple effective maps without change. At times, the date that the analysis *first* went effective is sufficient as well, especially when supporting data is sparse. Data should be entered in the MM/DD/YYYY format.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
Potential source to obtain	The date of the hydro effective analysis can be found in the project's hydrology report or Flood Insurance Study (FIS) text.				
Anticipated use for attribute	This date will be evaluated for age of analysis of the effective study.				
HYDRO_MDL	Hydrologic model used for the effective study.	Yes	String	100	D_HYDRO
Type of data expected	In this domain-based field the user should choose the name of the hydrologic model used and version, as appropriate.				
Potential source to obtain	There are two references in which one expects to find this information. One is in the reference section of the Flood Insurance Study (FIS) text and the second is the Technical Support Data Notebook (TSDN) for the study. A complete domain list of Hydrologic Models recognized by FEMA can be accessed on FEMA's Mapping Information Platform (MIP) or FEMA's website.				
Anticipated use for attribute	Reference and evaluation.				
HYDRO_MDL_CMT	Hydrologic model comment.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
HYDRA_DATE _EFFCT	Date of effective hydraulics analysis.	Yes	Date	—	—
Type of data expected	This date field will be used to document when the hydraulics effective study was produced because there can be much time between when the study was created and when it went effective. Age of maps does not adequately reflect the age of the analysis as a study can be published on multiple effective maps without change. At times, the date that the analysis *first* went effective is sufficient as well, especially when supporting data is sparse. Data should be entered in the MM/DD/YYYY format.				
Potential source to obtain	The date of the hydra effective analysis can be found in the project's hydraulics report or Flood Insurance Study (FIS) text.				
Anticipated use for attribute	This date will be evaluated for age of analysis of the effective study.				
HYDRA_MDL	Hydraulic model used for the effective study.	Yes	String	100	D_HYDRA
Type of data expected	In this domain-based field the user should choose the name of the hydraulic model used and version, as appropriate.				
Potential source to obtain	There are two references in which one expects to find this information. One is in the reference section of the Flood Insurance Study (FIS) text and the second is the Technical Support Data Notebook (TSDN) for the study. A complete domain list of Hydraulic Models recognized by FEMA can be accessed on FEMA's Mapping Information Platform (MIP) and FEMA's website.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	Reference and evaluation.				
HYDRA_MDL_CMT	Hydraulic model comment.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
TOPO_DATE	Date the topography dataset was collected or completed.	Yes	Date	—	—
Type of data expected	This field will allow users know the time period of the topography dataset that was used to create the effective modeling. This date should be earlier than the Hydrology and Hydraulic modeling dates for the same study.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer (https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography date is used in conjunction for a number of assessment checks.				
TOPO_SRC	The source of the LiDAR or topography dataset.	Yes	String	255	—
Type of data expected	This field should include pertinent details about owner, contractor, type, and quality level of the dataset.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer (https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography source is used in conjunction for a number of assessment checks.				
C1_GAGE	Critical Element 1, Change in gage record. Major change in gage record since effective analysis that includes major flood events (PASS/FAIL/UNKNOWN)? NOTE: Users may indicate change in rainfall record or other climatologic data in this field if gage data is not available but other precipitation indicators are available.	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not a major change in gage records has been observed since the effective analysis was completed.				
Potential source to obtain	Investigate the existence of gages along the reach. Record all gages near or on the stream reach AND gages listed in the FIS.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C2_DISCH	Critical Element 2, Change in Discharge. Updated and effective peak discharges differ significantly based on confidence limits criteria in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping* (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not updated and effective peak discharges differ significantly based on FEMA's current confidence limits criteria since the effective analysis was completed.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
Potential source to obtain	Look at the years of record for each gage. The FIS may tell you how many years of record were used in the model. Gage data are measured, compiled and served via web access by the USGS. The gage Esri shapefile will tell you if there are continuous and updated years of record available. Determine if 100-yr discharge obtained by running PeakFQ at effective date is still within 68% confidence interval of the Bullet 17B 100-yr estimate using updated gage data and PeakFQ. If not, Critical Element is set to 'FAIL'.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C3_MODEL	Critical Element 3, Model methodology. Model methodology no longer appropriate based on *Guidelines and Standards for Flood Risk Analysis and Mapping* (i.e. one-dimensional vs. two-dimensional modeling; Coastal Guidelines) (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not the model methodology used to produce the effective analysis still meet current guidelines and specifications.				
Potential source to obtain	Research and general knowledge to be provided by engineering staff.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C4_FCSTR	Critical Element 4, Hydraulic Change. Addition/removal of a major flood control structure (i.e., certified levee or seawall, reservoir with more than 50 acre-ft storage per square mile) (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there have been major flood control structures added or removed since the effective analysis was completed.				
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C5_CHANN	Critical Element 5, Channel Reconfiguration. Current channel reconfiguration outside effective SFHA (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not any channel reconfiguration outside the effective special flood hazard area (SFHA) have been observed since the effective analysis was completed.				
Potential source to obtain	NAIP or DOQQ imagery can be used to determine if the mapped SFHAs do not match the channel configurations on the aerial. If they do not match, record a FAIL. If you record a FAIL be sure you can go back and state with confidence that the SFHAs do not match information on the aerial. NOTE: when stating FAIL, you are saying that the floodplains on the map are no longer valid.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
C6_HSTR	Critical Element 6, Hydraulic Change 2. 5 or more new or removed hydraulic structures (bridge/culvert) that impact BFEs (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not 5 or more new or removed hydraulic structures (bridge/culvert) that impact base flood elevations (BFEs) have been observed since the effective analysis was completed. Consider any combination of new and removed of 5 or more structures (i.e. 3 new and 3 removed). This should not be used to supersede the Letter of Map Revision process.				
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C7_SCOUR	Critical Element 7, Channel Area Change. Significant channel fill or scour (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not significant channel fill or scour has been observed since the effective analysis was completed.				
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
S1_REGEQ	Secondary Element 1, Regression Equation. Use of rural regression equations in urbanized areas (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not a regression equation intended for rural use was used in an urbanized area.				
Potential source to obtain	An existing study will indicate the use of a regression equation and provide information on the area for which the model was run. This field could indicate the incorrect use of a regression equation intended for rural areas in urban areas or could capture that urban sprawl has overtaken a once rural area for which a rural regression equation model has been run.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S2_REPLO	Secondary Element 2, Repetitive Loss. Repetitive losses outside the SFHA (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not repetitive loss claims have been filed for properties outside the SFHA.				
Potential source to obtain	If there are repetitive loss points close to your reach and outside the SFHA, record a FAIL.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
S3_IMPAR	Secondary Element 3, Impervious Area. Increase in impervious area in the sub-basin of more than 50 percent (i.e., 10 percent to 15 percent, 20 percent to 30 percent, etc.) (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there is a significant increase in impervious surface in the sub-basin since the effective study.				
Potential source to obtain	Taking advantage of remote sensing land use classification data, or change detection analyses are potential sources for this field.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S4_HSTR	Secondary Element 4, Hydraulic Structure. More than 1 and less than 5 new or removed hydraulic structures (bridge/culvert) impacting BFEs (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there have been 1 to 4 new and/or removed hydraulic structures that impact BFEs since the effective study. This should not be used to supersede the Letter of Map Revision process.				
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S5_CHIMP	Secondary Element 5, Channel Improvements. Channel improvements / Shoreline changes (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there have been any channel improvement or shoreline changing projects since the effective study. This should not be used to supersede the Letter of Map Revision process.				
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation but one might check the local public works department for available supporting documentation.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S6_TOPO	Secondary Element 6, Topography Data. Availability of better topography/bathymetry (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there are new topographic data meeting FEMA minimum standards available since the effective study.				
Potential source to obtain	Look into all the resources available to determine if newer and/or more accurate topographic data are available for the reach and record a yes if you find updated topography (this will ultimately be based on whether or not new topographic data meet FEMA's minimum standards and are better that what was used for the effective study. The investigation of 'YES's' should be performed with an engineer or manager).				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
S7_VEGLU	Secondary Element 7, Vegetation or Land Use. Changes to vegetation or land use (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there are significant changes in land use or vegetation since the effective study. This does NOT include urban change.				
Potential source to obtain	Look at the NAIP (streaming) and other sources available to you to determine if the area has experienced changes to vegetation or land use.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S8_HWMS	Secondary Element 8, High Water Mark. Significant storms with High Water Marks (PASS/FAIL/UNKNOWN).	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there is recent storm surge high water mark data now available following the effective study.				
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation. One might reference an after-action report following a recent high water event.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S9_REGEQ	Secondary Element 9, Regression Equation. New regression equations available (PASS/FAIL/UNKNOWN)?	Yes	Short Integer	—	D_ELEMENT
Type of data expected	The originator of the CNMS record should have professional knowledge of this situation. This information may come to light following the release of a new study that includes a new regression model.				
Potential source to obtain	Research and general knowledge to be provided by engineering staff.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
CE_TOTAL	Total number of critical elements.	Yes	Short Integer	—	—
Type of data expected	A number equivalent to the sum of the number of Critical Elements equaling 'FAIL' from above.				
Potential source to obtain	User is to provide the sum of Critical Elements.				
Anticipated use for attribute	Determination of 'VALIDATED' vs. UNVERIFIED; UNVERIFIED is CE_Total > 0.				
SE_TOTAL	Total number of secondary elements.	Yes	Short Integer	—	—
Type of data expected	A number equivalent to the sum of the number of Secondary Elements equaling 'FAIL' from above.				
Potential source to obtain	User is to provide the sum of Secondary Elements.				
Anticipated use for attribute	Determination of 'VALIDATED' vs. UNVERIFIED; UNVERIFIED is SE_Total >= 4.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
A1_TOPO	Zone A Initial Assessment Check A1. Significant Topography Update Check.	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not a topographic data source is available that is significantly better than what was used for the effective Zone A modeling and mapping.				
Potential source to obtain	A new topographic data source for the study area of the effective Zone A must be available that meets or exceeds the requirements for vertical accuracy described in Program Standard 43.				
Anticipated use for attribute	A determination of FAIL for this initial assessment would trigger a BLE/LSAE data comparison; if no BLE/LSAE data is available then the validation status may be changed to UNVERIFIED.				
A2_HYDRO	Zone A Initial Assessment Check A2. Significant Hydrology Change Check.	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not new regression equations have become available for the effective study that would significantly affect the flow.				
Potential source to obtain	Availability of new regression equations can be checked with the USGS. Determination of significance must be made by professional judgment of an engineer.				
Anticipated use for attribute	A determination of FAIL for this initial assessment would trigger a BLE/LSAE data comparison; if no BLE/LSAE data is available then the validation status may be changed to UNVERIFIED.				
A3_IMPAR	Zone A Initial Assessment Check A3. Significant Development Check (NUCI Analysis).	Yes	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there has been significant development in the watershed since the effective analysis.				
Potential source to obtain	National Urban Change Indicator (NUCI) and National Land Cover Data (NLCD).				
Anticipated use for attribute	A determination of FAIL for this initial assessment would trigger a BLE/LSAE data comparison; if no BLE/LSAE data is available then the validation status may be changed to UNVERIFIED.				
A4_TECH	Zone A check A4. Check of studies backed by technical data.	Yes	Short Integer	—	D_ELEMENT
Type of data expected	For studies that do not fail one or more initial Zone A assessment checks, this PASS/FAIL field determines if the effective study is supported by modeling or sound engineering judgment and all regulatory products are in agreement.				
Potential source to obtain	FEMA Engineering Library.				
Anticipated use for attribute	If the effective Zone A study passes all initial assessment checks but is not supported by modeling, or if the original engineering method used is unsupported or undocumented, the BLE/LSAE comparison should be performed. Alternatively, if BLE/LSAE data are unavailable and the effective Zone A study passes all initial assessment checks but is not supported by modeling, or if the original engineering method used is unsupported or undocumented, then the study may be categorized as “Unverified” in the CNMS inventory.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
A5_COMPARE	Comparison of check of refined Zone A engineering analysis (BLE or LSAE) and effective Zone A study.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to record whether or not the effective study passes or fails a BLE/LSAE comparison.				
Potential source to obtain	BLE/LSAE data including cross sections attributed with +/-1 percent WSEL, Effective Zone A boundary, or BLE/LSAE topographic data.				
Anticipated use for attribute	When all other initial Zone A validation checks have been conducted, approximate studies may need to be compared to BLE/LSAE results to determine their validation status. Studies that pass the BLE/LSAE comparison may be categorized as VALID and those that do not pass categorized as UNVERIFIED.				
COMMENT	Additional comments.	No	String	255	—
Type of data expected	Additional analyst comments.				
Potential source to obtain	User comments.				
Anticipated use for attribute	Though the field cannot be domain enforced, it will sometimes include information pertaining to Validation decisions, or LOMR incorporation effects.				
BS_CASE_NO	A unique project identifier number (MIP Case Number) used for FEMA tracking purposes.	Yes	String	12	—
Type of data expected	E.g. 10-05-3616S.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data.				
BS_ZONE	Zone type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.	Yes	String	60	D_ZONE
Type of data expected	Entry from domain lookup table D_ZONE.				
Potential source to obtain	Flood zones depicted in scoping data or the Preliminary FIRM and/or FIRM Database of the NFIP.				
Anticipated use for attribute	Stores the flood zone type of a study currently in progress.				
BS_STDYTYP	Study type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.	Yes	String	255	D_STUDY_TYPE
Type of data expected	Entry from domain lookup table D_STUDY_TYPE.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Stores the study type of a study currently in progress.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
BS_HYDRO_M	Hydrologic model used for creating the SFHA represented by the reach currently being studied based on scoping data or the preliminary FIS text.	No	String	100	D_HYDRO
Type of data expected	In this domain-based field the user should choose the name of the hydrologic model used and version, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Stores the study type of a study currently in progress.				
BS_HYDRO_CMT	Being Studied Hydrologic model comment.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model being used not part of domain list.				
BS_HYDRA_M	Hydraulic model used for creating the SFHA represented by the reach currently being studied based on scoping data or the preliminary FIS text.	No	String	100	D_HYDRA
Type of data expected	In this domain-based field the user should choose the name of the hydraulic model used and version, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Stores the study type of a study currently in progress.				
BS_HYDRA_CMT	Being Studied Hydraulic model comment.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model being used not part of domain list.				
BS_FY_FUND	Attribute of the most recent effective FEMA fiscal year funding applied to the stream reach at the time of study (ex. Watershed, county).	Yes	String	4	D_FY_FUNDED
Type of data expected	Entry from domain lookup table D_FY_FUNDED.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Determine the latest FEMA funding year for the underlying SFHA study.				
_BS_PRELM_DATE	Expected Preliminary issuance date for reaches representing areas being actively studied.	Yes	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use 1/1/2049 as a default placeholder for Preliminary date.				
Anticipated use for attribute	Stores the expected Preliminary Date of a study currently in progress.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
BS_LFD_DATE	Expected Letter of Final Determination issuance date for reaches representing areas being actively studied.	Yes	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use 1/1/2050 as a default placeholder for LFD date.				
Anticipated use for attribute	Stores the expected Letter of Final Determination Date of a study currently in progress.				
EC1_UDEF	User Defined Critical Element 1.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Critical.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record. In counties which have been identified as utilizing the Extra Elements, EC1_UDEF failure will result in an UNVERIFIED Validation Status assignment.				
EC2_UDEF	User Defined Critical Element 2.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Critical.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record. In counties which have been identified as utilizing the Extra Elements, EC2_UDEF failure will result in an UNVERIFIED Validation Status assignment.				
ES1_UDEF	User Defined Secondary Element 1.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES1_UDEF will contribute to the Secondary Element count.				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
ES2_UDEF	User Defined Secondary Element 2.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES2_UDEF will contribute to the Secondary Element count.				
ES3_UDEF	User Defined Secondary Element 3.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES3_UDEF will contribute to the Secondary Element count.				
ES4_UDEF	User Defined Secondary Element 4.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES4_UDEF will contribute to the Secondary Element count.				
E_ELEMDATE	The date on which the User Defined Element values were populated.	Yes	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	User is to provide the date on which the E Elements were evaluated.				
Anticipated use for attribute	The date on which the User Defined Elements were populated.				
IS_URBAN	Is the HUC12 watershed contained by the reach classified as urban according to state regression equations.	No	String	10	D_TrueFalse
Type of data expected	Yes or no is expected to indicate whether the reach is in an urban watershed.				
Potential source to obtain	State regression equations to determine definition of urban. If not listed, default to 15%.				
Anticipated use for attribute	Facilitation and documentation of associated validation assessment checks (S1, S3).				

Table F-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
XX_CMT*	Details on why a check passed or failed.	Yes	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	User defined.				
Anticipated use for attribute	Details on why a check passed or failed.				
XX_SRC*	The data source used for performing the CNMS check.	Yes	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	User defined.				
Anticipated use for attribute	The data source used for performing the CNMS check.				
XX_URL*	Web link to obtain or view the source data.	No	String	100	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	User defined.				
Anticipated use for attribute	Web link to obtain or view the source data.				

*Comment, Source, and URL fields exist for each critical and secondary element (C1-C7, S1-S9) in S_Studies_Ln

S_Requests Feature Classes (Point/Polygon)

Table F-2: S_Requests_Ar/S_Requests_Pt (Table ID Code: 03/04)

Field	Description	Required	Type	Length	Domain
SRA_ID / SRP_ID	Primary key for tables. Assigned by table creator.	Yes	String	12	—
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.				
Potential source to obtain	A programmatic approach that prefixes five record counting digits with the 5-digit County FIPS code and a 2-digit feature class ID produces a number like 201190300001 (20119 is the county FIPS code, 03 is the feature class ID for 'S_Requests_Ar' and 00001 represent record counting digits) for the first record in 'S_Requests_Ar' for Meade County, Kansas. No repeat counting digits should be used within the same county.				
Anticipated use for attribute	Unique identification of each individual CNMS record.				
REACH_ID	Foreign key to join to the primary key REACH_ID of 'S_Studies_Ln' or primary key CREACH_ID of 'S_Coastal_Ln' in the CNMS data model.	Yes	String	12	—
Type of data expected	A 12-digit key from the corresponding stream centerline in 'S_Studies_Ln' or coastal reach in 'S_Coastal_Ln' that is nearest to the 'S_Requests' feature when there is a 1-1 or many-1 mapping between the polygon in this feature class and features in 'S_Studies_Ln' or 'S_Coastal_Ln'. For polygons in 'S_Requests_Ar,' this field may be left blank when many stream centerlines from 'S_Studies_Ln' or coastal reaches in 'S_Coastal_Ln' lie within a single polygon in this feature class, i.e. when the mapping is 1- many or many-many.				
Potential source to obtain	REACH_ID field in 'S_Studies_Ln' or CREACH_ID field in 'S_Coastal_Ln'.				
Anticipated use for attribute	Catalog and referencing; foreign key to primary key of 'S_Studies_Ln' or primary key of 'S_Coastal_Ln'.				
CASE_NO	A unique project identifier number (MIP Case Number) used for FEMA tracking purposes.	Yes	String	12	—
Type of data expected	E.g. 10-05-3616S. This case number should be that of the effective study.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data.				
WTR_NM	Name of flooding source.	Yes	String	100	—
Type of data expected	Water feature name (ex. Mississippi River, Lake Superior, Pacific Ocean).				
Potential source to obtain	The name of the flooding source should come from the FIS, FIRM and FIRM DB, and should be given that order of importance. The FIS lists profiles in alphabetical order in the table of contents and usually discusses them in other FIS sections in that same order. Section 1.2 should list all of these streams and the dates they were studied. Section 2.1 should also list all the streams studied by detailed methods, and should also list all the streams studied by approximate methods. Note that the FIRM Database should not be the sole source of information that is used to evaluate stream reaches. Often times there are graphic				

Table F-2: S_Requests_Ar/S_Requests_Pt (Table ID Code: 03/04)

Field	Description	Required	Type	Length	Domain
	features or annotation on the PDF map panel that will help identify a stream reach.				
Anticipated use for attribute	This attribute provides a geographic place name reference.				
POC_ID	Foreign key to join to 'Point_of_Contact' table. ID for 'Point of Contact'.	Yes	String	20	—
Type of data expected	This field, if populated, should have a matching record in the 'Point_of_Contact' table.				
Potential source to obtain	Establishing the relationship of 'S_Requests_Ar' records and 'Point_of_Contact' records is user controlled.				
Anticipated use for attribute	This field is used to establish a database "join" with records in the 'Point_of_Contact' table. The supporting idea is to relate record ownership information to specific CNMS records.				
RQST_SRC	Source of request record.	Yes	String	50	D_RQST_SRC
Type of data expected	The predefined acceptable values are to be selected from the 'D_RQST_SRC' domain list.				
Potential source to obtain	User selected based upon the circumstances of the request.				
Anticipated use for attribute	Allow sorting and classifications of requests generated during validation assessments, CNMS online viewer, or direct Geodatabase entry.				
RQST_CAT	Distinction between Cartographic and Flood Data requests.	Yes	String	30	D_RQST_CAT
Type of data expected	The predefined acceptable values are to be selected from the 'D_RQST_CAT' domain list.				
Potential source to obtain	User selected based upon the circumstances of the request.				
Anticipated use for attribute	Catalog and reference.				
RQST_LVL	Level of analysis requested.	Yes	String	30	D_RQST_LVL
Type of data expected	The predefined acceptable values are to be selected from the 'D_RQST_LVL' domain list.				
Potential source to obtain	User selected based upon the circumstances of the request.				
Anticipated use for attribute	Catalog and reference.				
MTHOD_TYPE	Type of method used.	Yes	String	20	D_MTHOD_TYPE
Type of data expected	The predefined acceptable values are to be selected from the 'D_MTHOD_TYPE' domain list.				
Potential source to obtain	User selected based upon the circumstances of the request.				
Anticipated use for attribute	Study background information gathering.				
DATE_RQST	Date request is made.	Yes	Date	—	—
Type of data expected	This field is of the type date. Date should be entered in MM/DD/YYYY format.				
Potential source to obtain	The user should enter the date for which the CNMS record was entered in the database.				

