Coordinated Needs Management Strategy (CNMS) Technical Reference

CNMS Database User's Guide

November 2021

FEMA

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Requirements for the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) Program are specified separately by statute, regulation, or FEMA policy (primarily the Standards for Flood Risk Analysis and Mapping). This document provides guidance to support the requirements and recommends approaches for effective and efficient implementation. Alternate approaches that comply with all requirements are acceptable.

For more information, please visit the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage (https://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 https://www.fema.gov/resource-document-library.

Table of Revisions

Affected Section or Subsection	Revision Date	Revision Description
Section 2	November 2021	Minor updates to clarify instructions for CNMS Update Touchpoints.
Section 3	November 2021	Clarified instructions for Backwater attribution. Removed BLE_POC field and replaced with BLE_CASE_NO field for tracking MIP Case # associated with the BLE study. Added VAL_DATE field to capture validation assessment date, rather than relying on STATUS_DATE alone. Added tables and guidance for S_Requests record updates.
Appendix B	November 2021	Expanded descriptions of detailed study validation assessment procedures.
Appendix C	November 2021	Clarified descriptions of Zone A study validation assessment procedures, including alignment of topo check procedures for detailed studies (Appendix B and Zone A studies). Expanded A5 check instructions.
Appendix F	November 2021	Updated CNMS data dictionary and field descriptions to reflect new fields (TRBALLAND, FLOODWAY, BLE_CASE_NO, MODEL_2D, BS_MODEL_2D, VAL_DATE) and removed fields (BLE_POC, FY_FUNDED). Updated domain tables, including additional HYDRO/HYDRA model types.
Appendix H	November 2021	Clarified NVUE reporting and calculation language, added 1PCT and 0.2PCT Annual Chance Contained Zones into calculated numerator.
Appendix J	November 2021	Refreshed and expanded quality control check criteria.

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List of Acronyms

ADCIRC	Advanced Circulation (model)
BFE	Base Flood Elevation
BLE	Base Level Engineering
CDS	Customer and Data Services
CE	Critical Element
CLOMR	Conditional Letter of Map Revision
CNMS	Coordinated Needs Management Strategy
CTP	Cooperating Technical Partner
CVA	Consolidated Vertical Accuracy
ERD	Entity Relationship Diagram
Esri	Environmental Systems Research Institute
EVA	Extreme Value Analysis
FBS	Floodplain Boundary Standard
FEMA	Federal Emergency Management Agency
FGDB	Esri File Geodatabase
FIPS	Federal Information Processing Standard
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FVA	Fundamental Vertical Accuracy
FY	Fiscal Year
GIS	Geographic Information System
HUC	Hydrologic Unit Code
HWM	High Water Mark
JPM-OS	Joint-Probability Method – Optimal Sampling
KSS	Knowledge Sharing Site
LFD	Letter of Final Determination
LiMWA	Limit of Moderate Wave Action
LOMR	Letter of Map Revision
LSAE	Large Scale Automated Engineering
MIP	Mapping Information Platform
MRLC	Multi-Resolution Land Characteristics Consortium
MSC	Map Service Center
NAIP	National Agricultural Imagery Program

NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPS	Nominal Pulse Spacing
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
PFD	Primary Frontal Dune
PMR	Physical Map Revision
PTS	Production and Technical Services
QA/QC	Quality Assurance/Quality Control
QL	Quality Level
QMP	Quality Management Plan
QR3	Quality Review 3
rFHL	Regional Flood Hazard Layer
RSC	Regional Service Center
SE	Secondary Element
SFHA	Special Flood Hazard Area
SID	Standard ID
SWL	Stillwater Level
TIN	Triangulated Irregular Network
TSDN	Technical Support Data Notebook
TWL	Total Water Level
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 future fiscal year or a deferment of the new study request. Streams not part of the Federal Emergency Management Agency's (FEMA's) Special Flood Hazard Area (SFHA) inventory (e.g., Zone X, Zone D, or Area Not Included), that have been studied 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) comprises processes and data for tracking New, Validated, or 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 November 2021 schema consists 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 Flood Insurance Rate Maps (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 a mapping need that is either flood data related or cartographic. 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, and for Coastal studies, six additional elements, secondary to the Critical Elements, which document PCE changes reviewed during the engineering study validation process. If these elements are evaluated to a "Yes" as a result of the identification of deficiencies and total four or more Secondary Element deficiencies for Riverine studies and total three or more for Coastal Studies, they 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 the 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 or for flood hazard studies currently being assessed under CNMS, or when a 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 a 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 System (GIS) Vector Data, which include polygons, points, and polylines. Vector Data are composed of vertices with relative or geospatially referenced coordinates that sometimes contain 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. The CNMS tracks the life cycle of needs, specifying opportunities to capture needs and proposing methods for their evaluation to inform planning, tracking, and reporting processes. The CNMS establishes a geospatially enabled effective means for users to enter, monitor, and update their inventory of floodplain studies. In addition, the 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.

The 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 or will be assigned in a future fiscal year, 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 the CNMS Study Records (S_Studies_Ln and S_Coastal_Ln feature classes). The CNMS Study Records should also include the Validation Status of approximate studies and those unmapped areas that have been considered for a new study. Unmapped areas that are not being considered for a new study are maintained in the S_Unmapped_Ln feature class.

FEMA will use the CNMS Study Records as the sole mechanism for reporting the 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 restudy. Appendix H provides more information for the 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

Flood Insurance Rate Maps (FIRMs) are the Federal Emergency Management Agency's (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. Given the changing nature of the landscape from the influences of physical, climatological, and engineering (PCE) 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 Coordinated Needs Management Strategy (CNMS) is a collection of procedures for the identification and management of flood hazard mapping requirements using a standard database model. In addition to recording and validating studies, the 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 using and maintaining Geographic Information System (GIS) and relational database technologies, the CNMS has been designed to track the study attributes of the current state of FEMA's study inventory and the life cycle 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, the 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 the 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 for 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).

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. CNMS users

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 use the CNMS Study Records as the basis for reporting NVUE metrics. Appendix I outlines procedures to update the 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

Figure 1, Figure 2, and Sections 2.1.1 through 2.1.14 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 activity is conducted at a regional level by using the Regional CNMS FGDBs.