Table F-2: S_Requests_Ar/S_Requests_Pt (Table ID Code: 03/04)

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	Resource and tracking are the anticipated uses of dates.				
DATE_RESOL	Date request is resolved.	Yes	Date	—	—
Type of data expected	This field is of the type date. Date should be entered in MM/DD/YYYY format.				
Potential source to obtain	Regional Support Center or relevant Study Managers. Date should represent the date of effective analysis for the study of the associated reach which addressed the Request.				
Anticipated use for attribute	Resource and tracking are the anticipated uses of dates.				
CARTO_RQST	Type of cartographic change requested.	Yes	String	50	D_CARTO_RQST
Type of data expected	It is expected that a single CNMS Request record will be either cartographic or flood data related. If the 'RQST_CAT' is CARTOGRAPHIC in nature, this field will be populated with predefined acceptable values selected from the 'D_CARTO_RQST' domain list. Populating this field with cartographic information implies that the 'FDATA_RQST' field remains unpopulated.				
Potential source to obtain	This information is expected to come from the originator of the CNMS Request record.				
Anticipated use for attribute	Catalog and reference.				
FDATA_RQST	Type of flood data change requested.	Yes	String	50	D_FDATA_RQST
Type of data expected	It is expected that a single CNMS Request record will be either flood data or cartographic related. If the 'RQST_CAT' is FLOOD DATA in nature, this field will be populated with predefined acceptable values selected from the 'D_FDATA_RQST' domain list. Populating this field with flood data information implies that the 'CARTO_RQST' field remains unpopulated.				
Potential source to obtain	This information is expected to come from the originator of the CNMS Request record.				
Anticipated use for attribute	Catalog and reference.				
RESOL_STATUS	Current request status pursuant to FEMA record review of the requested action or subsequent resolution.	No	String	25	D_RESOL_STAT
Type of data expected	Entry from domain lookup table D_RESOL_STATUS.				
Potential source to obtain	This information is expected to come from the reviewer of the CNMS Request record at a FEMA Regional or HQ level.				
Anticipated use for attribute	Resource and tracking.				
COMMENT	Additional comments.	No	String	255	—

Table F-2: S_Requests_Ar/S_Requests_Pt (Table ID Code: 03/04)

Field	Description	Required	Type	Length	Domain

PRIORITY	a. Priority of Request (HIGH, MED, LOW). Cartographic requests should not be prioritized as HIGH. "PRIORITY" field suggestions:
	• High
	  ○ BFE Errors
	  ○ Coastal Gutter Errors
	  ○ Floodway Delineation Errors
	  ○ Levee issue
	• Medium
	  ○ Changes to Hydraulic Condition
	  ○ Changes to Hydrologic Condition
	  ○ Community Model or Data
	  ○ Cross Section Errors
	  ○ Floodplain Delineation Errors
	  ○ High Water Data from Recent Flood
	  ○ Impacted Structures
	  ○ Other: Typically set priority to medium, more details required to be provided in comment field.
	  ○ Population Change or Growth in Floodplain
	• **Low**
	  ○ Cross section water name is wrong
	  ○ Road flooding not shown on map
	  ○ Flooding pinch point
		Yes	String	20	D_PRIORITY

Type of data expected	Entry from domain lookup table.				
Potential source to obtain	This information is expected to come from the originator of the CNMS Request record.				
Anticipated use for attribute	Resource and tracking.				

Table F-2: S_Requests_Ar/S_Requests_Pt (Table ID Code: 03/04)

Field	Description	Required	Type	Length	Domain
DATE_REVIEW	Date FEMA has reviewed incoming request and authorized its inclusion in the database.	No	Date	—	—
Type of data expected	This field is of the type date. Date should be entered in MM/DD/YYYY format.				
Potential source to obtain	This information is expected to come from the reviewer of the CNMS Request record at a FEMA Regional or HQ level.				
Anticipated use for attribute	Resource and tracking.				
CDS_ID	Unique identifier for Customer and Data Services Contractor (CDS) application system tracking.	Yes	String	12	—
Type of data expected	Text field size 12 – unique ID only created by CDS application.				
Potential source to obtain	CDS application will populate this field automatically and should not be edited or populated by any other means.				
Anticipated use for attribute	CDS Application system request record tracking.				

S_UnMapped_Ln Feature Class (polyline)

Table F-3: S_Unmapped_Ln (Table ID Code: 07)

Field	Description	Required	Type	Length	Domain
UML_ID	Primary key for table. Assigned by table creator.	Yes	String	12	—
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.				
Potential source to obtain	A programmatic approach that prefixes five record counting digits with the 5-digit County FIPS code and a 2-digit feature class ID produces a number like 201190700001 (20119 is the county FIPS code, 07 is the feature class ID for 'S_Unmapped_Ln' and 00001 represent record counting digits) for the first record in 'S_Unmapped_Ln for Meade County, Kansas. No repeat counting digits should be used within the same county.				
Anticipated use for attribute	Unique identification of each individual CNMS record.				
COMID	Primary key to relate back to the National Hydrology Dataset (NHD) medium resolution. Not assigned by table creator.	No	Long integer	—	—
Type of data expected	A number corresponding to National Hydrology Dataset medium resolution polyline segment.				
Potential source to obtain	The flowline Network layer within the CONUS-wide NHDPlusV21 (NHD Medium Resolution) geodatabase, which was downloaded in March of 2017				
Anticipated use for attribute	An identifier if users want to relate back to NHD.				
MILES	An attribute of the calculated miles of the data record entry.	Yes	Number (Double)	8	—
Type of data expected	A number corresponding to the length of the inventory polyline segment.				
Potential source to obtain	In feature class format, and if projection is in feet or meters permanent length field of feature class can be used to populate this field by applying the appropriate conversion to miles. Otherwise, make a field calculation using field calculator and convert to miles. Be sure to understand the units the projection is in and how it will influence any resulting calculations. The CNMS FGDB is provided in the NAD 1983 Geographic Coordinate System, at the Regional level, the length of the polyline segments can be calculated in local or state projections. During National data consolidation and analysis, the projection will be standardized across all Regions and mileage recalculated to a National standard.				
Anticipated use for attribute	Quantifies the CNMS Inventory in Tier 0 miles for reporting.				

Table F-3: S_Unmapped_Ln (Table ID Code: 07)

Field	Description	Required	Type	Length	Domain
CO_FIPS	Federal Information Processing Standard code for the county.	Yes	String	12	—
Type of data expected	5-digit Federal Information Processing Standard code which uniquely identifies state and counties, or the equivalent. The first two digits are the FIPS state code and the last three are the county code within the state or possession.				
Potential source to obtain	Countywide FIRM or FIS; U.S Department of Commerce, Bureau of the Census, Geography Division is the maintenance agency. Many departments within the U.S. government maintain references back to this standard, including the Natural Resources Conservation Service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_013697				
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.				
CID	Community Identification Number.	No	String	12	—
Type of data expected	A unique 6-digit number assigned to each community by FEMA and used for identity in computer databases; it is shown on the FIS, FIRM, and in the Q3 Flood Data files. The first two digits of the number are always the state FIPS code.				
Potential source to obtain	FEMA is the source. The CID is obtainable from multiple sources; Community Information System, Flood Insurance Studies, FIRM panels, FIRM indexes.				
Anticipated use for attribute	Catalog and referencing.				
HUC8_KEY	8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds knows as hydrologic cataloging units. This can be obtained by overlaying the HUC spatial files with the polyline information to determine which cataloging unit the polyline resides in.	Yes	String	8	—
Type of data expected	8-digit Hydrologic Unit Code.				
Potential source to obtain	Originator: United States Geological Survey (USGS): https://nhd.usgs.gov/data.html; or EPA surf your watershed: https://cfpub.epa.gov/surf/locate/index.cfm				
Anticipated use for attribute	Provides an attribute to determine what HUC 8 sub-basin the polyline resides in.				
GNIS_NAME	Name of NHD water source.	No	String	255	—
Type of data expected	Name if NHD has indicated one, not all NHD polylines are named.				
Potential source to obtain	NHDPlusV21 (NHD Medium Resolution) geodatabase.				
Anticipated use for attribute	A potential flooding source name.				

Table F-3: S_Unmapped_Ln (Table ID Code: 07)

Field	Description	Required	Type	Length	Domain
FEDLAND	Indicates if a stream segment is within federal land.	Yes	String	10	D_TrueFalse
Type of data expected	Domain True or False.				
Potential source to obtain	Federal land boundaries (from https://nationalmap.gov/small_scale/atlasftp.html#fedlanp) downloaded from the nationalmap.gov, this layer was last revised in 2014.				
Anticipated use for attribute	Used for program planning awareness and outreach.				
TRIBALLAND	Indicates if a stream segment is within tribal land.	Yes	String	10	D_TrueFalse
Type of data expected	Domain True or False.				
Potential source to obtain	Homeland Infrastructure Foundation-Level Data (HIFLD) Indian Lands and Native Entities from November 2018.				
Anticipated use for attribute	Used for program planning awareness and outreach.				
DA_G_1SQMI	Indicates if the downstream end of stream segment has drainage area of 1 or more square miles.	Yes	String	10	D_TrueFalse
Type of data expected	Domain True or False.				
Potential source to obtain	NHDPlusV21 (NHD Medium Resolution) geodatabase or use ArcHydro to delineate drainage areas				
Anticipated use for attribute	For base lining miles for national reporting.				
BWIDTH_FT	Stream's bank width in feet.	No	Number (Double)	—	—
Type of data expected	A number in feet associated with that particular stream.				
Potential source to obtain	An estimated statistical channel bankwidth was calculated for each line based on a relationship between bankwidth and drainage area which was published in an American Geophysical Union (AGU) research article with an ID of "10.1002/2013WR013916" (Wilkerson et al., 2014).				
Anticipated use for attribute	Used for the search radius when identifying structures nearby.				
STRIN1BW - STRIN20BW	Structure count within a distance of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, and 20 bankwidths.	No	Long integer	—	—
Type of data expected	Distance in feet.				
Potential source to obtain	FEMA will calculate the distance using a proprietary national structure dataset.				
Anticipated use for attribute	To help prioritize flooding sources for program planning needs.				

Table F-3: S_Unmapped_Ln (Table ID Code: 07)

Field	Description	Required	Type	Length	Domain
STRIN100FT - STRIN2K_FT	Structure count within a distance of 100, 200, 300, 400, 500, 1000, and 2000 feet.	No	Long integer	—	—
Type of data expected	Distance in feet.				
Potential source to obtain	FEMA will calculate the distance using a proprietary national structure dataset.				
Anticipated use for attribute	To help prioritize flooding sources for program planning needs.				
COMMENT	Additional comments.	No	String	255	—

Specific_Needs_Info Business Table

Table F-4: Specific_Needs_Info (Table ID Code: 06)

Field	Description	Required	Type	Length	Domain
SNI_ID	Primary key for table. Assigned by table creator.	Yes	String	12	—
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.				
Potential source to obtain	A programmatic approach that prefixes five record counting digits with the 5-digit County FIPS code and a 2-digit feature class ID produces a number like 201190600001 (20119 is the county FIPS code, 06 is the table ID for 'Specific_Needs_Info' and 00001 represent record counting digits) for the first record in 'Specific_Needs_Info' for Meade County, Kansas. No repeat counting digits should be used within the same county.				
Anticipated use for attribute	Unique identification of each individual CNMS record.				
CNMSREC_ID	Imported from corresponding record in 'S_Studies_Ln,' 'S_Coastal_Ln', 'S_Requests_Ar' or' S_Requests_Pt'.	Yes	String	12	—
Type of data expected	A 12-digit key from corresponding record in 'S_Studies_Ln', 'S_Coastal_Ln', S_Requests_Ar', or 'S_Requests_Pt'.				
Potential source to obtain	REACH_ID field in the 'S_Studies_Ln' feature class, CREACH_ID field in the 'S_Coastal_Ln' feature class, SRP_ID field in the 'S_Requests_Pt' table, or SRA_ID in the 'S_Requests_Ar' table.				
Anticipated use for attribute	Catalog and referencing; foreign key to above named feature classes or tables.				
COST_SHARE	Is there cost share (NO/YES/UNKNOWN)?	No	String	10	D_TrueFalse
Type of data expected	A yes or no is expected to indicate whether or not a there is available cost share.				
Potential source to obtain	FEMA and the Local sponsor should each have record of any cost share related to this CNMS record. Specific agreements are not required at this juncture.				
Anticipated use for attribute	This information will document where FEMA can leverage its resources by incorporating local data into a study.				
DISASTER	Associated disaster number, either federally or state declared.	No	Text	50	—
Type of data expected	An example of an associated disaster number excerpt from a FEMA disaster announcement: *Major Disaster Declaration number 1823 declared on Feb 17, 2009.* If the disaster number is a state one only, it should be documented in the comments section. Federal disaster designations should be the primary information in this field.				
Potential source to obtain	FEMA or State.				
Anticipated use for attribute	This is typically an historical reference to a disaster event.				

Table F-4: Specific_Needs_Info (Table ID Code: 06)

Field	Description	Required	Type	Length	Domain
MITIG_PLAN	Is there a mitigation plan identifying the need (NO/YES/UNKNOWN)?	No	String	10	D_TrueFalse
Type of data expected	A yes or no is expected to indicate whether or not reference to this CNMS record is included in a formal mitigation plan. If yes, please identify the specific mitigation plan document in the comment field. Additionally, document whether the plan is a state, local, or tribal mitigation plan and whether it is a standard or enhanced plan.				
Potential source to obtain	Mitigation Plan documents.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				
RSK_ASSESS	Is there a risk assessment other than the 2010 Annualized Loss Estimate (NO/YES/UNKNOWN)?	No	String	10	D_TrueFalse
Type of data expected	A yes or no is expected to indicate whether or not reference to this CNMS record is included in a formal risk assessment document. If YES, then please complete entries for fields RSK_COMMENT, RSK_DATE, and RSK_MITIG.				
Potential source to obtain	The local FEMA Region or local community might have information regarding risk assessments that may be associated with this record.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				
RSK_CMMENT	Details on the type of Risk Assessment other than the 2010 Annualized Loss Estimate if answer to RSK_ASSESS was 'YES'.	Yes	Text	255	—
Type of data expected	Document name and description of the Risk Assessment performed.				
Potential source to obtain	The same source that helped determine the answer 'YES' to RSK_ASSESS.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				
RSK_DATE	Date that the Risk Assessment identified in RSK_CMMENT if answer to RSK_ASSESS was 'YES'.	Yes	Date	—	—
Type of data expected	This field is of the type date. Date should be entered in MM/DD/YYYY format.				
Potential source to obtain	The same source that helped determine the answer 'YES' to RSK_ASSESS.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				
RSK_MITIG	Has the Risk Assessment identified in RSK_CMMENT been included as part of the current adopted hazard mitigation plan (NO/YES/UNKNOWN)?	Yes	String	10	D_TrueFalse
Type of data expected	This field is to be filled only Estimate if answer to RSK_ASSESS was 'YES'.				
	NO/YES/UNKNOWN based on reading the current adopted Hazard Mitigation Plan, and looking for the inclusion of the risk assessment identified through RSK_ASSESS and RSK_CMMENT in the Hazard Mitigation Plan.				
Potential source to obtain	The same source that helped determine the answer 'YES' to RSK_ASSESS.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				

Table F-4: Specific_Needs_Info (Table ID Code: 06)

Field	Description	Required	Type	Length	Domain
HAZUS	Is there an enhanced HAZUS (Level 2 or 3) run on the stream (NO/YES/UNKNOWN)	No	String	10	D_TrueFalse
Type of data expected	A yes or no is expected to indicate whether or not loss estimation has been generated for this study using the Flood Tool within HAZUS-MH. If YES, please identify the location of any specific HAZUS related outputs in the comment field.				
Potential source to obtain	The FEMA Region, state or community government, or HAZUS User's Group are three potential sources for obtaining this information.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				
HAZUS_LVL	Level of HAZUS run (System default is 'Level 1' for Contiguous United States)	No	String	20	D_HAZUS_Lvl
Type of data expected	There are three levels of HAZUS modeling runs: Level 1 is the basic level using HAZUS provided data (FEMA has already run the HAZUS Level 1 modeling for the nation); Level 2 is a run incorporating detailed and updated building stock data; and Level 3 is the most detailed and user controlled. The type of data expected are indications of whether Levels 2 and 3 have been run.				
Potential source to obtain	The organization or individual responsible for initiating the HAZUS study are the most probable sources for obtaining information related to the level at which a HAZUS run was developed.				
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.				
COMMENT	Additional comments.	No	String	255	—

County_QC_Status Business Table

Table F-5: County_QC_Status

Field	Description	Required	Type	Length	Domain
CO_FIPS	Federal Information Processing Standard code for the county.	Yes	String	12	—
Type of data expected	5-digit Federal Information Processing Standard code which uniquely identifies state and counties, or the equivalent. The first two digits are the FIPS state code and the last three are the county code within the state or possession.				
Potential source to obtain	Countywide FIRM or FIS; U.S Department of Commerce, Bureau of the Census, Geography Division is the maintenance agency. Many departments within the U.S. government maintain references back to this standard, including the Natural Resources Conservation Service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_013697				
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.				
CO_NAME	The name of the County represented by this record.	Yes	String	50	—
Type of data expected	Text string.				
Potential source to obtain	User input.				
Anticipated use for attribute	Reference field. Users are sometimes more comfortable using common names for geographies rather than referring to them by CO_FIPS.				
CERT_DATE	Date which the county successfully passed through the CNMS QC Tool.	No	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	This field will be populated by the CNMS QC Tool.				
Anticipated use for attribute	This field will track the most recent data a given county has passed through the automated QC process.				
CERT_ID	POC for entity passing the county through the CNMS QC Tool.	No	String	20	—
Type of data expected	Existing Point_of_Contact table value.				
Potential source to obtain	This field will be populated by the CNMS QC Tool.				
Anticipated use for attribute	This field will track the POC_ID for the most recent entity to pass the county through the automated QC process.				

Point_of_Contact Business Table

Table F-6: Point_of_Contact (Table ID Code: 05)

Field	Description	Required	Type	Length	Domain
POC_ID	Primary key for table. Assigned by record creator or user.	Yes	String	20	—
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.				
Potential source to obtain	A programmatic approach that prefixes 5 record counting digits with the 5-digit County FIPS code followed by the table ID 05 produces a number like 201190500001 (20119 is the county FIPS code, 05 is a table ID to separate from 'CNMS_IDs' used on the 4 FCs, and 00001 represents record counting digits) for the first POC record in Meade County, Kansas. Unique identifier obtained from National CNMS viewing solution.				
Anticipated use for attribute	Unique identification of each individual CNMS POC record.				
POC_NAME	Given name of the point of contact knowledgeable of CNMS record	Yes	String	50	—
Type of data expected	Free text entry of point of contact's name.				
Potential source to obtain	Presumably a person connected to the identification of a CNMS record.				
Anticipated use for attribute	Information is used to identify the name of the POC for each CNMS data entry.				
POC_TITLE	Any title associated with the point of contract.	Yes	String	20	—
Type of data expected	Free text entry of the position held by the POC at his/her organization				
Potential source to obtain	Normally, this information should be readily available to the person making the CNMS entry. Otherwise, it can be looked up on government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	This information can be used to identify the position of the POC within an organization. Should the POC move on to a new position, this information can be used to identify the appropriate new POC for a CNMS data entry.				
POC_DESCRIPTION	Information regarding the role and responsibilities of the point of contact.	Yes	String	60	—
Type of data expected	Free text entry of the job functions of a POC.				
Potential source to obtain	Normally, this information should be readily available to the person making the CNMS entry. Otherwise, it can be looked up on government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	This field provides additional information about the job functions of a POC as they relate to the CNMS project need/request.				