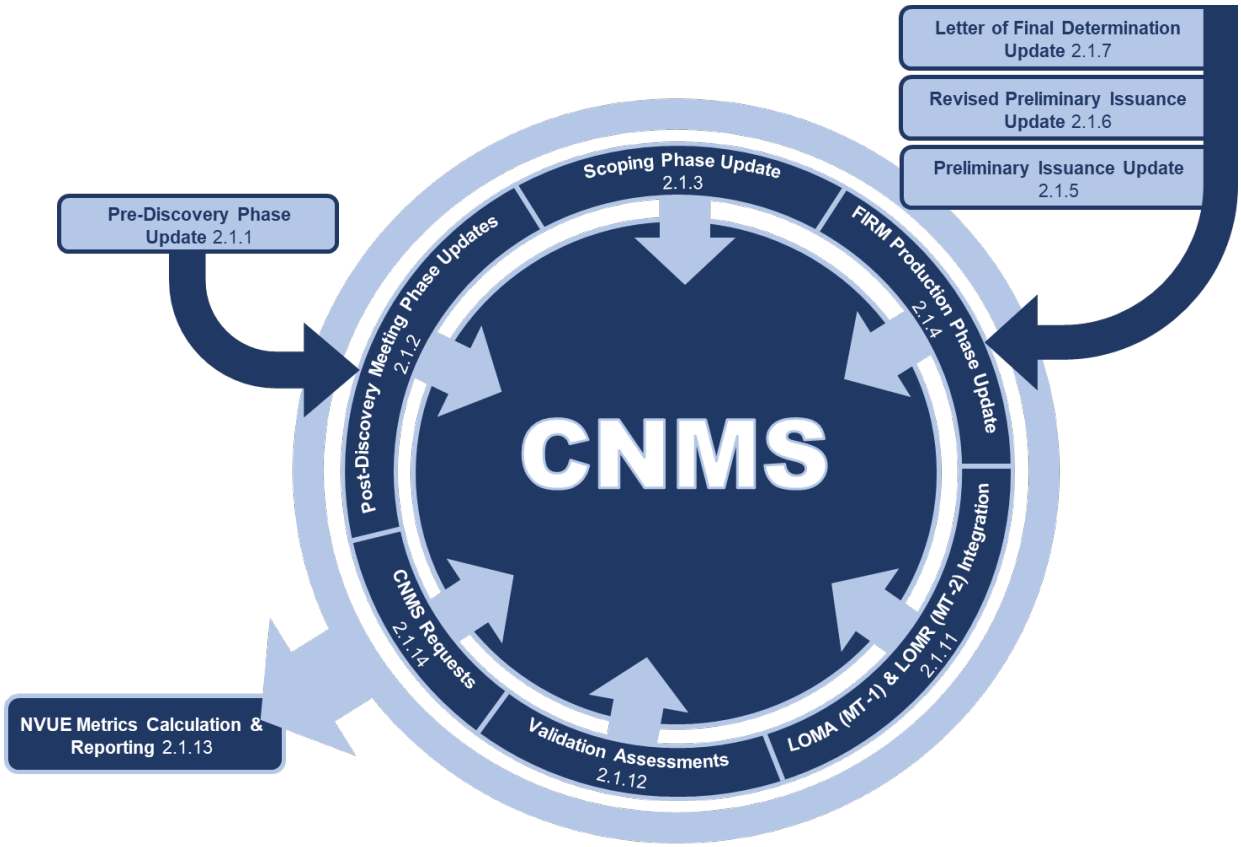


Figure 1: CNMS Update Touchpoints Lifecycle

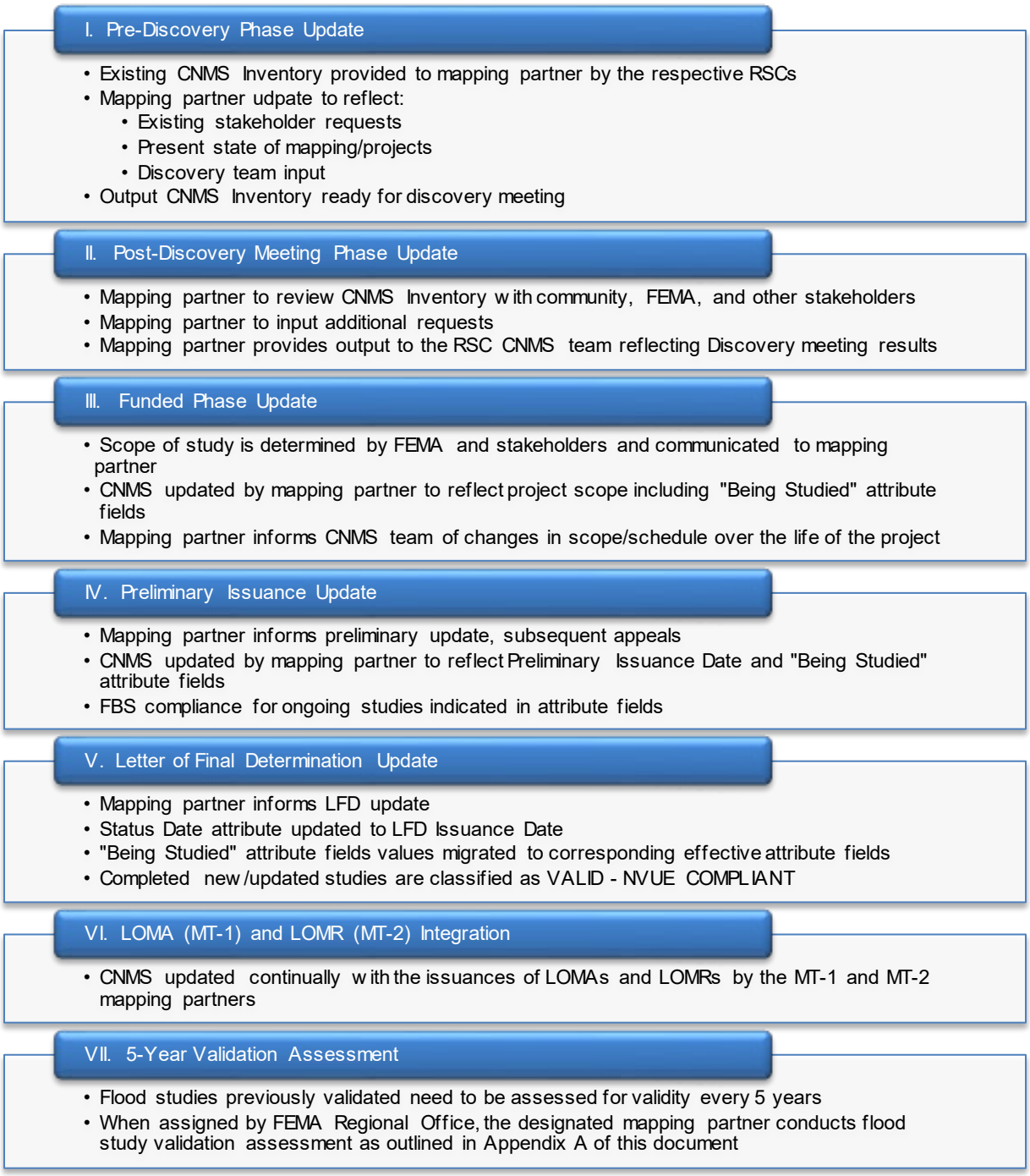


Figure 2: CNMS Update Touchpoints

2.1.1. PRE-DISCOVERY PHASE UPDATE

Upon initiation of the Discovery phase for a new project, the Regional Service Center (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 the CNMS as UNKNOWN – TO BE ASSESSED. Mapping Partners must coordinate any required validation assessment work with the RSC. 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, using the Zone A validation procedures (Appendix C).

2.1.2. POST-DISCOVERY MEETING PHASE UPDATE

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). Within 30 days of the completed 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 UPDATE

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 Issuance date. The Mapping Partner will submit the data back to the RSC for updating the Regional CNMS FGDB within 30 days of scope finalization.

The Mapping Partner may choose to use 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, Data Entry Process (Section 3.2.5 for Riverine Studies and Section 3.9.3 for Coastal Studies), and the Validation Procedures in Appendices A through D if study assessments were to be performed as part of the Discovery efforts.

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 a duration of three years from the 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 the CNMS per the guidelines in Section 3, Data Entry Process; Section 3.2.6 for Riverine Studies and Section 3.9.4 for Coastal Studies.

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 that may not have been updated during the Flood Risk Project but for which new vector data were 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 the guidelines in Section 3, Data Entry Process; Section 3.2.7 for Riverine Studies and Section 3.9.5 for Coastal Studies.

Following creation of the updated CNMS FGDB incorporating data from the Preliminary 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 CNMS data extracted from the regional CNMS Database will be archived in the same centralized location mentioned in Section 2.1.1 and will not replace the prior archived version from the

Discovery or Production phase updates. This process should be completed before the mapping project passes Quality Review 3 (QR3).

2.1.6. REVISED PRELIMINARY ISSUANCE PHASE UPDATE

A revised preliminary project will need to be evaluated during the QR3 to see if the revisions impact the CNMS Database. It may be determined that the revised preliminary project does not impact the CNMS Database because the revisions are 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_PRELIM_DATE will continue to reflect the date of the initial Preliminary Issuance.

If the mapping project is a revised preliminary project that impacts the flood engineering study (extents of the study, flood zone, models), 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 are updated properly. The BS_PRELIM_DATE for the revised Reaches will be updated to reflect the revised preliminary date, and the BS_CASE_NO field will be updated to reflect the revised preliminary study.

2.1.7. LFD ISSUANCE PHASE UPDATE

Within 30 days of issuance of the LFD, the Mapping Partner will submit data communicating the effective status of the project area of interest to the RSC for updating of the regional CNMS FGDB. These data may simply be correspondence acknowledging no change in the data since Preliminary Issuance, 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 Status Date attribute to reflect the date of LFD Issuance. Stream Centerline geometry should be verified and revised as necessary to match the new study FIRM data sources as published in the LFD FIRM database. Primary consideration should be given to using S_Profil_Basln and when it is not available, S_Wtr_Ln. Stream Centerline effective study attributes should be verified and revised as necessary to reflect the new study as published in the LFD Flood Insurance Study (FIS). All data should be topologically correct and reflect the CNMS study attribute update requirements per the guidelines in Section 3, Data Entry Process; Section 3.2.8 for Riverine Studies and Section 3.9.6 for Coastal Studies.