Table F-6: Point_of_Contact (Table ID Code: 05)

Field	Description	Required	Type	Length	Domain
ORG_NAME	The name of the owner, or managing government agency, of the subject item.	Yes	String	50	—
Type of data expected	Free text entry of the name of the organization.				
Potential source to obtain	Normally, this information should be readily available to the person making the CNMS entry. Otherwise, it can be looked up on government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Information can be used for correspondence with the POC.				
ORG_TYPE	A code that represents a kind of organization.	Yes	String	50	D_ORG_TYPE
Type of data expected	The predefined acceptable values are to be selected from the 'D_Org_Type' domain list.				
Potential source to obtain	Normally, this information should be readily available to the person making the CNMS entry. Otherwise, it can be looked up on government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Information can be used to determine the source of the CNMS need/request (e.g. initiated by public agency vs. private sector, etc.).				
Domain Table	D_ORG_TYPE				
BUSINESS_PHONE	The business telephone number of the contact person.	Yes	String	20	—
Type of data expected	Free text entry of 10-digit phone number.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
MOBILE_PHONE	The cellular phone number of the contact person.	No	String	20	—
Type of data expected	Free text entry of 10-digit phone number.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
FAX_PHONE	The fax number of the contact person.	No	String	20	—
Type of data expected	Free text entry of 10-digit fax number.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				

Table F-6: Point_of_Contact (Table ID Code: 05)

Field	Description	Required	Type	Length	Domain
ADDRESS_1	The first line of the point of contact's address.	Yes	String	75	—
Type of data expected	Free text entry of POC's address.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
ADDRESS_2	The second line of the point of contact's address.	No	String	75	—
Type of data expected	Free text entry of POC's address, if applicable.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
CITY_NAME	The city or town in which the contact person's address is located	Yes	String	75	—
Type of data expected	Free text entry of city name in which organization resides.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
STATE	The name of the State in which the contact person's address is located.	Yes	String	50	D_STATE
Type of data expected	Free text entry of state name in which organization resides.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
Domain Table	D_STATE.				
ZIP_CODE	The Zip Code of the contact person's address.	Yes	String	10	—
Type of data expected	Free text entry of 5- or 9-digit zip code for the organization.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				

Table F-6: Point_of_Contact (Table ID Code: 05)

Field	Description	Required	Type	Length	Domain
COUNTY	The county name.	Yes	String	100	—
Type of data expected	Free text entry of county name in which organization resides.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
EMAIL_ADDRESS	Electronic mail address.	Yes	String	50	—
Type of data expected	Free text entry of standard email address of POC.				
Potential source to obtain	Information can be obtained from government websites (if POC works for public agency) or corporate websites (if POC works for private sector).				
Anticipated use for attribute	Correspondence and communications with the POC regarding the CNMS entry.				
COMMENT	Additional comments.	No	String	255	—

S_Coastal_Ln Feature Class (polyline)

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
CREACH_ID	Primary key for table. Assigned by table creator.	Yes	String	12	—
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.				
Potential source to obtain	A programmatic approach that prefixes five record counting digits with the 5-digit County FIPS code and a 2-digit feature class ID will produce a number like 330150800001 (33015 is the county FIPS code, 08 is the feature class ID for S_Coastal_Ln and 00001 represent record counting digits) for the first record in S_Coastal_Ln for Rockingham County, New Hampshire. No repeat counting digits should be used within the same county.				
Anticipated use for attribute	Unique identification of each individual CNMS record.				
CSTUDY_ID	Internal key used to establish relationship between coastal reaches.	Yes	String	12	—
Type of data expected	This field will be a 12-digit string.				
Potential source to obtain	The value in this field will typically represent the existing CREACH_ID of a single reach amongst a group of related reaches.				
Anticipated use for attribute	Key field used to link multiple reaches which represent segments of the same study. This field can also be used to link multiple reaches to external supporting data which is common among them. The expected relationship between this field and individual S_Coastal_Ln features is one to many, with a single CSTUDY_ID being represented by one or more features.				
CASE_NO	A unique project identifier number (MIP Case Number) used for FEMA tracking purposes.	No	String	12	—
Type of data expected	E.g. 10-05-3616S. This case number should be that of the effective study.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data.				
CO_FIPS	Federal Information Processing Standard code.	Yes	String	12	—
Type of data expected	5-digit Federal Information Processing Standard code which uniquely identifies state and counties, or the equivalent. The first two digits are the FIPS state code and the last three are the county code within the state or possession.				
Potential source to obtain	Countywide FIRM or FIS; U.S Department of Commerce, Bureau of the Census, Geography Division is the maintenance agency. Many departments within the U.S. government maintain references back to this standard, including the Natural Resources Conservation Service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_013697				
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
CID	Community Identification Number.	Yes	String	12	—
Type of data expected	A unique 5- or 6-digit number assigned to each community by FEMA and used for identity in computer databases; it is shown on the FIS, FIRM, and in the Q3 Flood Data files. The first two digits of the number are always the state FIPS code.				
Potential source to obtain	FEMA is the source. The CID is obtainable from multiple sources; Community Information System, Flood Insurance Studies, FIRM panels, FIRM indexes.				
Anticipated use for attribute	Catalog and referencing.				
STUDY_NAME	Linking geography's that used similar coastal mapping methodologies.	Yes	String	255	—
Type of data expected	E.g. Lake Michigan Surge Study, LA USACE Surge Study, or CCAMP OPC Central.				
Potential source to obtain	Use MIP project name or name of coastal study.				
Anticipated use for attribute	A common identifier for similar coastal mapping methodologies.				
CVALIDATION	Coastal validation status. This attribute establishes the latest evaluation condition of a coastal reach in relation to the criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.	Yes	String	50	D_VALID_CAT
Type of data expected	Entry from domain lookup table D_VALID_CAT.				
Potential source to obtain	Current entry; or user assessed entry based on evaluation of criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.				
Anticipated use for attribute	Used to categorize the Inventory for the purposes of planning, study selection, tracking and reporting.				
CSTAT_TYPE	Coastal validation status type. This attribute establishes the sub-categories for each of the Validation Status classes of a coastal flooding source in relation to the criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.	Yes	String	100	D_STATUS_TYPE
Type of data expected	Entry from domain lookup table D_STATUS_TYPE.				
Potential source to obtain	Current entry; or user assessed entry based on evaluation of criteria set forth in the CNMS Technical Reference, any procedure memorandums, or previous work.				
Anticipated use for attribute	Used to further define the Validation Status type to categorize the Inventory for the purposes of planning, study selection, tracking and reporting.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
MILES	An attribute of the calculated miles of the data record entry.	Yes	Number (Double)	8	—
Type of data expected	A number corresponding to the length of the inventory polyline segment.				
Potential source to obtain	In feature class format, and if projection is in feet or meters permanent length field of feature class can be used to populate this field by applying the appropriate conversion to miles. Otherwise, make a field calculation using field calculator and convert to miles. Be sure to understand the units the projection is in and how it will influence any resulting calculations. The CNMS FGDB is provided in the NAD 1983 Geographic Coordinate System, at the Regional level, the length of the polyline segments can be calculated in local or state projections. During National data consolidation and analysis, the projection will be standardized across all Regions and mileage recalculated to a National standard.				
Anticipated use for attribute	Quantifies the CNMS Inventory in coastal miles for reporting (ex. NVUE, quarterly reports).				
SOURCE	Source of polyline segment represented in the inventory.	Yes	String	100	D_SOURCE
Type of data expected	Entry from domain lookup table D_SOURCE.				
Potential source to obtain	NOAA OCS shoreline data set.				
Anticipated use for attribute	Verify and document source of coastal linework used.				
STATUS_DATE	Date to track the status of the study within the CNMS inventory. The STATUS_DATE can only be changed as a result of one of the following conditions: 1. When a new or updated study has reached LFD issuance resulting in a study becoming VALID – NVUE COMPLIANT, the STATUS_DATE will be set to the LFD issuance date. 2. When the validation assessment of a study has been completed, the STATUS_DATE will be set to the date the assessment was completed (current date). 3. When a new or updated study is initiated, the STATUS_DATE is updated (current date) at each of the various CNMS touchpoints (scoping, production, Prelim, and LFD issuance). When a CNMS record is set to VALID – NVUE COMPLIANT as a result of validation assessment or LFD issuance, the STATUS_DATE marks the beginning of the 5-year clock and must not be changed until the next validation assessment is completed or updated study is initiated.	Yes	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	Calendar, RSC Management.				
Anticipated use for attribute	Determine the most recent analysis and condition of the polyline. Will track and maintain the currency of the inventory, to insure all requirements are being adhered to according to mandates set forth within the NFIP.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
FY_FUNDED	Attribute of the most recent effective FEMA fiscal year funding applied to the stream reach at the time of study (ex. Watershed, county).	Yes	String	25	D_FY_FUNDED
Type of data expected	Entry from domain lookup table D_FY_FUNDED.				
Potential source to obtain	MIP case numbers (as they are associated with fiscal year first funded), RSC Management.				
Anticipated use for attribute	Determine the latest FEMA funding year for the underlying SFHA study.				
REASON	Attribute allows for user input of detailed description of considerations or special circumstances when determining attributes VALIDATION_STATUS, SOURCE, or any pertinent information in the data creation process.	No	String	255	—
Type of data expected	Preferably user defined template “canned” descriptors of their data entry process and considerations.				
Potential source to obtain	Criteria evaluated and considered in the bulk validation of CNMS Study Records, ancillary information presented by the regions or other parties, data used that is not readily available, etc.				
Anticipated use for attribute	Attribute will document more details about the underlying considerations of other attributes contained in the CNMS database. This will serve as a first stop when questions arise about the attribution contained in the database without going back to the criteria, check sheets, or intermediate datasets. By choosing to use template “canned” entries, query of such entries will be streamlined. A useful example might be the need to query a specific consideration that based on current business rules is attributed a certain way, but based on new information might need to be queried and reattributed a different way.				
HUC8_KEY	8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds knows as hydrologic cataloging units. This can be obtained by overlaying the HUC spatial files with the polyline information to determine which cataloging unit the polyline resides in.	Yes	String	8	—
Type of data expected	8-digit Hydrologic Unit Code.				
Potential source to obtain	Originator: United States Geological Survey (USGS): https://nhd.usgs.gov/data.html; or EPA surf your watershed: https://cfpub.epa.gov/surf/locate/index.cfm				
Anticipated use for attribute	Provides an attribute to determine what HUC 8 sub-basin the polyline resides in.				
STUDY_TYPE	Study type of the SFHA represented by the reach based on the current effective FIS text.	Yes	String	40	D_STUDY_TYPE
Type of data expected	Entry from domain lookup table D_STUDY_TYPE.				
Potential source to obtain	FIS Text, Study Manager Input etc.				
Anticipated use for attribute	Query into the characteristics of the inventory: type of study, Validation Status, mileage.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
TIER	A tracking method within CNMS on program "maturity" curve.	Yes	String	12	D_TIER
Type of data expected	Tier 0, 1, 2, 3, 4 or 5 entry from domain lookup table D_TIER Tier 0: Known to be flood prone (i.e. draining greater than 1 square mile) but not yet identified as SFHA on a regulatory FIRM Tier 1: SFHA is not available in digital format. Tier 2: SFHA is available as a digital product, but not known to be model-backed. Tier 3: Is available as a digital product, model-backed and may not be consistent with high quality elevation data (utilizes elevation data inferior to USGS Quality Level (QL) 2 equivalence or better). Tier 4: is available as a digital product, model-backed and consistent with high quality elevation data (USGS Quality Level (QL) 2 equivalence or better). (This tier should serve as meeting all current Risk MAP technical requirements). Tier 5: SFHA is available as a digital product, and including enhanced analyses such as future land use, or future climate-informed analyses.				
Potential source to obtain	Determination may be made by query of attributes in CNMS and/or referencing the effective FIS.				
Anticipated use for attribute	To categorize CNMS studies into 5 Tiers.				
WSEL_AVAIL	Tracks availability of Water Surface Elevation (WSEL) grids and if they are compliant with FEMA SID 415.	No	String	50	D_WSEL_AVAIL
Type of data expected	Entry from domain lookup table D_WSEL_AVAIL.				
Potential source to obtain	Flood Risk Database, RSC or Study Manager input.				
Anticipated use for attribute	Tracking mechanism for availability of WSEL grids and whether or not they meet FEMAs quality standards.				
DPTH_AVAIL	Tracks availability of depth grids and if they are compliant with FEMA SID 628.	No	String	50	D_DEPTH_AVAIL
Type of data expected	Entry from domain lookup table D_DPTH_AVAIL.				
Potential source to obtain	Flood Risk Database, RSC or Study Manager input.				
Anticipated use for attribute	Tracking mechanism for availability of depth grids and whether or not they meet FEMAs quality standards.				
FBS_CMPLNT	Is the floodplain represented by this feature FBS Compliant? (False (NO) / True (YES) / UNKNOWN). LOMRs do not apply, set to UNKNOWN	Yes	String	10	D_TrueFalse
Type of data expected	This field is based upon domain lookup table D_TrueFalse.				
Potential source to obtain	Regional Support Centers and /or TSDN. This is typically submitted around QR3 and no later than 30 days after Preliminary issuance.				
Anticipated use for attribute	Tracking FBS compliance.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
FBS_CHKDT	Date when the FBS audit was performed on the reach. If the report is not dated, use the date the report was delivered to FEMA / Mapping Information Platform or as a last resort the date when the FBS_CMPLNT field was populated. LOMRs do not apply, set to STATUS_DATE.	Yes	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	Calendar.				
Anticipated use for attribute	Tracks attribution of latest FBS compliance value.				
FBS_CTYP	FBS compliance check type – bulk attributed at project level (e.g., county-wide, watershed, PMR) or attributed individually. LOMRs do not apply, set to INDIVIDUAL REACH ATTRIBUTION.	Yes	50	—	D_FBS_CTYPE
Type of data expected	This field will hold a user selected value from domain table D_FBS_CTYP.				
Potential source to obtain	Entered by user when FBS_CMPLNT field is populated, based upon check type.				
Anticipated use for attribute	Indicator of the type of FBS check recorded for this reach.				
DATE_EFFCT	Date of effective analysis.	Yes	Date	—	—
Type of data expected	This date field will be used to document when the effective study was produced because there can be much time between when the study was created and when it went effective. Age of maps does not adequately reflect the age of the analysis as a study can be published on multiple effective maps without change. At times, the date that the analysis *first* went effective is sufficient as well, especially when supporting data is sparse. Data should be entered in the MM/DD/YYYY format.				
Potential source to obtain	The date of effective analysis for a detailed study is usually included in Section 1.2 in the FEMA Insurance Study (FIS) text.				
Anticipated use for attribute	This date will be evaluated for age of analysis of the effective study.				
TOPO_DATE	Date the topography dataset was collected or completed.	Yes	Date	—	—
Type of data expected	This field will allow users know the time period of the topography dataset that was used to create the effective modeling. This date should be earlier than the Hydrology and Hydraulic modeling dates for the same study.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer (https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography date is used in conjunction for a number of assessment checks.				
TOPO_SRC	The source of the LiDAR or topography dataset.	Yes	String	255	—
Type of data expected	This field should include pertinent details about owner, contractor, type, and quality level of the dataset.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
	(https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography source is used in conjunction for a number of assessment checks.				
BATHY_DATE	Date the bathymetry dataset was collected or completed.	Yes	Date	—	—
Type of data expected	This field will allow users know the time period of the topography dataset that was used to create the effective modeling. This date should be earlier than the Hydrology and Hydraulic modeling dates for the same study.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer (https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography date is used in conjunction for a number of assessment checks.				
BATHY_SRC	The source of the bathymetry dataset.	Yes	String	255	—
Type of data expected	This field should include pertinent details about owner, contractor, type, and quality level of the dataset.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer (https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography source is used in conjunction for a number of assessment checks.				
POP_COAST	An indication of a MapMod or Risk MAP funded coastal study.	Yes	String	10	D_TrueFalse
Type of data expected	This is a YES/NO field based upon domain lookup table D_TrueFalse.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	The denominator for coastal NVUE.				
SURGE_MDL	Surge/Stillwater method used for the effective study.	No	String	200	D_SURGEMDL
Type of data expected	In this domain-based field the user should choose the name of the surge model used and version, as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
STAT_METH	Surge statistical method used for the effective study.	No	String	200	D_STATMETH
Type of data expected	In this domain-based field the user should choose the name of the surge statistical method used and version, as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				
STAT_CMT	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
SURGE2DW	Indicates if the surge model is coupled with 2-D wave analysis for the effective study.	No	String	20	D_SURGE2DW
Type of data expected	In this domain-based field the user should choose how the surge model is coupled with the 2-D wave analysis (tightly or loosely coupled, or not coupled at all).				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				
SETUP_METH	When a 2-D model is not run, setup method used for the effective study.	No	String	200	D_SETUPMETH
Type of data expected	In this domain-based field the user should choose the name of the setup method used as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				
SETUP_CMT	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
RUNUP_MDL	Runup model used for the effective study.	No	String	200	D_RUNUPMDL
Type of data expected	In this domain-based field the user should choose the name of the runup model used, as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
EROS_METH	Erosion method used for the effective study.	No	String	200	D_EROSMETH
Type of data expected	In this domain-based field the user should choose the name of the erosion method used, as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				
EROS_METH	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
OVWAVE_MDL	Overland wave model used for the effective study.	No	String	200	D_OVWVMDL
Type of data expected	In this domain-based field the user should choose the name of the overland wave model used, as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				
WAVE_MDL	Wave model used for the effective study.	No	String	200	D_WVDL
Type of data expected	In this domain-based field the user should choose the name of the wave model used, as appropriate.				
Potential source to obtain	Flood Insurance Study (FIS) text or Technical Data Notebook (TSDN) for the study.				
Anticipated use for attribute	Reference and evaluation.				
OVWAVE_CMT	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
Type of data expected	This field should include pertinent details about owner, contractor, type, and quality level of the dataset.				
Potential source to obtain	The topography dataset's metadata or NOAA Data viewer (https://coast.noaa.gov/dataviewer/#/lidar/search/)				
Anticipated use for attribute	The topography source is used in conjunction for a number of assessment checks.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
C_C1	Critical Element 1, Gage Analysis. Have there been any recorded storm events from tide gages since the effective modeling date, where the SWL exceeds the 1-percent-annual-chance SWEL (i.e., the 100-year SWEL)?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C_C2	Critical Element 2, Storm Data. Are there any potentially statistically significant storm intensity data since the effective modeling?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C_C3	Critical Element 3, Great Lakes Ice Conditions. Are there changes in ice coverage data for the Great Lakes?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C_C4	Critical Element 4, Coastal Model Evaluation. Is there documented evidence that any of the models used in the effective study are inaccurate?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C_C5	Critical Element 5, FEMA Coastal Modeling and Mapping Procedure Changes or Improvements. Have there been any FEMA coastal modeling changes, mapping procedural changes, or general improvements since the effective study that could impact the coastal flood hazard mapping?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
	of UNVERIFIED Validation Status to the record.				
C_C6	Critical Element 6, Erosion and Long-Term Retreat. Has shoreline erosion occurred since the effective modeling date that could impact the coastal flood hazard mapping?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C_C7	Critical Element 7, Removal or Deterioration of Flood Protection Structures. Have any existing coastal structures, shown as providing flood protection in the effective mapping, been removed or has their condition deteriorated such that they are no longer adequate in providing protection?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.				
C_S1	Secondary Element 1, Starting Wave Conditions for One-Dimensional Modeling. Are the effective methods for determining starting wave conditions no longer appropriate and do they no longer meet FEMA model criteria?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	Any combination of 3 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
C_S2	Secondary Element 2, Bathymetric and Topographic Data. Do the bathymetric and topographic data used in the effective study no longer meet FEMA standards?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	Any combination of 3 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
C_S3	Secondary Element 3, Land Use Changes. Have there been significant changes to land use or vegetation coverage in the coastal SFHA that could impact coastal floodplain mapping?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	Any combination of 3 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
C_S4	Secondary Element 4, Evidence of FIRM Inaccuracy. Repetitive Loss Properties. Do patterns of repetitive loss properties from coastal flooding exist outside of the coastal SFHA?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	Any combination of 3 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
C_S5	Secondary Element 5, Evidence of FIRM Inaccuracy. LOMRs. Do patterns of LOMRs indicate that the present BFEs, zone delineations, or floodplain boundaries may not be correct?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	Any combination of 3 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
C_S6	Secondary Element 6, Evidence of FIRM Inaccuracy. High Water Marks. Have high water marks (HWMs) been collected that exceed mapped BFEs and/or the inland extent of mapped SFHAs?	No	Short Integer	—	D_ELEMENT
Type of data expected	This is a PASS/FAIL field based upon domain lookup table D_ELEMENT.				
Potential source to obtain	Analysis based upon coastal validation assessment process guidelines.				
Anticipated use for attribute	Any combination of 3 or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
C_CE_TOTAL	Total number of coastal critical elements.	No	Short Integer	—	—
Type of data expected	A number equivalent to the sum of the number of Critical Elements equaling 'YES' from above.				
Potential source to obtain	User is to provide the sum of Critical Elements.				
Anticipated use for attribute	Determination of VALIDATED vs. UNVERIFIED; UNVERIFIED is CE_Total > TBD.				
C_SE_TOTAL	Total number of coastal secondary elements.	No	Short Integer	—	—
Type of data expected	A number equivalent to the sum of the number of Secondary Elements equaling 'YES' from above.				
Potential source to obtain	User is to provide the sum of Secondary Elements.				
Anticipated use for attribute	Determination of VALIDATED vs. UNVERIFIED; UNVERIFIED is SE_Total >= TBD.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
COMMENT	Additional comments.	No	String	255	—
Type of data expected	Additional analyst comments.				
Potential source to obtain	User comments.				
Anticipated use for attribute	Though the field cannot be domain enforced, it will sometimes include information pertaining to Validation decisions, or LOMR incorporation effects.				
BS_CASE_NO	A unique project identifier number (MIP Case Number) used for FEMA tracking purposes.	Yes	String	12	—
Type of data expected	E.g. 10-05-3616S.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data.				
BS_STDYTYP	Study type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.	Yes	String	255	D_STUDY_TYPE
Type of data expected	Entry from domain lookup table D_STUDY_TYPE.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Stores the study type of a study currently in progress.				
BS_SRGMODL	Surge model of the ongoing study.	No	String	200	D_SURGEMDL
Type of data expected	In this domain-based field the user should choose the name of the surge model used and version, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_STATMETH	Surge statistical method of the ongoing study	No	String	200	D_STATMETH
Type of data expected	In this domain-based field the user should choose the name of the surge statistical method used and version, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_STATCMT	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
BS_SRG2DW	Indicates if the surge model is coupled with 2-D wave analysis for the ongoing study.	No	String	200	D_SURGE2DW
Type of data expected	In this domain-based field the user should choose, for the ongoing study, how the surge model is coupled with the 2-D wave analysis (tightly or loosely coupled, or not coupled at all).				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_SUPMETH	When a 2-D model is not run, setup method of the ongoing study.	No	String	200	D_SETUPMETH
Type of data expected	In this domain-based field the user should choose the name of the setup method used as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_SETUPCM	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
BS_RUPMODL	Runup model of the ongoing study.	No	String	200	D_RUNUPMDL
Type of data expected	In this domain-based field the user should choose the name of the runup model used, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_ERSMETH	Erosion method of the ongoing study.	No	String	200	D_EROSMETH
Type of data expected	In this domain-based field the user should choose the name of the erosion method used, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_EROSMCT	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
BS_OVLDMDL	Overland wave model of the ongoing study.	No	String	200	D_OVWVMDL
Type of data expected	In this domain-based field the user should choose the name of the overland wave model used, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_WVMDL	Wave model of the ongoing study.	No	String	200	D_WVDL
Type of data expected	In this domain-based field the user should choose the name of the wave model used, as appropriate.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Reference and evaluation.				
BS_WAVECMT	Additional comments pertaining to the model or indicating a model used not part of domain list.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	Flood Insurance Study.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
BS_FY_FUND	Attribute of the most recent effective FEMA fiscal year funding applied to the stream reach at the time of study (ex. Watershed, county).	No	String	25	D_FY_FUNDED
Type of data expected	Entry from domain lookup table D_FY_FUNDED.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	Determine the latest FEMA funding year for the underlying SFHA study.				
BS_PRELM_DATE	Expected Preliminary issuance date for reaches representing areas being actively studied.	No	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use 1/1/2049 as a default placeholder for Preliminary date.				
Anticipated use for attribute	Stores the expected Preliminary Date of a study currently in progress.				
BS_LFD_DATE	Expected Letter of Final Determination issuance date for reaches representing areas being actively studied.	No	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use 1/1/2050 as a default placeholder for LFD date.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	Stores the expected Letter of Final Determination Date of a study currently in progress.				
EC1_UDEF	User Defined Critical Element 1.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture the results of additional Region-Specific validation processes which have been deemed Critical.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record. In counties which have been identified as utilizing the Extra Elements, EC1_UDEF failure will result in an UNVERIFIED Validation Status assignment.				
EC2_UDEF	User Defined Critical Element 2.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field based upon domain lookup table D_ELEMENT is to capture the results of additional Region-Specific validation processes which have been deemed Critical.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record. In counties which have been identified as utilizing the Extra Elements, EC2_UDEF failure will result in an UNVERIFIED Validation Status assignment.				
ES1_UDEF	User Defined Secondary Element 1.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field based upon domain lookup table D_ELEMENT is to capture the results of additional Region-Specific validation processes which have been deemed Critical.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES1_UDEF will contribute to the Secondary Element count.				
ES2_UDEF	User Defined Secondary Element 2.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field based upon domain lookup table D_ELEMENT is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES2_UDEF will contribute to the Secondary Element count.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
ES3_UDEF	User Defined Secondary Element 3.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field based upon domain lookup table D_ELEMENT is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES3_UDEF will contribute to the Secondary Element count.				
ES4_UDEF	User Defined Secondary Element 4.	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field based upon domain lookup table D_ELEMENT is to capture the results of additional Region-Specific validation processes which have been deemed Secondary.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES4_UDEF will contribute to the Secondary Element count.				
E_ELEMDATE	The date on which the User Defined Element values were populated.	No	Date	—	—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	User is to provide the date on which the Elements were evaluated.				
Anticipated use for attribute	The date on which the User Defined Elements were populated.				
C_XX_CMT	Details on why a check passed or failed.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	User defined.				
Anticipated use for attribute	Details on why a check passed or failed.				
C_XX_SRC	The data source used for performing the CNMS check.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	User defined.				
Anticipated use for attribute	The data source used for performing the CNMS check.				

Table F-7: S_Coastal_Ln (Table ID Code: 08)

Field	Description	Required	Type	Length	Domain
C_XX_URL	Web link to obtain or view the source data.	No	String	255	—
Type of data expected	Text field (255 characters maximum).				
Potential source to obtain	User defined.				
Anticipated use for attribute	Web link to obtain or view the source data.				

*Comment, Source, and URL fields exist for each critical and secondary element (C_C1-C_C7, C_S1-CS6) in S_Coastal_Ln

Coastal_County_QC_Status Business Table

Table F-8: Coastal_County_QC_Status

Field	Description	Required	Type	Length	Domain
CO_FIPS	Federal Information Processing Standard code for the county.	Yes	String	12	—
Type of data expected	5-digit Federal Information Processing Standard code which uniquely identifies state and counties, or the equivalent. The first two digits are the FIPS state code and the last three are the county code within the state or possession.				
Potential source to obtain	Countywide FIRM or FIS; U.S Department of Commerce, Bureau of the Census, Geography Division is the maintenance agency. Many departments within the U.S. government maintain references back to this standard, including the Natural Resources Conservation Service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_013697				
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.				
CO_NAME	The name of the County represented by this record.	Yes	String	50	—
Type of data expected	Text string.				
Potential source to obtain	User input.				
Anticipated use for attribute	Reference field. Users are sometimes more comfortable using common names for geographies rather than referring to them by CO_FIPS.				
CERT_DATE	Date which the county successfully passed through the CNMS QC Tool.	No	Date		—
Type of data expected	Calendar date (ex. 01/01/10).				
Potential source to obtain	This field will be populated by the CNMS QC Tool.				
Anticipated use for attribute	This field will track the most recent data a given county has passed through the automated QC process.				
CERT_ID	POC for entity passing the county through the CNMS QC Tool.	No	String	20	—
Type of data expected	Existing Point_of_Contact table value.				
Potential source to obtain	This field will be populated by the CNMS QC Tool.				
Anticipated use for attribute	This field will track the POC_ID for the most recent entity to pass the county through the automated QC process.				

UserRequest_Removal Business Table

Table F-9: UserRequest_Removal

Field	Description	Required	Type	Length	Domain
CDS_ID	Unique identifier for Customer and Data Services Contractor (CDS) application system tracking.	Yes	String	9	—
Type of data expected	Text field size 12 – unique ID only created by CDS application.				
Potential source to obtain	CDS application will populate this field automatically and should not be edited or populated by any other means.				
Anticipated use for attribute	CDS Application system request record tracking.				
REQUEST_LAYER	Layer (S_Requests_Pt or S_Requests_Ar) containing request record to be archived by CDS application system.	Yes	String	20	D_RQST_LYR
Type of data expected	The predefined acceptable values are to be selected from the 'D_RQST_LYR' domain list.				
Potential source to obtain	RSC or Study Manager.				
Anticipated use for attribute	Provides ability to query multi-county coastal study efforts.				
COMMENT	Text field (255 characters maximum).	No	String	255	—

F.2. Domain Tables

The following tables list the acceptable domain values for the CNMS database. Tables containing coded values will display two columns, with the coded value on the left and the corresponding description on the right. Tables where coded values are equal to their corresponding description will display only a single column with the appropriate code/description text.

Acceptable Null Values:

For all non-populated fields, calculate the null values for each field type as follows:

- Text field: “” (empty string)
- Numeric field: NULL
- Date field: NULL
- Domain field: NULL

D_BLE

BLE Category Type
BLE TIER A
BLE TIER B
BLE TIER C
BLE TIER D
BLE TIER E
BLE 2D
LSAE

D_CARTO_RQST

Cartographic Request Type
BASE MAP UPDATE
FLOOD HAZARD FEATURE SYMBOLIZATION AND NOTES
INDEX PANEL ERRORS
MAP BODY (PANEL) ERRORS
MAP COLLAR ISSUES

D_DUPLICATE

Duplicate Geometry Category
CATEGORY 1
CATEGORY 2
CATEGORY 3

D_ELEMENT

Element Pass/Fail/Unknown	
Coded Value	**Name**
10	PASS
11	FAIL
12	UNKNOWN

D_FBS_CTYP

Floodplain Boundary Standard Check Type
BULK ATTRIBUTION
INDIVIDUAL REACH ATTRIBUTION

D_FDATA_RQST

Flood Data Request Type	
ANY LABELING OUTSIDE COUNTY BOUNDARY	FLOODPLAIN DELINEATION ERRORS
BFE ERRORS	FLOODWAY DELINEATION ERRORS
CHANGES TO HYDRAULIC CONDITION	IMPACTED STRUCTURES
CHANGES TO HYDROLOGIC CONDITION	LEVEE ISSUE
CHANNEL IMPROVEMENTS	LIMIT OF STUDY ERRORS
CHANNEL RECONFIGURATION	NEW STRUCTURE
CHANNEL FILL OR SCOUR	OTHER
COASTAL GUTTER ERRORS	POPULATION CHANGE OR GROWTH IN FLOODPLAIN
COMMUNITY MODEL OR DATA	REMOVED STRUCTURE
CROSS SECTION ERRORS	SFHA LABELLING ERRORS

D_FY_FUNDED

Fiscal Year Funded	
Coded Value	**Name**
FY03	FISCAL YEAR 2003 FUNDED
FY04	FISCAL YEAR 2004 FUNDED
FY05	FISCAL YEAR 2005 FUNDED
FY06	FISCAL YEAR 2006 FUNDED
FY07	FISCAL YEAR 2007 FUNDED
FY08	FISCAL YEAR 2008 FUNDED
FY09	FISCAL YEAR 2009 FUNDED
FY10	FISCAL YEAR 2010 FUNDED
FY11	FISCAL YEAR 2011 FUNDED
FY12	FISCAL YEAR 2012 FUNDED
FY13	FISCAL YEAR 2013 FUNDED
FY14	FISCAL YEAR 2014 FUNDED
FY15	FISCAL YEAR 2015 FUNDED

Fiscal Year Funded	
Coded Value	**Name**
FY16	FISCAL YEAR 2016 FUNDED
FY17	FISCAL YEAR 2017 FUNDED
FY18	FISCAL YEAR 2018 FUNDED
FY19	FISCAL YEAR 2019 FUNDED
FY20	FISCAL YEAR 2020 FUNDED
FY21	FISCAL YEAR 2021 FUNDED
FY22	FISCAL YEAR 2022 FUNDED
FY23	FISCAL YEAR 2023 FUNDED
FY24	FISCAL YEAR 2024 FUNDED
FY25	FISCAL YEAR 2025 FUNDED
FY26	FISCAL YEAR 2026 FUNDED
FY27	FISCAL YEAR 2027 FUNDED
FY28	FISCAL YEAR 2028 FUNDED
FY29	FISCAL YEAR 2029 FUNDED
FY30	FISCAL YEAR 2030 FUNDED
PRE	PRE-MAPMOD FUNDED

D_HAZUS_LVL

HAZUS Level
LEVEL 1
LEVEL 2
LEVEL 3

D_ HYDRA

Hydraulic Model	
ADVANCED ICPR	HEC-RAS 5.0.5
ADVANCED ICPR 2.20 (OCTOBER 2000)	HEC-RAS 5.0.6
ADVANCED ICPR 3.02 (NOVEMBER 2002)	HEC-RAS 5.0.7
B-292	HIGHWATER MARKS
B-MAN NORMAL DEPTH ANALYSIS PROGRAM	HISTORICAL FLOOD DATA
CHAN FOR WINDOWS 2.03 (1997)	HY8
CRITICAL DEPTH METHOD	HY8 4.1
CULVERT ANALYSIS	HY8 6.0
CULVERT MASTER	ICPR
CULVERT MASTER 2.0 (SEPTEMBER 2002)	J-635
DAMBRK	LAKE ROUTING ANALYSIS
DEPTH FREQUENCY METHOD	LRD-1
DEPTH-DISCHARGE RATING CURVE	MIKE 11
DHM	MIKE 11 HD (2002 D)
DHM 21 (AUGUST 1987)	MIKE 11 HD (2004)
DHM 34 (AUGUST 1987)	MIKE 11 HD (JUNE 1999)

Hydraulic Model	
DWOPER	MIKE FLOOD HD
E431	MIKE FLOOD HD (2002 D)
FAN	MIKE FLOOD HD (2004)
FEQ	MIKE FLOOD HD (2009)
FEQ 8.92 (1997)	NETWORK
FEQ 8.92 (1999)	NETWORK (JUNE 2002)
FEQ 9.98 (2005)	NORMAL DEPTH
FEQUTL	OTHER
FEQUTL 4.68 (1997)	PONDPACK
FEQUTL 4.68 (1999)	PONDPACK V 8 (MAY 2002)
FEQUTL 5.46 (2005)	PSUPRO
FESWMS 2DH	QUICK
FESWMS 2DH 1.1 (JUNE 1995)	QUICK-2 1.0
FLDWAV	QUICK-2 2.0
FLDWAV (NOVEMBER 1998)	S2DMM
FLDWY	S2DMM (FEBRUARY 2005)
FLDWY (MAY 1989)	SFD
FLO-2D	SHEET 2D 9 (JULY 2000)
FLO-2D 2003.6	SHEET 2D9
FLO-2D 2004.10	SLOPE-AREA METHOD
FLO-2D 2006.1	SRH-2D
FLO-2D 2007.06	STORMCAD
FLO-2D V.2000.11 (DECEMBER 2000)	STORMCAD V 4 (JUNE 2002)
FLO-2D PRO	SWMM
GLWRM	SWMM 4.30 (MAY 1994)
HCSWMM	SWMM 4.31 (JANUARY 1997)
HCSWMM 4.31B (AUGUST 2000)	SWMM 5 V 5.0.005 (MAY 2005)
HEC-2	TABS-RMA2
HEC-2 (1983)	TABS-RMA4
HEC-2 4.6.2 (MAY 1991)	TUFLOW
HEC-RAS	UNET
HEC-RAS 2.2 (SEPTEMBER 1998)	UNET 4.0 (APRIL 2001)
HEC-RAS 3.0.1	UNKNOWN
HEC-RAS 3.1.1	WSP-2
HEC-RAS 3.1.3	WSPGW
HEC-RAS 4.0	WSPGW 12.96 (OCTOBER 2000)
HEC-RAS 4.1	WSPRO
HEC-RAS 5.0	WSPRO (JUNE 1988)
HEC-RAS 5.0.1	XPSTORM
HEC-RAS 5.0.2	XPSTORM 10.0 (MAY 2006)
HEC-RAS 5.0.3	XP-SWMM
HEC-RAS 5.0.4	XP-SWMM 8.52

D_HYDRO

Hydrology Model	
2POND	LOG-PEARSON TYPE III ANALYSIS
AHYMO 97	MIKE 11 RR
AHYMO 97 (AUGUST 1997)	MIKE 11 RR (2002 D)
API	MIKE 11 RR (2004)
BULLETIN 15	MIKE 11 RR (JUNE 1999)
BULLETIN 17	MIKE 11 UHM
BULLETIN 17A	MIKE 11 UHM (2002 D)
BULLETIN 17B	MIKE 11 UHM (2004)
BULLETIN 17C	MIKE 11 UHM (JUNE 1999)
CUHPF/PC	MODIFIED PULS ROUTING TECHNIQUES
CUHPF/PC (MAY 1996)	OTHER
CUHPF/PC (MAY 2002)	PEAKFQ
DBRM	PEAKFQ 2.4 (APRIL 1998)
DBRM 3.0 (1993)	PEAKFQ 2.5
DEPTH FREQUENCY METHOD	PEAKFQ 3.0
DISCHARGE VERSUS DRAINAGE AREA RELATIONS	PEAKFQ 4.0
DR3M	PEAKFQ 5.2
DR3M (OCTOBER 1993)	PEAKFQ 7.1
FAN	PEAKFQ-REGRESSION EQUATIONS
GAGE ANALYSIS	PONDPACK
HEC-1	PONDPACK V 8 (MAY 2002)
HEC-1 4.0.1	PRECIP
HEC-1 4.1	PRMS
HEC-FFA	PRMS 2.1 (JANUARY 1996)
HEC-FFA 3.1	RATIONAL METHOD
HEC-FFA-REGRESSION EQUATIONS	REGRESSION EQUATIONS
HEC-HMS	REGULATED FREQUENCY CURVES
HEC-HMS 1.1	S2DMM
HEC-HMS 2.0	SNYDER METHOD
HEC-HMS 2.0.3	SOIL CONSERVATION SERVICE NATIONAL ENGINEERING HANDBOOK
HEC-HMS 2.1.1	SQUARE ROOT OF THE DRAINAGE AREA METHOD
HEC-HMS 2.1.2	STATISTICAL METHODS IN HYDROLOGY
HEC-HMS 2.1.3	SWMM
HEC-HMS 3.5	SWMM (RUNOFF) 4.30 (MAY 1994)
HEC-HMS 4.0	SWMM (RUNOFF) 4.31 (JANUARY 1997)
HEC-HMS 4.1	SWMM 5 V 5.0.005 (MAY 2005)
HEC-HMS 4.2	SWMM 5.1
HEC-HMS 4.3	TR-20
HEC-IFH	TR-20 (FEBRUARY 1992)

Hydrology Model	
HEC-IFH 2.01	TR-20 WIN 1.00.002 (JANUARY 2005)
HEC-SSP 2.0	TR-55
HEC-SSP 2.1	TR-55 (JUNE 1986)
HEC-IFH 1.03	TWO STATION STATISTICAL METHOD
HEC-IFH 1.04	UNET
HEC-IFH 2.0	UNKNOWN
HIGHWATER; SLOPE AREA METHOD	VEN TE CHOW - B462
HSPF	WIN TR-55 1.0.08 (JANUARY 2005)
HSPF 10.10	WRC
HSPF 10.11	XPSTORM
HSPF 11.0	XPSTORM 10.0 (MAY 2006)
HYMO	XP-SWMM
ICPR	XP-SWMM 8.52
LAKE ROUTING ANALYSIS	

D_LINE_TYPE

Line Type
COASTAL
LAKE OR POND
OTHER
PLAYA
PONDING
RIVERINE

D_MTHOD_TYPE

Method Type
NEW
REDELINEATION
UPDATED

D_ORG_TYPE

Organization Type
FEMA
FLOOD CONTROL DISTRICT
HOME OWNER
IRRIGATION DISTRICT
LEVEE DISTRICT
NON-FEMA FEDERAL AGENCY
OTHER
PRIVATE SECTOR