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 CNMS data extracted from the Regional CNMS Database will be archived in the same centralized location mentioned in Section 2.1.1 and 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 AND 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 Sections 2.1.1 through 2.1.7 above. 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 the CNMS and receive the BEING STUDIED classification. BLE or LSAE studies not being used to update the regulatory FIRM can be leveraged for assessment work only and may have tracking fields in the 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 the CNMS, which depends on whether the BLE or LSAE is counting toward 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, National Hydrography Dataset (NHD), or draft output from BLE/LSAE projects, although the Mapping Partner should consult with the RSC on source and scale choice and follow the general guidelines for updating S_Studies_Ln 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 BLE and LSAE mapping updates 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 use 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

The CNMS includes a Tier classification field that describes the maturity of the flood hazard data product. In addition to the 1.22 million miles within the CNMS Inventory (including coastal miles), all 4 million miles of stream as referenced by the United States Geological Survey (USGS) that drain greater than one square mile should fall into one of these six tiers:

Tier 0: Known to be flood-prone (i.e., draining greater than one 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, is model-backed, and may not be consistent with high-quality elevation data (uses elevation data that are inferior to USGS Quality Level (QL) 2 equivalence or better).

Tier 4: Is available as a digital product, is model-backed, and is 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 includes enhanced analyses such as future land use or future climate-informed analyses.

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

2.1.10. FLOOD RISK PRODUCT TRACKING

The 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 underway (funded) or complete. The Mapping Partner will typically update these tracking fields during Scoping Phase Updates, once the scope is confirmed, and again at Preliminary Issuance 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. MT-1 AND MT-2 INTEGRATION WORKFLOW

MT-1 and MT-2 teams can log mapping and flood data issues as CNMS Requests Records using the process described in Section 3.4. In addition, Letters of Map Revision (LOMRs) issuance must be

integrated with CNMS efforts as outlined in Appendix I to reflect effective data and support assessment activities.

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 Regions. Regions will need to re-assess flood studies in the deferred category at least every five 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 planning 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 Riverine 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 fiscal year, or that the request for a new Study has been deferred. Section 3.2 outlines the attribution policy for Riverine CNMS Study Records.

2.1.13. NVUE METRICS CALCULATION AND REPORTING

National CNMS data are 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 are 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" or "Flood data" type.

Users including, but not limited to, Regions, Discovery teams, FIRM production 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, 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 to a decision to issue a new or 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:

- CNMS Inventory Feature Dataset (S_Studies_Ln, S_Coastal_Ln, S_Unmapped_Ln)
- CNMS Requests Feature Dataset (S_Requests_Pt, S_Requests_Ar).

Figure 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.