Organization Type
RECLAMATION DISTRICT
US CITY GOVERNMENT
US COUNTY GOVERNMENT
US STATE GOVERNMENT
WATER AGENCY

D_PRELIM_QTR

Preliminary Quarter			
Q1FY10	Q2FY15	Q3FY20	Q4FY25
Q2FY10	Q3FY15	Q4FY20	Q1FY26
Q3FY10	Q4FY15	Q1FY21	Q2FY26
Q4FY10	Q1FY16	Q2FY21	Q3FY26
Q1FY11	Q2FY16	Q3FY21	Q4FY26
Q2FY11	Q3FY16	Q4FY21	Q1FY27
Q3FY11	Q4FY16	Q1FY22	Q2FY27
Q4FY11	Q1FY17	Q2FY22	Q3FY27
Q1FY12	Q2FY17	Q3FY22	Q4FY27
Q2FY12	Q3FY17	Q4FY22	Q1FY28
Q3FY12	Q4FY17	Q1FY23	Q2FY28
Q4FY12	Q1FY18	Q2FY23	Q3FY28
Q1FY13	Q2FY18	Q3FY23	Q4FY28
Q2FY13	Q3FY18	Q4FY23	Q1FY29
Q3FY13	Q4FY18	Q1FY24	Q2FY29
Q4FY13	Q1FY19	Q2FY24	Q3FY29
Q1FY14	Q2FY19	Q3FY24	Q4FY29
Q2FY14	Q3FY19	Q4FY24	Q1FY30
Q3FY14	Q4FY19	Q1FY25	Q2FY30
Q4FY14	Q1FY20	Q2FY25	Q3FY30
Q1FY15	Q2FY20	Q3FY25	Q4FY30

D_PRIORITY

Request Record Priority
HIGH
LOW
MEDIUM

D_RESOL_STAT

Resolution Status
DEFERRED
NO

Resolution Status
UNKNOWN
YES

D_RQST_CAT

Request Category
CARTOGRAPHIC
FLOOD DATA

D_RQST_LVL

Request Level
APPROXIMATE
DETAILED WITH FLOODWAY
DETAILED WITHOUT FLOODWAY
LIMITED DETAIL
N/A
TO BE DETERMINED

D_RQST_SRC

Request Record Source
CNMS VIEWER
VALIDATION ASSESSMENT
GEODATABASE ENTRY

D_RQST_LYR

Request Feature Layer
S_REQUESTS_PT
S_REQUESTS_AR

D_SOURCE

Source	
Coded Value	**Name**
FIRM	COUNTY FIRM DATABASE
FIRM_PRELIM	COUNTY FIRM DATABASE ACQUIRED DURING STUDY PERIOD
DIGITIZED	DIGITIZED
NFHL	NATIONAL FLOOD HAZARD LAYER
NHD-HIGH	NATIONAL HYDROGRAPHY DATASET HIGH RESOLUTION
NHD-LOW	NATIONAL HYDROGRAPHY DATASET LOW RESOLUTION
NHD-MED	NATIONAL HYDROGRAPHY DATASET MEDIUM RESOLUTION
RFHL	REGIONAL FLOOD HAZARD LAYER

D_STATE

STATE	
ALABAMA	MONTANA
ALASKA	NEBRASKA
ARIZONA	NEVADA
ARKANSAS	NEW HAMPSHIRE
CALIFORNIA	NEW JERSEY
COLORADO	NEW MEXICO
CONNECTICUT	NEW YORK
DELAWARE	NORTH CAROLINA
DISTRICT OF COLUMBIA	NORTH DAKOTA
FLORIDA	OHIO
GEORGIA	OKLAHOMA
HAWAII	OREGON
IDAHO	PENNSYLVANIA
ILLINOIS	RHODE ISLAND
INDIANA	SOUTH CAROLINA
IOWA	SOUTH DAKOTA
KANSAS	TENNESSEE
KENTUCKY	TEXAS
LOUISIANA	UTAH
MAINE	VERMONT
MARYLAND	VIRGINIA
MASSACHUSETTS	WASHINGTON
MICHIGAN	WEST VIRGINIA
MINNESOTA	WISCONSIN
MISSISSIPPI	WYOMING
MISSOURI	

D_STATUS_TYPE

Status Type
BEING ASSESSED
BEING STUDIED
DEFERRED
NVUE COMPLIANT
TO BE ASSESSED
TO BE STUDIED

D_ STUDY_TYPE

Study Type
DIGITAL APPROXIMATE
DIGITAL CONVERSION APPROXIMATE
DIGITAL CONVERSION DETAILED
DIGITAL DETAILED
NEW OR UPDATED APPROXIMATE
NEW OR UPDATED DETAILED
NON-DIGITAL APPROXIMATE
NON-DIGITAL DETAILED
REDELINEATED
UNMAPPED

D_TrueFalse

True (Yes) / False (No)	
Coded Value	**Name**
T	True (Yes)
F	False (No)
U	Unknown

D_VALID_CAT

Validation Category
ASSESSED
UNKNOWN
UNVERIFIED
VALID

D_ZONE

Flood Zone
0.2 PCT ANNUAL CHANCE FLOOD HAZARD CONTAINED
1 PCT ANNUAL CHANCE FLOOD HAZARD CONTAINED
A
A99
AE
AH
AO
AR
AREA NOT INCLUDED
D
OPEN WATER
V
VE
X

D_EROSMETH

Erosion Method
540 SF
540 SF/NOBLE
540 SF/NONSTANDARD
CSHORE
KRIEBEL-DEAN
MK&A (KOMAR)
MULTIPLE METHODS USED
NOBLE
NONE
NONSTANDARD

D_RUNUPMDL

Runup Model	
ACES	RUNUP 2.0/CSHORE
CSHORE	SPM/CEM
CSHORE/SPM	STOCKDON
CSHORE/SPM/TAW	TAW
DIM	TAW/ACES/RUNUP 2.0
DIM/TAW	TAW/RUNUP 2.0
DIM/TAW/SPM	TAW/RUNUP 2.0/CSHORE
DIM/TAW/STOCKDON	TAW/RUNUP 2.0/CSHORE/SPM
MULTIPLE METHODS USED	TAW/RUNUP 2.0/SPM

Runup Model	
NONE	TAW/RUNUP 2.0/SPM/ACES
RUNUP 2.0	

D_SETUPMETH

Setup Method
ACES
CSHORE
DIM
DIM/GOURLAY
DIM/STOCKDON
NONE
SPM/CEM
STOCKDON
STWAVE
SWAN
UNSWAN

D_SURGE2DW

How Surge Model is coupled with 2D Wave analysis
LOOSELY COUPLED
NONE
NOT COUPLED
TIGHTLY COUPLED

D_STATMETH

Surge Statistical Method
EST
EXTREME VALUE ANALYSIS
GAGE ANALYSIS
GEV
JPM
JPM-OS
JPM-OS/EST
MONT CARLO
MULTIPLE METHODS USED
POT

D_SURGEMDL

Surge/Stillwater Method

Surge/Stillwater Method
ADCIRC
DELFT
FEMA SURGE
GEOCLAW/TSUNAMI
MIKE 21
MULTIPLE METHODS USED
NONE
SELFE
SLOSH
TIDE GAGE
TIDE GAGE/MIKE 21
TUFLOW
XP-SWMM

D_OVWVMDL

Overland Wave Model
NONE
STWAVE
SWAN
WHAFIS

D_WAVE_MDL

Wave Model
ACES
DELFT3D
GROW/SCRIPPS
MIKE SW
MULTIPLE METHODS USED
NONE
OTHER
OWI GROW
REFDIF
SCRIPPS SHELF
SPM/CEM
STWAVE
SWAN
WAM
WAVEWATCHIII
WIS/ACES

D_TIER

TIER Inventory
TIER 0
TIER 1
TIER 2
TIER 3
TIER 4
TIER 5

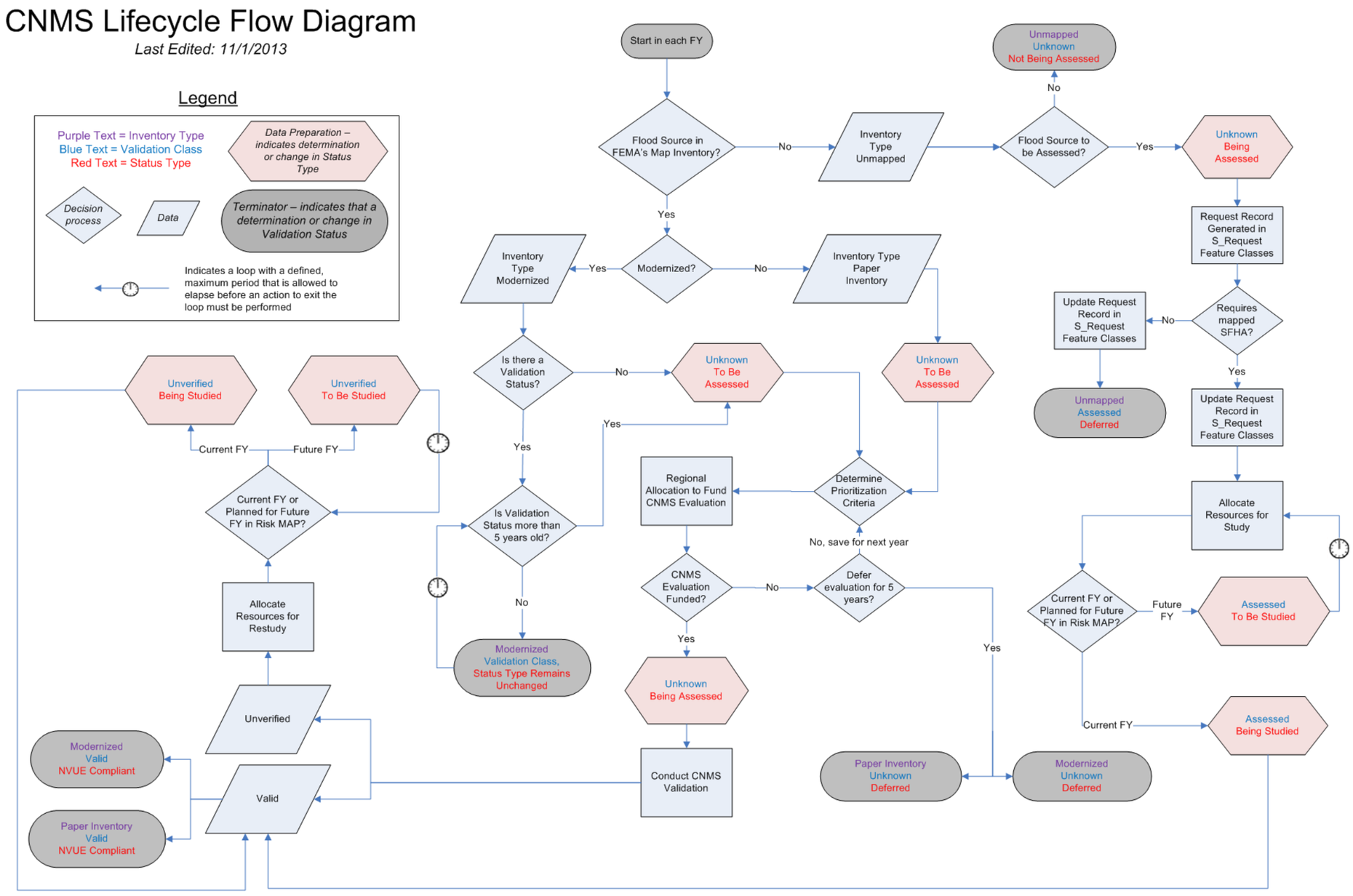
D_WSEL_AVAIL

D_WSEL_AVAIL
FUNDED COMPLIANT SID 415
FUNDED NON-COMPLIANT SID 415
COMPLETE COMPLIANT SID 415
COMPLETE NON-COMPLIANT SID 415
QUALITY UNKNOWN

D_DEPTH_AVAIL

Depth Grid Availability
01PCT COMPLIANT SID 628
01PCT AND OTHER COMPLIANT SID 628
01PCT NON-COMPLIANT SID 628
01PCT AND OTHER NON-COMPLIANT SID 628
QUALITY UNKNOWN

Appendix G. CNMS Lifecycle Flow Diagram



Appendix H. NVUE Reporting Guidance

H.1. Introduction

FEMA Standard #9 states that CNMS is the sole authority for reporting flood map update needs. CNMS is also the reporting mechanism for the NVUE metric. Per Standard #13, reporting of NVUE must take place quarterly. NVUE reporting should be on a schedule that is aligned with the Joint Program Review (JPR) and Status of Studies reporting processes. The Region (with support from the RSC) will be responsible for compiling all CNMS data at the regional level to facilitate reporting of NVUE statistics. Each Regional CNMS database will be submitted for national roll-up on the last business day of each quarter and also dated and archived at the Region. Following the national roll-up of the Regional CNMS FGDBs, the national NVUE table is generated within 10 business days after the end of each quarter, culminating in a report to the FEMA Headquarters Program Area C Lead. This report will summarize NVUE statistics for each State in the Region, along with the Region as a whole, including a breakdown by Validation Status and Status Type for Modernized (Tiers 2-5), and Paper Inventories (Tier 1), as well as for unmapped areas (Tier 0). The NVUE metric will be reported as both “NVUE Attained” and “NVUE Initiated”. Any NVUE metric based planning will assume completion and finalization of all stream miles that are classified in CNMS as BEING STUDIED - barring any changes in scope, appeals or protests at a project level prior to LFD issuance, NVUE Attained + Initiated represents the final state of the NVUE metric once all ongoing studies are issued preliminary. The NVUE Initiated metric and associated attributes in the S_Studies_Ln feature class will support the ability to forecast the attainment rate of NVUE.

Prior to FY11, a single NVUE metric was being reported which was the ratio of all New, Validated, and Updated Engineering Study miles divided by the sum total of all miles in FEMA’s Mapped SFHA inventory. A New or Updated study is considered NVUE complaint, and thus included in calculations of NVUE attained, after the issuance of the Preliminary FIRM. The National NVUE table generated each quarter, reports NVUE mileages and percentages at a state, regional and national level. It also provides the ability to distinguish between FEMA’s Modernized, Unmodernized and Unmapped stream reach inventory. Since the beginning of FY 11, two NVUE metrics are reported – NVUE Attained and NVUE Attained + Initiated. NVUE Attained is described above. NVUE Initiated miles are those New or Updated Study stream reaches which have been funded for new/updated engineering, but have not yet been issued as part of a Preliminary FIRM. While a mechanism exists in CNMS to capture these ‘Initiated’ miles, due to the retroactive updates needed for pre-FY11 studies, the CNMS FGDBs do not hold all NVUE Initiated miles. While the Regional CNMS FGDBs are being updated to store all ongoing studies, the best available source of all NVUE Initiated miles, along with their Preliminary issuance date, is available in the Risk MAP Project Planning and Purchasing Portal (P4). The Risk MAP Project Planning and Purchasing Portal is currently leveraged to calculate NVUE Initiated miles per FEMA Region and their anticipated attainment FY Quarter. This data is then included in the National NVUE table distributed to a wide audience to provide NVUE projections into the future.

The sections below describe the steps taken to complete NVUE calculations in the most appropriate manner possible. However, it should be noted that due to the inherent transient nature of the CNMS FGDBs and the policy and guidance as it surrounds this metric, all calculations for reporting purposes should be run through the FEMA HQ's CNMS Development team. There are several nuances in geospatial data processing, capturing which are beyond the scope of this document.

H.2. Understanding the Data Attributes Necessary for NVUE Calculations

The fields discussed below are all necessary for NVUE Calculation and mileage classification into bins when reporting and the National NVUE Table. The primary 'bins' into which study mileages get sorted are represented by the different allowed Validation Status and Status Type combinations as listed below. Within these categories, studies can typically be based on Detailed or Approximate engineering methods. Further classification includes Modernized (digital) or UnModernized (paper) Inventories.

Allowed VALIDATION_STATUS – STATUS_TYPE Combinations

- VALID – NVUE COMPLIANT (can contain detailed or approximate miles, but not unmapped miles)
- VALID – BEING STUDIED
- VALID – BEING ASSESSED
- UNKNOWN – BEING ASSESSED
- UNKNOWN – TO BE ASSESSED
- UNKNOWN – DEFERRED
- UNKNOWN – BEING STUDIED
- UNVERIFIED – TO BE STUDIED
- UNVERIFIED – BEING STUDIED
- ASSESSED – TO BE STUDIED*
- ASSESSED – BEING STUDIED*
- ASSESSED – DEFERRED*

  **Note: These Validation Status and Status Type combinations are possible only for Unmapped Streams that do not have mapped SFHAs in FEMA inventory.*

FIPS

FIPS is the 5-digit County code which indicates the county in which the study reach lies. The first two digits of the FIPS code are the state FIPS, and when combined with a separate state lookup table this field can also inform the Region number of the study. This number defines the levels at which NVUE is reported when a political boundary based reporting is desired.

FLD_ZONE

FLD_ZONE is used to differentiate between Detailed and Approximate Studies. While the domain range allows for more values than are currently in use, it has been standard practice when rolling up NVUE thus far to remove any X, V, or VE records from consideration (as in, they do not get a detailed or approximate assignment and contribute 0 to NVUE), leaving just A, AE, AO, AH. At this point, where FLD_ZONE = “A”, the study is considered approximate, and where FLD_ZONE <> “A” the study is considered detailed. Studies with FLD_ZONE = “X” are unmapped streams which do not get factored in to the numerator or denominator when calculating NVUE since they are not studied as of yet. An exception to the zone-based exclusion is applied when records have a Status Type of BEING STUDIED, and are past their projected Preliminary FIRM issuance dates. In such cases, the BS_ZONE is instead used in the determination of Detailed or Approximate.
The S_Coastal_Ln feature does not include a FLD_ZONE field as no differentiation of coastal flood zone studies is necessary for coastal NVUE calculations. Instead, the POP_COAST field is used to differentiate whether coastal miles are counted toward coastal NVUE.

VALIDATION STATUS

See above for brief description on bins, and sub bins, as well as description of legal combinations of Validation Status and Status Type attributes for a CNMS Study Record to count towards the NVUE Calculation. Only ‘VALID – NVUE COMPLIANT’ or ‘VALID – BEING ASSESSED’ miles, and those with a ‘BEING STUDIED’ Status Type which are past their projected Preliminary FIRM issuance dates are counted in the numerator when calculating NVUE. When calculating NVUE Attained + Initiated miles, “UNVERIFIED – BEING STUDIED” study miles that have not yet been issued Preliminary are also included in the numerator. As of the date of this document, NVUE Initiated Miles are calculated using the Risk MAP Project Planning and Purchasing Portal (P4). All mapped miles of all VALIDATION STATUS and STATUS TYPE combinations are counted for calculating the NVUE denominator (Note: all ASSESSED miles are omitted from the denominator, as they represent unmapped reaches).

MILES

Miles are calculated in the North America Albers Equal Area Conic projection. Miles are used to calculate NVUE percentages for a given political entity or watershed. Miles are counted 1:1 as calculated except in instances where specific business rules apply such as those described in the LINE_TYPE field discussion below and discussed in Section 3.2 of this document.

STUDY_TYPE

This field is used to determine whether a study is modernized or unmodernized (paper inventory). This field was a late addition to the schema and so may not be populated consistently for some regions. Due to the bulk methodology used to represent the unmodernized inventory in CNMS it is possible to use this field for separating the unmodernized inventory. Simply put, if the field value equals “Non-Digital Approximate”, or “Non-Digital Detailed”, then the study is unmodernized. If not, the study is considered Modernized. An exception is applied when records have a Status Type of BEING STUDIED, and are past their

projected Preliminary FIRM issuance dates. In such cases, the BS_STDY_TYP field is instead used in the determination of Modernized and UnModernized.

LINE_TYPE

The LINE_TYPE field is used to communicate the type of study representation the linework is showing. In some cases linework exists that depicts stillwater flooding or lakes / ponds. In these instances, 1 linear mile of study in the inventory does not represent the same required effort to study as 1 linear mile of true riverine study. To correct this, the business rule was established which says that any feature with LINE_TYPE = LAKE OR POND, PONDING, or PLAYA will have its MILES halved before they are added to either the numerator or denominator when calculating NVUE or reporting mileage break downs. This rule applies no matter what level of rollup is being performed.

HUC8_KEY (only needed when rolling up at a watershed level)

The HUC8_KEY displays the HUC8 level watershed into which the study reach drains. NVUE can be rolled up at this level rather than political boundary, but it requires further application of business rules as described in the DUPLICATE field entry.

DUPLICATE (only when rolling up at a watershed level)

The DUPLICATE field has been populated based on a series of business rules put in place to prevent over counting of mileage in scenarios where studies form the boundary between multiple political entities. This approach has allowed mileage calculation to remain accurate while still retaining information related to the side of the study in each entity (if they differ). -. When rolling up at a watershed level, the mileage for records where DUPLICATE = ‘CATEGORY 2’ may be counted as zero. Handling the DUPLICATE field is complex, but necessary to ensure appropriate documentation and tracking for streams that define political boundaries. While assessing watersheds post-discovery, it might be necessary to handle the duplicate field differently. Further details on the attribute types possible under this field are outlined in Section 3.2 of this document.

STATUS_TYPE

See VALIDATION_STATUS entry above, as these two fields work together to form the bins into which study miles are separated in the National NVUE Table.

H.3. NVUE Calculation

For the NVUE Numerator, when reporting at a political boundary level, NVUE calculation is as simple as halving all modernized mileages where the LINE_TYPE is of an appropriate value (see above), summing this result with the remaining modernized mileage in that entity and then dividing the total by the associated total mileage. Between FY11Q1 and FY14Q4 the NVUE denominator was defined as the sum total of all mapped miles in FEMA’s SFHA inventory that fall within the geospatial footprint defined by all counties and communities part of the KPI1 Map Mod metric, at the time it attained 92% (9/30/2011). As of FY15Q1, the NVUE denominator is defined as the full inventory of all mapped miles in FEMA’s SFHA inventory and calculated each

quarter using the latest CNMS FGDBs. As previously mentioned, any coastal or unmapped miles within the Inventory do not get counted towards the NVUE numerator or the denominator. FEMA is reviewing the process for Coastal Study inclusion in NVUE metric calculations. As of the date of issuance of this guidance, no coastal or coastally influenced studies are represented within the NVUE Metric calculation.

Appendix I. LOMA (MT-1) & LOMR (MT-2) Integration in CNMS

I.1. Identifying Mapping Needs/Requests Because of LOMC Processing

When processing MT-1 and MT-2 case files, occasionally issues are identified that could affect data stored in CNMS. In order to capture these issues appropriately, the LOMC Analysts should complete request records in CNMS, or update CNMS study records when secondary or critical issues are identified as outlined in the Validation Assessment Procedures (Appendix A). To submit CNMS requests, the LOMC group will use the request function of the National CNMS Web Portal (https://msc.fema.gov/cnms/). Requests will be submitted from information identified during either a MT-1 or MT-2 review. Typical requests anticipated include the following:

- *Improvement/Change to flooding source identified during the LOMA process:* If there has been a change, FEMA may deny the request and require that a LOMR be submitted. Many times the homeowner will not follow up with a LOMR. In cases where homeowners do not follow up with a LOMR the improvement area/need could be lost and therefore should be recorded in CNMS.
- *More extensive updated hydrology is submitted:* Where new hydrology is developed, it is common for only the main channel to be updated. This floodway specific practice ignores that hydrology is produced, and is readily available, for broader areas. As long as the hydrology data meet the minimum DCS, the full extent of these data can be utilized.
- *Existing-conditions-modeling developed during the CLOMR stage:* During the CLOMR review, an applicant is required to submit existing-conditions data. In cases where a CLOMR is not followed up by a LOMR, it is possible this new data could be lost and therefore should be recorded in CNMS.
- *BFE Determination:* If an applicant submits a complete study to determine a BFE in an Approximate A Zone SFHA, these data could potentially be used to update a Zone A study to a limited-detail study or higher.

I.2. Updating the CNMS Inventory for Approved LOMRs

Approved LOMRs may include new or revised analysis potentially changing the Validation Status or other attributes of the study that are stored in CNMS. In order to maintain an accurate database, no less frequent than once a quarter, the CNMS inventory should be updated to reflect approved LOMRs. Regional CNMS teams will obtain an extract from the rFHL (Regional Flood Hazard Layer). The extract will include the rFHL clipped to the S_LOMR layer for all LOMRs that were added to the rFHL that past quarter. The regional CNMS lead will use the rFHL data with the LOMR Determination Document to determine appropriate updates to CNMS.

When documenting presence of a LOMR in the S_Studies_Ln feature class (especially important when a FLD_ZONE changes based on the LOMR), recording the LOMR case number

in the 'REASON' field is suggested. The LOMRs encountered can be classified into the following two categories:

Type 1

LOMRs representing newly studied or completely restudied (typically with updates to both hydrology and hydraulics) streams or portions of streams using new or updated engineering shall be "broken out" from the remainder of the stream. These are then treated as a separate study and are subject to the guidelines outlined in the Validation Assessment Procedures (Appendix A) and Section 3.2. There are multiple mandatory updates to the CNMS inventory that need to occur with a Type 1 LOMR; see Table I-1.

Table I-1: S_Studies_Ln Updates Due to Type 1 LOMR

Field	Description
REACH_ID	Update as needed; add if new study Reach or revise if Reach split out from an existing study
STUDY_ID	Set to NULL
CASE_NO	Populate with LOMR MIP Case Number (e.g. 17-05-5892P)
CO_FIPS	Update as needed
CID	Update as needed
WTR_NM	Update as needed according to stream name in LOMR doc
WTR_NM_1	Update as needed
FLD_ZONE	Update as needed according to LOMR flood zone
VALIDATION_STATUS	Set to VALID
STATUS_TYP	Set to NVUE-COMPLIANT. If Reach is BEING STUDIED, do not update.
MILES	Calculate to North America Albers Equal Area Conic
SOURCE	Update as needed
STATUS_DATE	Update with Effective Date of LOMR
FY_FUNDED	Update according to first two digits of LOMR MIP Case Number
REASON	Populate with LOMR MIP Case Number followed by Basis of Request (e.g., "LOMR 16-06-3012P (New H&H)"). Migrate any existing notes to COMMENT field.
HUC8_KEY	Update as needed
STUDY_TYPE	Update as needed according to LOMR flood zone revision
TIER	Update as needed
WSEL_AVAIL	Set to NULL
DPTH_AVAIL	Set to NULL
BLE	If populated, do not overwrite
BLE_POC	If populated, do not overwrite
BLE_DATE	If populated, do not overwrite
LINE_TYPE	Update as needed
FBS_CMPLNT	Set to Unknown

FBS_CHKDT	Set to STATUS DATE
FBS_CTYP	Set to INDIVIDUAL REACH ATTRIBUTION
DUPLICATE	Update as needed
HYDRO_DATE_EFFCT	Update as needed
HYDRO_MDL	Update as needed
HYDRO_MDL_CMT	Update as needed
HYDRA_MDL	Update as needed
HYDRA_MDL_CMT	Update as needed
HYDRA_DATE_EFFCT	Update as needed
TOPO_DATE	Update as needed
TOPO_SRC	Update as needed
C1_GAGE through S9_REGEQ & associated CMT, SRC, and URL	Set to NULL
CE_TOTAL and SE_TOTAL	Set to NULL
A1_TOPO through A5_COMPARE & associated CMT, SRC, and URL	Set to NULL
COMMENT	Update as needed
BS_CASE_NO	If populated, do not overwrite
BS_ZONE	If populated, do not overwrite
BS_STDYTYP	If populated, do not overwrite
BS_HYDRO_M	If populated, do not overwrite
BS_HYDRO_CMT	If populated, do not overwrite
BS_HYDRA_M	If populated, do not overwrite
BS_HYDRA_CMT	If populated, do not overwrite
BS_FY_FUND	If populated, do not overwrite
BS_PRELIM_DATE	If populated, do not overwrite
BS_LFD_DATE	If populated, do not overwrite
EC1_UDEF through ES4_URL	Set to NULL

Type 2

LOMRs that updated only a portion of an existing study, typically to update mapping, topo, or hydraulics fall into the Type 2 category. These stream reaches are not to be broken out from existing studied stream reaches. It is important to remember that if this LOMR was issued due to a new hydraulic structure, channel, or other hydraulic feature, then that structure / channel or other hydraulic feature should not count against Elements C6 / S4 in S_Studies_Ln, as a LOMR has been processed to account for its affects, though it should still be documented appropriately.

Appendix J. CNMS Quality Management Plan (QMP)

J.1. Introduction

The data in the Regional CNMS File geodatabases (FGDBs) are continually updated by multiple stakeholders. In addition, the evolution of the Risk MAP program needs, warrant changes to CNMS Schema to accommodate the capture of additional study attributes through bulk geoprocessing, or on a case by case basis.

In order to ensure that the data attributes in the CNMS FGDBs are appropriately populated for consistent reporting of NVUE and SFHA study status, FEMA has established the requirement to utilize the CNMS FGDB QC Tool for Quality Assurance and Quality Control. This QC tool has the following features that benefit CNMS-related operations:

- Helps ensure timely and successful reporting of NVUE after each quarterly roll-up of the Regional CNMS FGDBs
- Can be used as a standalone tool within the existing infrastructure of various CNMS Stakeholders.
- Uses a self-certification model to document compliance and to note any exceptions requested
- Supports ArcGIS 10.2 and 10.3
- Has an easy to use interface that presents issues found by the QC tool to the user for incorporation and documentation

Has a phased implementation that accommodates the incorporation of the multiple phases of schema changes to the Regional CNMS FGDBs

Proper incorporation of the CNMS FGDB QC Tool into the CNMS Update and Maintenance workflow is necessary to ensure usefulness of the CNMS FGDBs to support Risk MAP program needs.

The following sections outline 1) the targeted user groups who will interact with the CNMS FGDB QC Tool and their intended workflows, 2) the attribute quality verification criteria applied by the CNMS FGDB QC Tool, and 3) a User's Guide for operation of the CNMS FGDB QC Tool.

J.2. Workflow and User Interface

This appendix outlines the workflow envisioned for a targeted list of user types, and key features of the user interface of the CNMS FGDB QC Tool.

User Groups

As outlined in the introduction to this document, multiple stakeholders are expected to update the CNMS FGDBs locally prior to Regional and National roll-up of the database.

The following profile is assumed for users that will be using the CNMS FGDB QC Tool:

- has a knowledge of CNMS Policies and Procedures and is well versed with the CNMS Technical Reference
- is a CNMS liaison representing a FEMA Regional Office, RSC, PTS, or CTP responsible of making updates to the CNMS FGDB per project scopes and operating procedures

Data Inputs

Due to multiple stakeholder involvement, self-certification and exceptions need to be documented at source. The CNMS FGDB QC Tool supports data submissions spanning various geography types. It accepts single or multiple counties' data, watershed-level data, and an entire Region CNMS FGDB. The CNMS FGDB used with the QC Tool should be in the schema that is reflected in this current CNMS Technical Reference. The list of checks seen in Section J.3 also applies to this version of the CNMS data model.

The User Interface (UI) for the CNMS FGDB QC Tool outlined in the section below, will prompt the user to identify the type of geography that the QC check is being applied for. By accepting inputs at various geographic resolutions, the tool can also be used to check quality at any phase of the database roll-up - locally at the production centers, or during quarterly Regional/National Roll-up. CNMS database updates warranted by Map Production, Discovery efforts, Preliminary FIRM Issuance, LFD issuance and Post-production activities can then be reviewed for quality on a smaller scale prior to reintegration into the Regional CNMS FGDB.

User Interface and Platform

The CNMS FGDB QC Tool can be installed on desktops by users with administrative rights to the workstation, and operated independent of a license. The CNMS FGDB QC Tool functions within the Esri ArcGIS 10.2 and 10.3 environments.

The UI itself is integrated with ArcGIS to work within an ArcMap session and can read out of an Esri FGDB. Upon launching the UI, the user will be prompted to select from options to 'Validate a Single or Multiple Counties/Watersheds' and 'Validate Entire Region', and will then be asked for an FGDB file location. The tool will then auto-populate a list of the counties included in the FGDB, or will continue without a message, respectively, depending on the option first selected.

The tool will perform a series of checks as defined in the table seen in Section J.3., and will prompt the user for input in several ways. First, the user will be shown results of any certain checks which are not considered critical. Fixes to these issues may be made by looking into features associated with these secondary issues. The user will be required to provide brief documentation for any exceptions for secondary issues that will not be addressed prior to self-certifying and advancing the CNMS FGDB to the next roll-up. Second, values deemed to violate schema, and/or quality rules, and/or suspected to cause issues in the quarterly roll-up of the Regional CNMS FGDBs will be flagged and documented in a table with records associated with CNMS FGDB feature primary keys. This table of records may be used to associate with the appropriate CNMS feature class to identify and correct issues. The table of records with results

of the QC check will contain fields that classify the type of issue found during the automated check, along with possible suggestions for eliminating the issue for each record.

After addressing the errors listed in the QC check output table, the CNMS FGDB should be resubmitted for a run through the UI described above iteratively, until a validation check passes without any critical issues remaining unaddressed. Any secondary issues that have an associated request for exception with a reason noted within the table of records for the QC issues found, will be allowed in the FGDB that will be advanced for the next stage in the roll-up. At this point, the CNMS FGDB submission is considered to be self-certified and contact details of the user is collected for the self-certification and for entry in the Points_of_Contact table of the CNMS FGDB.

When the next roll-up happens at the state- or Regional- level, if the table of records resulting from running the QC tool is carried forward, notes of exceptions will be retained so that subsequent teams rolling the database up, do not have to re-document the request for exception. Users should note that exceptions are linked to REACH_ID values, and so in order for them to be carried forward, those values would need to be retained on the linework as appropriate.

J.3. Quality Control Criteria

This Section outlines the types of checks that will be performed. In addition to several logical consistency requirements, the quality checks queries have been defined based on the CNMS Technical Reference in collaboration with the PTS CNMS Development Team and FEMA Headquarters.

Validation Categories

S – This category represents checks against schematic values, such as domain adherence.

Q – This category represents quality issues in the Inventory based on logic checks and combinations of field values.

CNMS S_Studies_Ln Checks Table

Table J-1: S_Studies_Ln Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
REACH_ID	No	Must be 12 characters in length	S	—	Critical
		The first five characters must match with the associated FIPS field value.	S	—	Critical
		The two characters following the FIPS must be '01'.	S	—	Critical
		Each Reach_ID must be unique.	S	—	Critical
STUDY_ID	Yes	If populated (non-null), Must be 12 characters in length	S	—	Secondary
CASE_NO	Yes	None	S	—	N/A
CO_FIPS	No	Five Character Length Enforcement	S	—	Critical
CID	No	—	S	—	Critical
WTR_NAME	Yes	None	S	—	N/A
WTR_NAME_1	Yes	None	S	—	N/A
FLD_ZONE	No	D_ZONE Domain Value	S	—	Critical
		Zone A + Detailed STUDY_TYPE is Not Permissible.	Q	—	Critical
		Records with Unmapped FLD_ZONE Values should only be allowed to have 'ASSESSED' Validation Status.	Q	Unmapped type means FLD_ZONE = 'X', 'D', 'AREA NOT INCLUDED	Critical
		Coastal Flood Zones Not Allowed	Q	Records with FLD_ZONE = 'V' or 'VE' Should not exist in this feature class	Critical
		Zone A/AE/AH/AO/AR Streams Cannot Have 'ASSESSED' Validation Status.	Q	—	Critical
		D_VALID_CAT Domain	S	—	Critical
VALIDATION_STATUS	No	Validation Status – Status Type Combination Must Pass Check Against List of Acceptable Combinations	Q	Acceptable Combinations Defined in CNMS Technical Reference	Critical
		Non-SFHA FLD_ZONE Values should prohibit records from being called VALID. Other rules apply.	Q	This includes , 'AREA NOT INCLUDED', 'D', , 'X', and 'OPEN WATER'	Critical
		D_Status_Type Domain	S	—	Critical
STATUS_TYPE	No	IF STATUS_TYPE is 'DEFERRED', there should not be a future date value in PRELM_DATE	Q	—	Secondary

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		If PRELM_DATE is a future date, STATUS_TYP should be 'BEING STUDIED'	Q	—	Secondary
MILES	No	Should be greater than zero and not null.	Q	—	Critical
SOURCE	No	D_SOURCE domain	S	—	Critical
STATUS_DATE	No	Should be In Expected Data Format (Date)	S	—	Critical
		Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
FY_FUNDED	Yes	D_FY_FUNDED domain	S	—	Critical
HUC8_KEY	No	Must be 8 Characters in Length	Q	—	Critical
		Must Be an Existing HUC (From 2010 HUC8 WBD)	Q	—	Critical
STUDY_TYPE	No	D_STUDY_TYPE domain	S	—	Critical
TIER	No	D_TIER domain	S	—	Critical
		If TIER 0, cannot have FLD_ZONE = A, AE, AH, AO, AR if TIER 2, 3, 4, or 5 STUDY_TYPE cannot be NONDIGITAL. If TIER 0 STUDY_TYPE must be "UNMAPPED"	Q		Critical
WSEL_AVAIL	Yes	D_WSEL_AVAIL domain	S	—	Secondary
DPTH_AVAIL	Yes	D_DEPTH_AVAIL	S	—	Secondary
BLE	Yes	D_BLE	S	—	Secondary
BLE_POC	Yes	If BLE field is populated, cannot be NULL. If not NULL, should Contain an Existing POC_ID from POC_ID Table	Q	—	Secondary
BLE_DATE	Yes	Should be In Expected Data Format (Date)	S	—	Secondary
		If BLE field is populated, cannot be NULL	Q	—	Secondary
FBS_CMPLNT	No	D_TrueFalse domain	S	—	Critical
FBS_CHKDT	No	Should be In Expected Data Format (Date)	S	—	Critical
FBS_CHKDT	No	Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
FBS_CTYP	No	D_FBS_CTYPE domain	S	—	Critical
LINE_TYPE	No	D_LINE_TYPE Domain	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		Value of 'COASTAL' should not exist within this feature class	—	—	Critical
DUPLICATE	No	D_DUPLICATE Domain	S	—	Critical
DATE_EFFECT	Yes	Should be In Expected Data Format (Date)	S	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
HYDRO_MDL	No, if FLD_ZONE = AE/AO/AH/AR	D_HYDRO Domain	S	—	Critical
HYDRA_MDL	No, if FLD_ZONE = AE/AO/AH/AR	D_HYDRA Domain	S	—	Critical
C1 to C7, S1 to S9, A1 to A5	No	D_ELEMENT Domain	S	Check Against D_ELEMENT Domain	Critical
CE_TOTAL	No	The Value Should Accurately Reflect the Number of Failed Critical Elements	Q	—	Critical
SE_TOTAL	No	The Value Should Accurately Reflect the Number of Failed Secondary Elements	Q	—	Critical
BS_CASE_NO	Yes	None	S	—	N/A
BS_ZONE	Yes	D_Zone Domain	S	—	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' and PRELM_DATE is a past date	Q	This field MUST be populated in this instance.	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' and PRELM_DATE is a future date	Q	This field should be populated in this instance.	Secondary
		BS_ZONE should not be an Unmapped Zone Type if BS_STDYTYP does not equal 'UNMAPPED'	Q	Unmapped type means FLD_ZONE = 'X', 'D', 'AREA NOT INCLUDED'	Critical
BS_STDYTYP	Yes	D_STUDY_TYPE Domain	S	—	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' and PRELM_DATE is a past date	Q	This field MUST be populated in this instance.	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' and PRELM_DATE is a future date	Q	This field should be populated in this instance.	Secondary
		If FLD_ZONE is an Unmapped type OR STUDY_TYPE is 'UNMAPPED' then BS_STDYTYPE cannot be set to 'REDELINEATED', 'DIGITAL CONVERSION DETAILED', or 'DIGITAL CONVERSION APPROXIMATE'	Q	Unmapped type means FLD_ZONE = 'X', 'D', 'AREA NOT INCLUDED'	Critical
BS_HYDRO_M	Yes	D_HYDRO Domain	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
BS_HYDRA_M	Yes	D_HYDRA Domain	S	—	Critical
BS_FY_FUND	Yes	D_FY_FUNDED Domain	S	—	Critical
		Check if STATUS_TYPE = 'BEING STUDIED'	Q	If the STATUS_TYP value is 'BEING STUDIED', this field should be populated.	Secondary
BS_PRELIM_DATE	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
		Check if STATUS_TYPE = 'BEING STUDIED'	Q	If the STATUS_TYP value is 'BEING STUDIED', the PRELM_DATE field must be populated, otherwise PRELIM_DATE field must be NULL	Critical
BS_LFD_DATE	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		If populated, should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
BS_LFD_DATE	Yes	Check if STATUS_TYPE = 'BEING STUDIED' Should be later than PRELM_DATE	Q	If the STATUS_TYP value is 'BEING STUDIED', the LFD_DATE field should be populated, otherwise LFD date must be NULL	Secondary
BS_LFD_DATE	Yes	Check if STATUS_TYPE = 'BEING STUDIED' Should be a date in the future.	Q	If the LFD date is in the past, it either needs to be corrected or the CNMS update for LFD Issuance Phase is overdue.	Secondary
EC1_UDEF and EC2_UDEF	Yes	D_ELEMENT Domain	S	—	Critical
ES1_UDEF through ES4_UDEF	Yes	D_ELEMENT Domain	S	—	Critical
E_ELEMDATE	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical

CNMS S_Coastal_Ln Checks Table

Table J-2: S_Coastal_Ln Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
CREACH_ID	No	Must be 12 characters in length	S	—	Critical
		The first five characters must match with the associated FIPS field value.	S	—	Critical
		The two characters following the FIPS must be '08'.	S	—	Critical
		Each Reach_ID must be unique.	S	—	Critical
CSTUDY_ID	Yes	If populated (non-null), Must be 12 characters in length	S	—	Secondary
CO_FIPS	No	Five Character Length Enforcement	S	—	Critical
CVALIDATION	No	Validation Status – Status Type Combination Must Pass Check Against List of Acceptable Combinations	Q	Acceptable Combinations Defined in CNMS Technical Reference	Critical
		D_Status_Type Domain	S	—	Critical
CSTAT_TYP	No	IF STATUS_TYPE is 'DEFERRED', there should not be a future date value in PRELM_DATE	Q	—	Secondary
		If PRELM_DATE is a future date, CSTAT_TYP should be 'BEING STUDIED'	Q	—	Secondary
MILES	No	Should be greater than zero and not null.	Q	—	Critical
SOURCE	No	D_SOURCE domain	S	—	Critical
STATUS_DATE	No	Should be In Expected Data Format (Date)	S	—	Critical
		Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
FY_FUNDED	Yes	D_FY_FUNDED domain	S	—	Critical
HUC8_KEY	No	Must be 8 Characters in Length	Q	—	Critical
		Must Be an Existing HUC (From 2010 HUC8 WBD)	Q	—	Critical
STUDY_TYPE	No	D_STUDY_TYPE domain	S	—	Critical
TIER	No	D_TIER domain	S	—	Critical
WSEL_AVAIL	Yes	D_WSEL_AVAIL domain	S	—	Secondary

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
DPTH_AVAIL	Yes	D_DEPTH_AVAIL domain	S	—	Secondary
FBS_CMPLNT	No	D_TrueFalse domain	S	—	Critical
FBS_CHKDT	No	Should be In Expected Data Format (Date)	S	—	Critical
FBS_CHKDT	No	Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
FBS_CTYP	No	D_FBS_CTYPE domain	S	—	Critical
DATE_EFFECT	Yes	Should be In Expected Data Format (Date)	S	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
POP_COAST	No		S	—	Critical
SURGE_MDL	Yes	D_SURGEMDL Domain	S	—	Critical
STAT_METH	Yes	D_STATMETH Domain	S	—	Critical
SURGE2DW	Yes	D_SURGE2DW Domain	S	—	Critical
SETUP_METH	Yes	D_SETUPMETH Domain	S	—	Critical
RUNUP_MDL	Yes	D_RUNUPMDL Domain	S	—	Critical
EROS_METH	Yes	D_EROSMETH Domain	S	—	Critical
OVWAVE_MDL	Yes	D_OVWVMDL	—	—	—
WAVE_MDL	Yes	D_WVDL	—	—	—
C_C1 to C_C7, C_S1 to C_S6	No	D_ELEMENT Domain	S	—	Critical
C_CE_TOTAL	No	The Value Should Accurately Reflect the Number of Failed Critical Elements	Q	—	Critical
C_SE_TOTAL	No	The Value Should Accurately Reflect the Number of Failed Secondary Elements	Q	—	Critical
BS_STDYTYP	Yes	D_STUDY_TYPE Domain	S	—	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' and PRELM_DATE is a past date	Q	This field MUST be populated in this instance.	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' and PRELM_DATE is a future date	Q	This field should be populated in this instance.	Secondary
BS_SRGMODL	Yes	D_SURGEMDL Domain	S	—	Critical
BS_STATMETH	Yes	D_STATMETH Domain	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
BS_SRG2DW	Yes	D_SURGE2DW Domain	S	—	Critical
BS_SUPMETH	Yes	D_SETUPMETH Domain	S	—	Critical
BS_RUPMODL	Yes	D_RUNUPMDL Domain	S	—	Critical
BS_ERSMETH	Yes	D_EROSMETH Domain	S	—	Critical
BS_OVLDMDL	Yes	D_OVWVMDL Domain	S	—	Critical
BS_WVMDL	Yes	D_WVDL Domain	S	—	Critical
BS_FY_FUND	Yes	D_FY_FUNDED Domain	S	—	Critical
		Check if STATUS_TYPE = 'BEING STUDIED'	Q	If the STATUS_TYP value is 'BEING STUDIED', this field should be populated.	Secondary
BS_PRELIM_DATE	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
		Check if STATUS_TYPE = 'BEING STUDIED'	Q	If the STATUS_TYP value is 'BEING STUDIED', the PRELM_DATE field must be populated., otherwise PRELIM_DATE field must be NULL	Critical
BS_LFD_DATE	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		If populated, should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical
		Check if STATUS_TYPE = 'BEING STUDIED' Should be later than PRELM_DATE	Q	If the STATUS_TYP value is 'BEING STUDIED', the LFD_DATE field should be populated, otherwise LFD date must be NULL	Secondary
BS_LFD_DATE	Yes	Check if STATUS_TYPE = 'BEING STUDIED' Should be a date in the future.	Q	If the LFD date is in the past, it either needs to be corrected or the CNMS update for LFD Issuance Phase is overdue.	Secondary
EC1_UDEF and EC2_UDEF	Yes	D_ELEMENT Domain	S	—	Critical
ES1_UDEF through ES4_UDEF	Yes	D_ELEMENT Domain	S	—	Critical
E_ELEMDATE	Yes	Should be In Expected Data Format (Date)	S	—	Critical
E_ELEMDATE	Yes	Should be a real date	Q	Date should be realistic: Year should be greater than or equal to 1950 AND less than or equal to 2050	Critical

CNMS S_Requests_Ar and S_Requests_Pt Checks Table

Table J-3: S_Requests_Ar/Pt Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
SRA_ID	No	Must be 12 characters in length	S	—	Critical
		The two characters following the FIPS must be '03'.	S	—	Critical
		Each SRA_ID must be unique.	S	—	Critical
SRP_ID	No	Must be 12 characters in length	S	—	Critical
		The two characters following the FIPS must be '04'.	S	—	Critical
		Each SRP_ID must be unique.	S	—	Critical
REACH_ID	Yes	Must be 12 characters in length	S	—	Critical
		If this Field is Populated, the Associated REACH_ID Should be Present in 'S_Studies_Ln' or 'S_Coastal_Ln'	S	Recognizing that REACH_ID's May Disappear from the Inventory Through Normal Maintenance Practices, This Check Will Not Cause Validation Failure, but Will Show Up in the Data Validation Output	Secondary
WTR_NAME	Yes	None	S	—	N/A
POC_ID	Yes	If not NULL, Should Contain an Existing POC_ID from POC_ID Table	S	—	Secondary
RQST_SRC	No	D_RQST_SRC Domain	S	—	Critical
RQST_CAT	No	D_RQST_CAT Domain	S	—	Critical
RQST_LVL	Yes	D_RQST_LVL Domain	S	—	Critical
MTHOD_TYPE	Yes	D_MTHOD_TYPE Domain	S	—	Critical
DATE_RQST	No	Should be In Expected Data Format (Date)	S	—	Critical
DATE_RESOL	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		Value Must Represent Later Date in Time Than DATE_RQST	S	—	Secondary
CARTO_RQST	No if RQST_CAT = 'CARTOGRAPHIC'	D_CARTO_RQST Domain	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
FDATA_RQST	No, if RQST_CAT = 'FLOOD DATA'	D_FDATA_RQST Domain	S	—	Critical
RESOL_STATUS	Yes	D_RESOL_STAT Domain	S	—	Critical
COMMENT	Yes	Special Characters Check	S	Will Check for Presence of Special Characters Which May Cause Future Interoperability Issues, But Will Not Cause Validation Failure.	Secondary
PRIORITY	Yes	D_PRIORITY Domain	S	—	Critical
DATE_REVIEW	Yes	Should be In Expected Data Format (Date)	S	—	Critical
		Value Must Represent Later Date in Time Than DATE_RQST	S	—	Critical

CNMS S_Unmapped_Ln Table

Table J-4: Unmapped_Ln Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
UML_ID	No	Must be 12 characters in length	S	—	Critical
		The two characters following the FIPS must be '07'.	S	—	Critical
		Each UML_ID must be unique.	S	—	Critical
CO_FIPS	No	Five Character Length Enforcement	S	—	Critical
CID	No	None	S	—	Critical
HUC8_KEY	No	Must be 8 Characters in Length	S	—	Critical
		Must Be an Existing HUC	Q	—	Critical
MILES	No	Should be greater than zero and not null.	Q	—	Critical

CNMS County_QC_Status Table

Table J-5: County_QC_Status Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
CO_FIPS	No	Five Character Length Enforcement	S	—	Critical
CO_NAME	No	Must Not be NULL	Q	—	Critical
CERT_DATE	Yes	Should be In Expected Data Format (Date)	S	This is populated by the QC Tool	N/A
CERT_ID	Yes	Should be 12 characters in length	S	This is populated by the QC Tool	N/A
		Should match a POC_ID value in the Point_of_Contact Table	Q	This is populated by the QC Tool	N/A

CNMS Coastal_County_QC_Status Table

Table J-6: Coastal_County_QC_Status Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
CO_FIPS	No	Five Character Length Enforcement	S	—	Critical
CO_NAME	No	Must Not be NULL	Q	—	Critical
CERT_DATE	Yes	Should be In Expected Data Format (Date)	S	This is populated by the QC Tool	N/A
CERT_ID	Yes	Should be 12 characters in length	S	This is populated by the QC Tool	N/A
		Should match a POC_ID value in the Point_of_Contact Table	Q	This is populated by the QC Tool	N/A

CNMS Point_of_Contact Table

Table J-7: Point_of_Contact Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
POC_ID	No	Must be 12 characters in length	S	—	Critical
		The two characters following the FIPS must be '05'.	S	—	Critical
		Each POC_ID must be unique.	S	—	Critical
POC_NAME	No	None	—	—	N/A
POC_TITLE	Yes	None	—	—	N/A
POC_DESCRIPTION	No	None	—	—	N/A
ORG_NAME	No	None	—	—	N/A
ORG_TYPE	No	D_ORG_TYPE Domain	S	—	N/A
BUSINESS_PHONE	Yes	None	—	—	N/A
MOBILE_PHONE	Yes	None	—	—	N/A
FAX_PHONE	Yes	None	—	—	N/A
ADDRESS_1	Yes	None	—	—	N/A
ADDRESS_2	Yes	None	—	—	N/A
CITY_NAME	Yes	None	—	—	N/A
STATE	Yes	D_State Domain	S	Note that this may be left blank as well	Critical
ZIP_CODE	Yes	None	—	—	N/A
COUNTY	Yes	None	—	—	N/A
EMAIL_ADDRESS	Yes	None	—	—	N/A
COMMENT	Yes	None	—	—	N/A

CNMS Specific_Needs_Info Table

Table J-8: Specific_Needs_Info Checks

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
SNI_ID	No	Must be 12 characters in length	S	—	Critical
		The two characters following the FIPS must be '06'.	S	—	Critical
		Each SNI_ID must be unique.	S	—	Critical
CNMSREC_ID	No	Must be 12 characters in length	S	—	Critical
		The two characters following the FIPS must be '01', '03', '04', or '08'}	Q	—	Critical
COST_SHARE	Yes	D_TrueFalse Domain	S	—	Critical
DISASTER	Yes	None	—	—	N/A
MITIG_PLAN	Yes	D_TrueFalse Domain	S	—	Critical
RSK_ASSESS	Yes	D_TrueFalse Domain	S	—	Critical
RSK_CMMENT	Yes	None	—	—	N/A
RSK_DATE	Yes	Should be In Expected Data Format (Date)	Q	—	Critical
RSK_MITIG	Yes	D_TrueFalse Domain	S	—	Critical
HAZUS	Yes	D_TrueFalse Domain	S	—	Critical
HAZUS_LVL	Yes	D_HAZUS_Lvl	S	—	Critical
COMMENT	Yes	None	—	—	N/A

J.4. User's Guide: CNMS FGDB QC Tool

Note on ArcGIS Version:

This tool is currently configured to work with ArcMap versions 10.2 and 10.3. The user does not need to be an administrator to install and use this tool.

How to Install and Access the Tool:

1. At this point, the CNMS FGDB QC Tool installation file is not available for download directly from the web. Instead, obtain a copy of the "CNMS_QC.esriAddIn file from your FEMA Regional Support Center and copy to a folder on your computer where you have write access.
2. Open an ArcMap document. Click on Customize-Add-In Manager and go to the Options tab. Click on 'Add Folder' and browse to the folder where you placed your add-in file. In the screenshot below, the add-in file has been placed in the "C:\PROJECTS" folder.

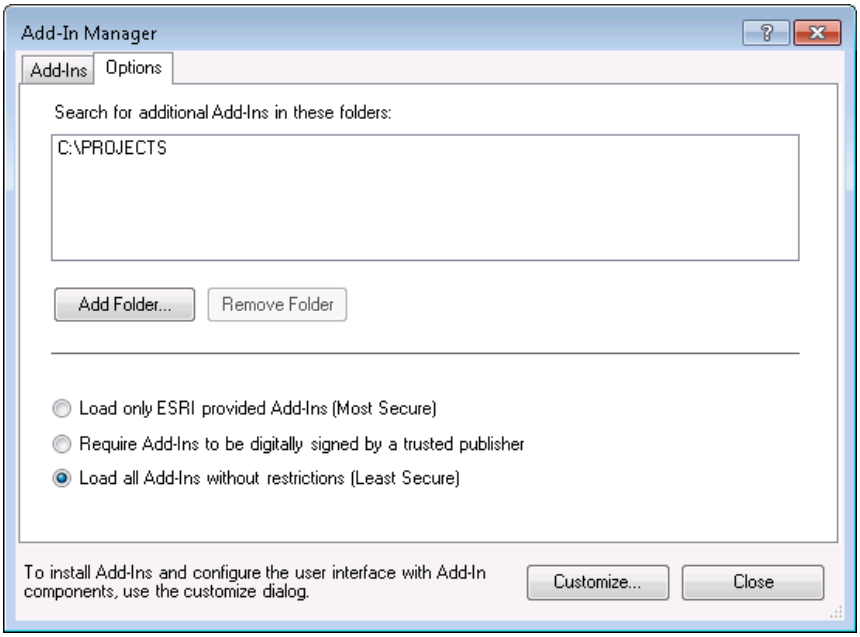


Figure J-1: Add-In Manager

3. Click Customize on the Add-In Manager dialog. You can also reach the Customize dialog by clicking on 'Customize-Customize Mode' on the main ArcMap menu. In the Customize dialog, check on the CNMS QC toolbar, which will be added into your ArcMap session. Alternatively, you can access the CNMS QC add-in from the Commands tab, under Add-In Controls, and drag the CNMS QC add-in onto your own desired toolbar.

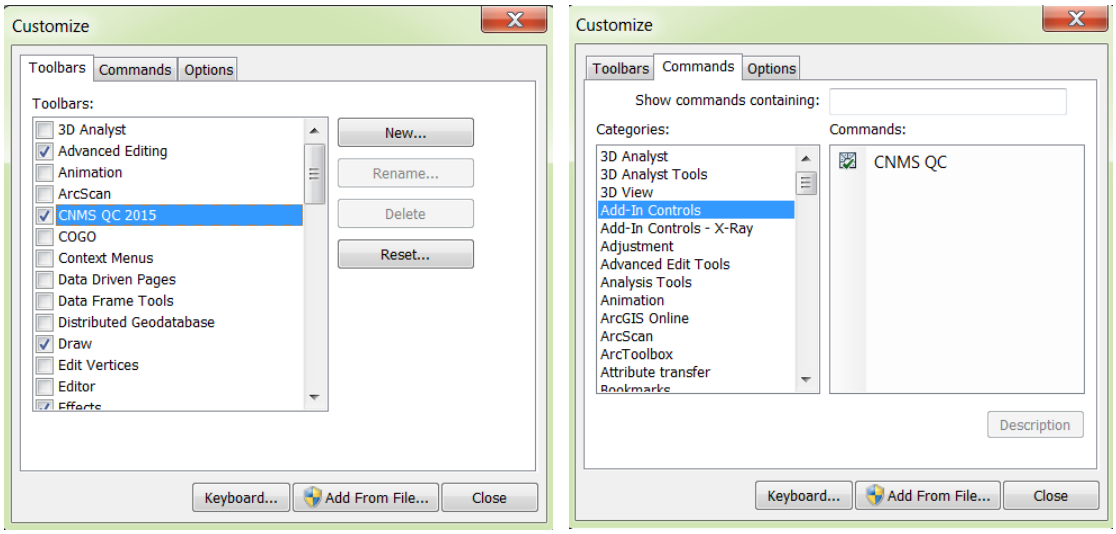


Figure J-2: Add-In Controls

4. Click Customize – Extensions and turn on the CNMS QC extension.

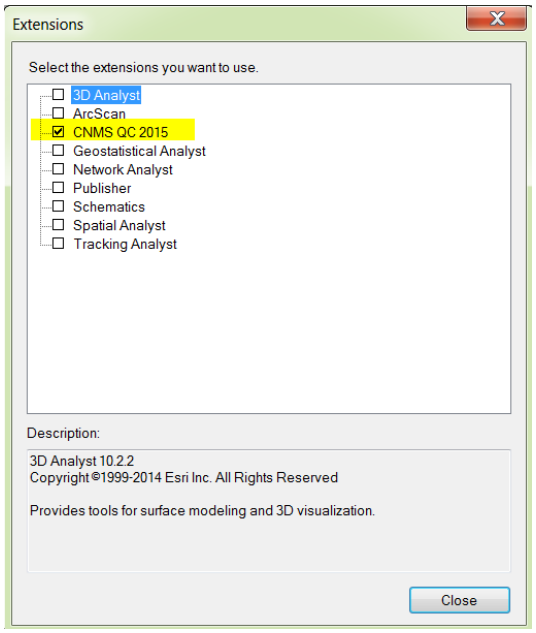


Figure J-3: CNMS QC Extension

How to Uninstall/Update Previous Add-in:

Add-ins can be updated by simply replacing the add-in file in the folder where the old add-in file resides. Close any open ArcMap MXDs before replacing the add-in file.

Alternatively, you can use the Delete this Add-In on Add-In Manager dialog to uninstall the add-in.

Intended FGDB QC Workflow:

1. Start the CNMS FGDB QC Tool by clicking on the icon previously added to either an existing or custom toolbar
2. Select an Esri FGDB (conforming to latest CNMS schema) using the Select FGDB dialog. Alternatively, if you have an S_Studies_Ln feature class already in your ArcMap MXD as the top layer in the Table of Contents, the QC Tool will automatically load the associated CNMS FGDB.

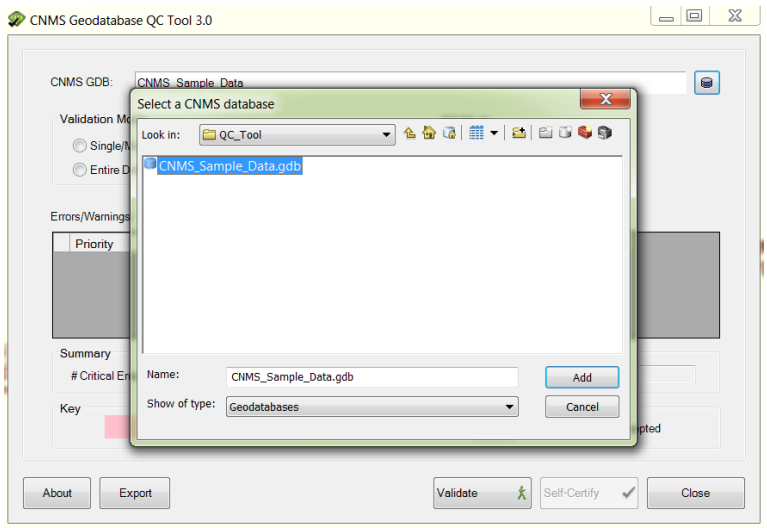


Figure J-4: Select FGDB

The selected FGDB is listed on the user interface as shown below:

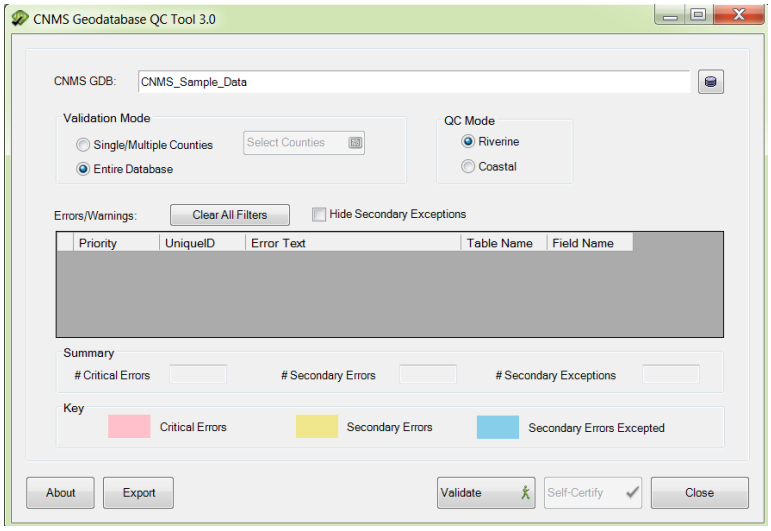


Figure J-5: FGDB Selected

1. Under QC Mode, choose “Riverine” to validate riverine CNMS inventory (S_Studies_Ln), choose “Coastal” to validate the coastal CNMS inventory (S_Coastal_Ln) within the selected CNMS GDB.
2. Choose to either validate a selection of counties within the selected FGDB or to validate the entire selected FGDB. Validating a selection of counties allows the user to selection using the “Select Counties” button.

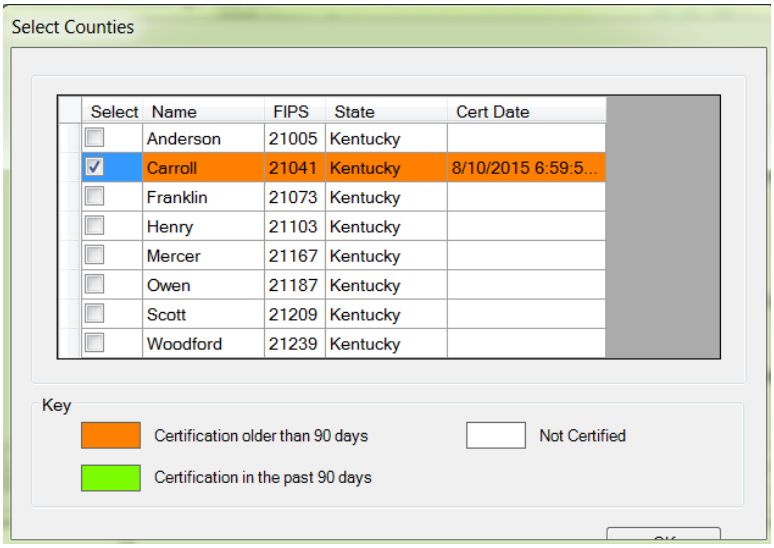


Figure J-6: Select Counties

3. Click on the "Validate" button to perform a QC check on the selected CNMS FGDB. The grid will be populated with any issues identified within the area selected for QC. Issues are categorized as either Critical or Secondary. Critical issues must be addressed before the FGDB is submitted as complete. The tool allows the addition and documentation of validation exceptions for Secondary issues only.
4. The context-menu available on the grid allows the following actions:
   a. Zoom to the selected record on the map. The selection occurs based on the Reach_ID field for S_Studies_Ln, SRA_ID field for S_Requests_Ar and SRP_ID field for S_Requests_Pt. If there are no unique ID fields, the OID field is used. (Right click – Zoom to Selection)
   b. Add a validation exception (Right click – Mark as exception)
   c. Edit an existing validation exception (Right click – Edit exception)
   d. Delete an existing validation exception (Right click – Delete exception)
   e. Export the QC results (critical and secondary errors) to a comma-delimited text file.
   f. Self-Certify – when there are no longer any critical errors, the CNMS database is Self-Certified whereby a certification date and POC ID are populated for each associated county FIPS in the County_QC_Status table.

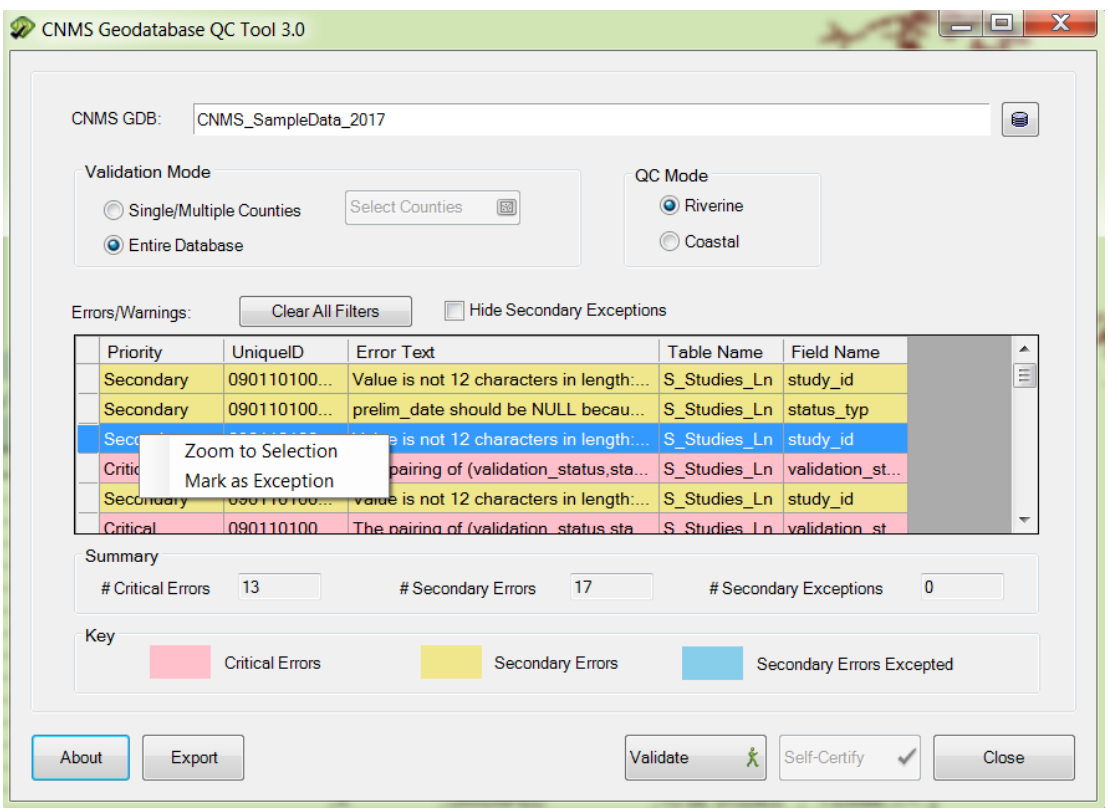


Figure J-7: Zoom to Error

Note that color coding is used to differentiate Critical vs. Secondary issues.

1. **Adding exceptions**: When a record is marked as an exception, the tool will bring up an input dialog where exception comments can be documented. This information will be stored in the database. Within the user interface, the color of the affected record will change to cyan indicating the existence of exception documentation.

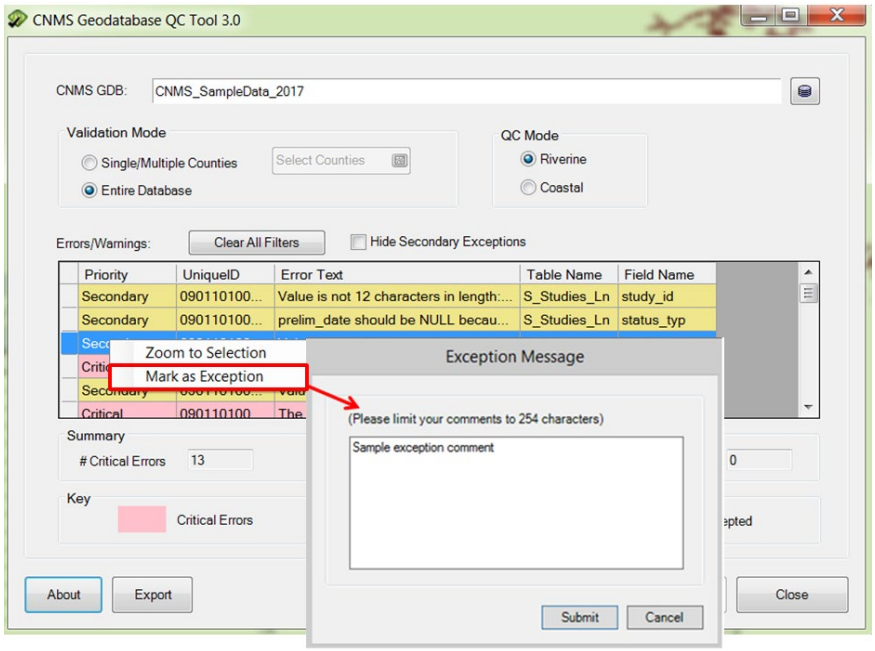


Figure J-8: Mark as Exception

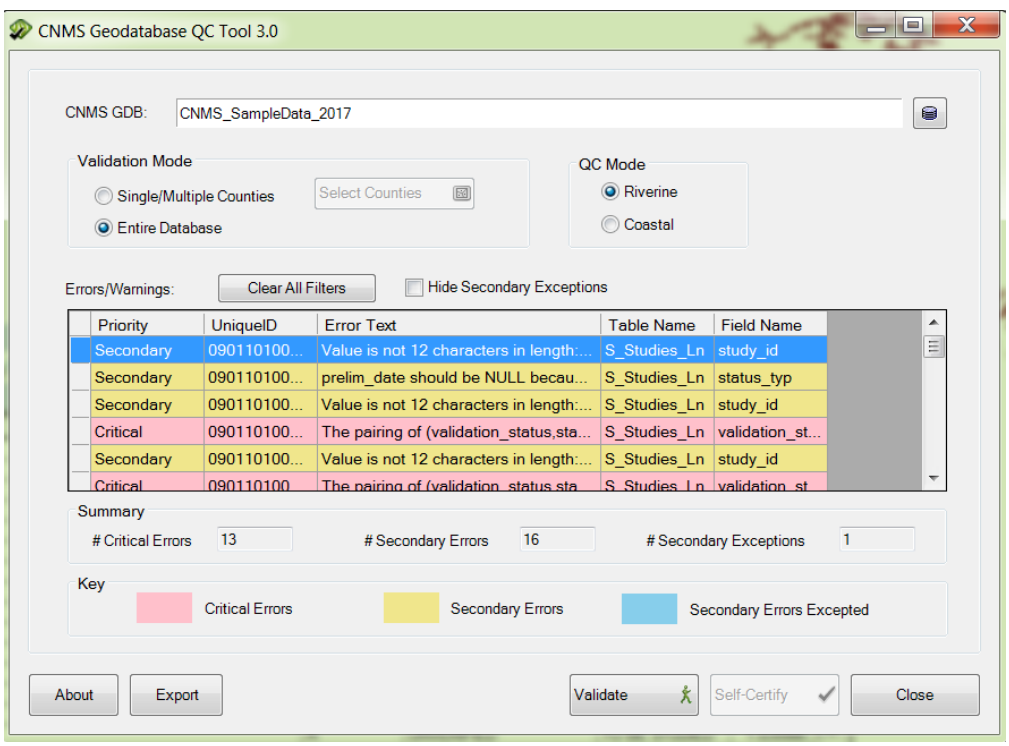


Figure J-9: Exception Entered

2. **Editing and deleting exceptions**: Clicking on an existing exception provides additional options to edit and/or delete exceptions.

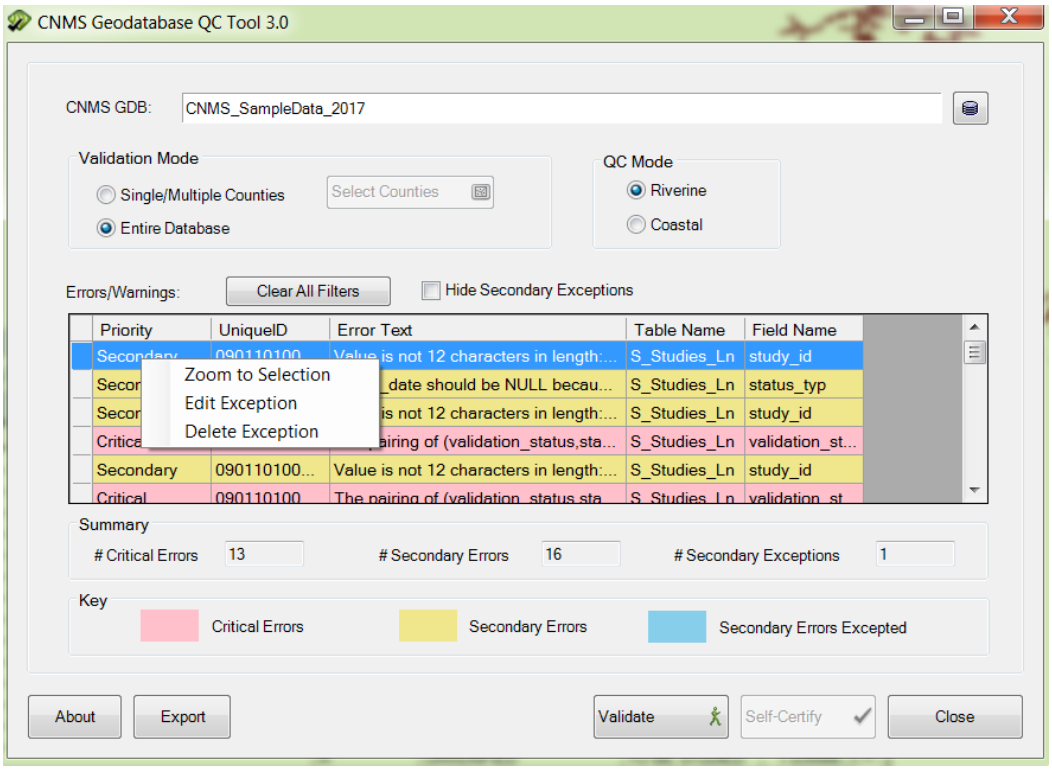


Figure J-10: Edit Exception

3. Selecting 'Edit Exception' brings up the input dialog allowing comments to be altered. This feature can also be used as to overwrite existing comments. Deleting an exception brings up a confirmation dialog (as shown below). Upon confirmation, the exception documentation is permanently deleted from the database.

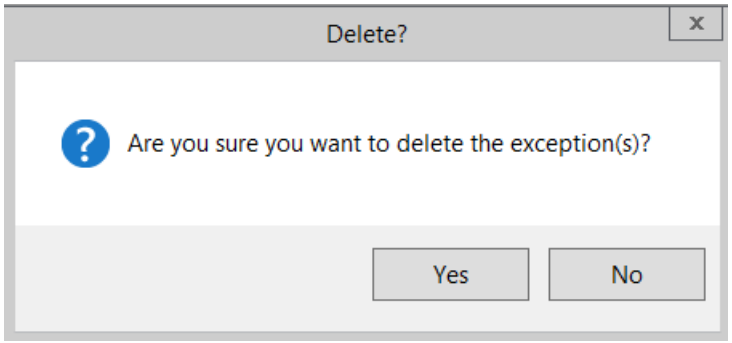


Figure J-11: Delete Exception

4. Click on the “Validate FGDB” button after every round of changes until all issues have been addressed. A success message will appear at the end of the validation process. Validation is complete only when:
   a. All Critical validation items have been addressed.
   b. All Secondary validation items have been addressed or marked as exceptions with user documentation.

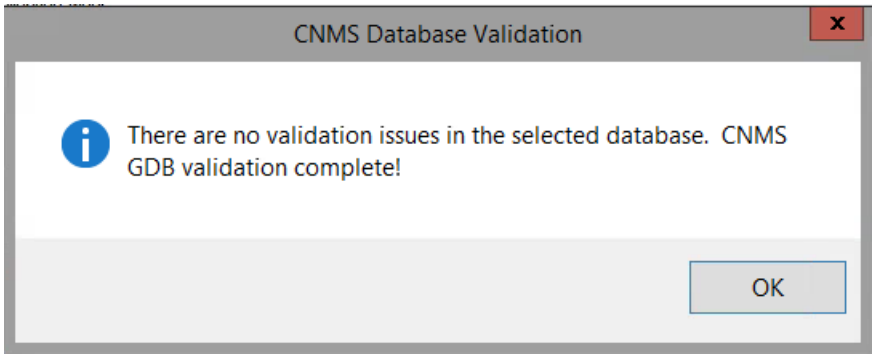
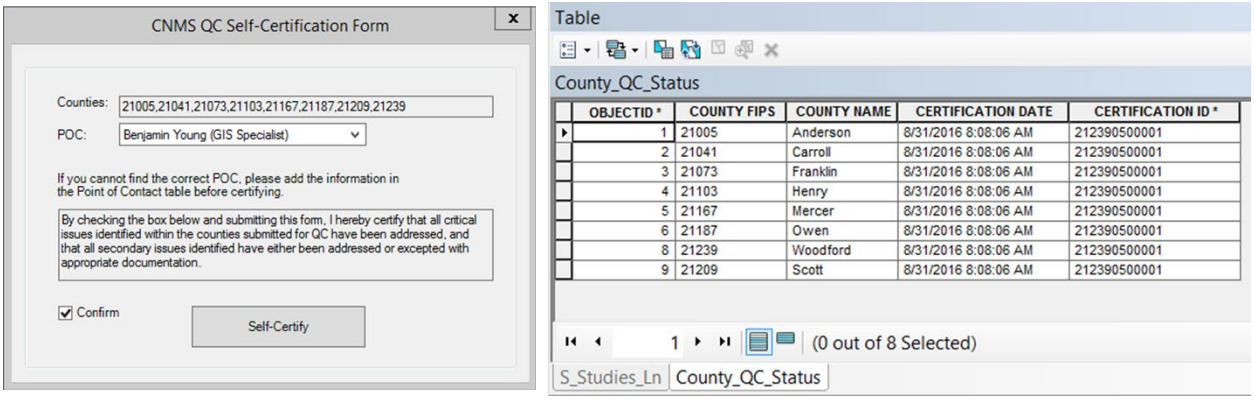


Figure J-12: Validation Complete

5. When there are no longer any critical errors, and all secondary errors have been addressed or marked as exceptions, click on the Self-Certify button to open and complete the CNMS QC Self-Certification Form. This will record the current date and user-defined POC into the County_QC_Status table.



OBJECTID *	COUNTY FIPS	COUNTY NAME	CERTIFICATION DATE	CERTIFICATION ID *
1	21005	Anderson	8/31/2016 8:08:06 AM	212390500001
2	21041	Carroll	8/31/2016 8:08:06 AM	212390500001
3	21073	Franklin	8/31/2016 8:08:06 AM	212390500001
4	21103	Henry	8/31/2016 8:08:06 AM	212390500001
5	21167	Mercer	8/31/2016 8:08:06 AM	212390500001
6	21187	Owen	8/31/2016 8:08:06 AM	212390500001
8	21239	Woodford	8/31/2016 8:08:06 AM	212390500001
9	21209	Scott	8/31/2016 8:08:06 AM	212390500001

Figure J-13: Self-Certification Form and resulting updated County_QC_Status table.

Additional CNMS FGDB QC Tool Features:

The grid allows filtering and sorting of the data in a familiar manner.

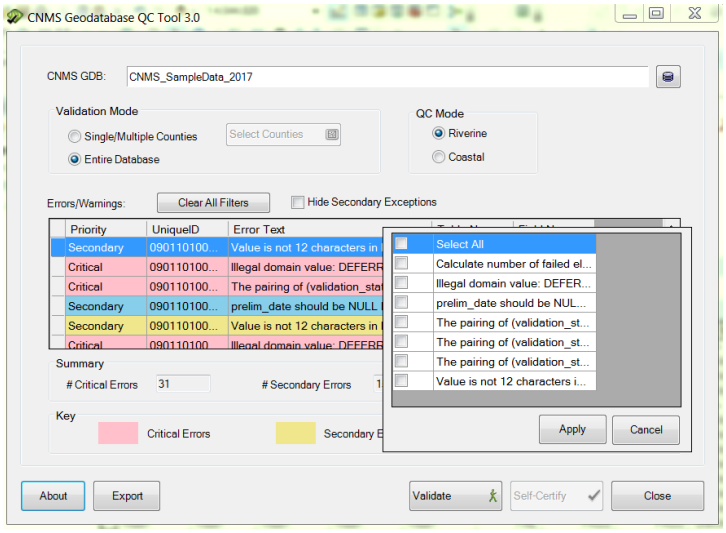


Figure J-14: CNMS FGDB QC Tool Filtering

Filtered columns are highlighted in yellow. The “Clear All Filters” button will clear all current filter criteria.

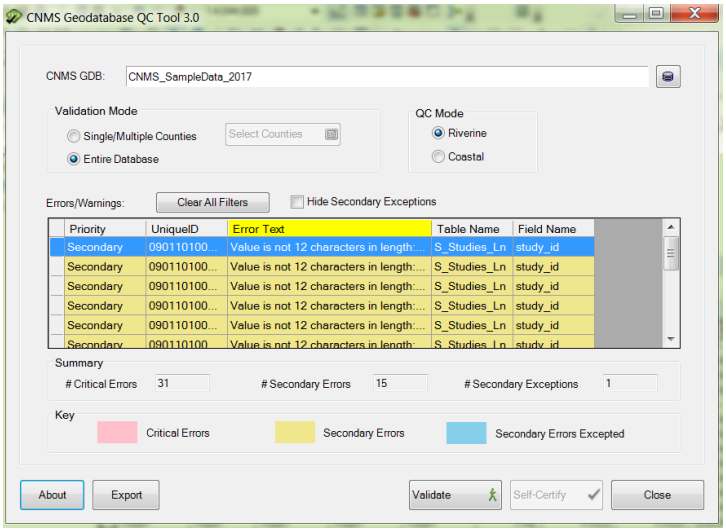


Figure J-15: CNMS FGDB QC Tool Sorting

The grid also allows sorting by clicking on the column headers.