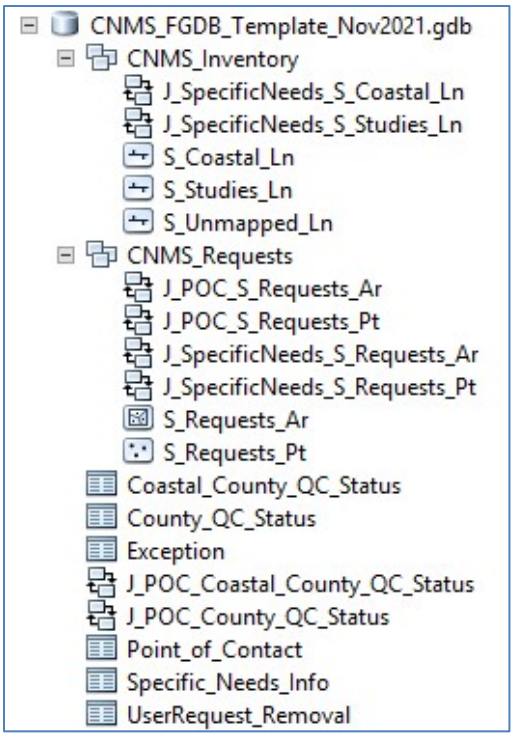


Figure 3: CNMS FGDB Components as Seen in Esri ArcCatalog

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). 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 determination documents may be found on the MSC through searching by Product ID, typically the LOMC Case Number. Users can also search by the 11-character Panel Number and then click the LOMC button to find or identify LOMRs on the map panel. To obtain detailed information about the modeling and topography used in the LOMR study, users can search the Mapping Information Platform (MIP) File Explorer (K Drive) and/or Flood Risk Study Engineering Library. If the information cannot be found at these two locations, the MT-2 team may be contacted for help. The process to be followed to incorporate LOMRs is outlined in Appendix I.

2.2.4. FEMA ENGINEERING 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, a need to access historic effective FIS reports and FIRM panels may arise. The FEMA Engineering Library is the primary source for accessing such historic data and models.

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_BasIn from FIRM Database
- S_Wtr_Ln from the FIRM Database
- National Hydrography Dataset High Resolution
- National Hydrography Dataset Medium Resolution
- Heads-up digitization of a representative centerline for the flooding source, using orthoimagery

Effective and preliminary FIRM databases may be downloaded from the FEMA MSC. The National Hydrology Dataset may be downloaded from the USGS National Geospatial Program site.

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 that was 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 are 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 hydraulic structures
  - Unmapped flooding sources with relation to building structure counts based on proximity
  - Other Critical and Secondary validation element issues
- For FEMA and Cooperating Technical Partner (CTP) Planning and Reporting
  - Multi-Year Planning and Business Plans
  - Post-Purchase Management
  - NVUE Attained Metric
  - Life Cycle Cost Model

2.4. Quality

The Mapping Partner is responsible for the implementation of the CNMS Quality Management Plan (QMP) documented in Appendix J.

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. The Mapping Partner will 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 conducted by external entities from time-to-time.

2.5. CNMS Record Entry Determination – Quick Reference Guide

Tables 2-1 and 2-2 below outline the required steps for riverine and coastal CNMS data development at each Risk MAP and CNMS life cycle touchpoint. For complete guidance on performing CNMS mapping updates, see Section 3, Data Entry Process.

Table 2-1: Riverine CNMS Record Entry Determination

(Blank)	"The Inventory" of Studied Streams	Streamlines for Unmapped Areas	Mapping Requests Information	Ancillary Information
CNMS Touchpoints	S_Studies_Ln	S_Unmapped_Ln	S_Requests_Ar/S_Requests_Pt	Specific_Needs_Info
Pre-Discovery Meeting (3.2.3)	Review current status of studies within riverine project footprint. Current CNMS Inventory status for the Discovery area of interest is presented on Discovery Map during Discovery Meeting(s).	Review unmapped stream Reaches within riverine project footprint for awareness purposes. If necessary, unmapped streams are displayed in the Discovery Map.	Review existing Request Records within the riverine project footprint to consider for inclusion in the study Statement of Work. Request Records can be included in the Discovery Map (materials) presented at Discovery meeting(s) for refinement and the collection of new Request Records.	Review information contained within to increase working knowledge of riverine project footprint being considered for the study update process.
Post-Discovery Meeting (3.2.4)	Update as necessary based on additional requests from Discovery Meeting(s). BLE / LSAE studies not intended to update a regulatory FIRM are typically captured in S_Studies_Ln at this touchpoint, including the population of BLE tracking fields (see Section 3.2.2).	Update as necessary based on additional requests.	Standard 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 scope, Request Records can be created to document the need.	Update Specific_Needs_Info information where applicable.

(Blank)	"The Inventory" of Studied Streams	Streamlines for Unmapped Areas	Mapping Requests Information	Ancillary Information
Scoping Phase (3.2.5)	Update data in S_Studies_Ln to reflect extent of floodplain study and populate "Being Studied" (BS) fields to reflect study process has been initiated, including estimated Preliminary Issuance and LFD Issuance dates. BLE/LSAE studies intended to update a regulatory FIRM are captured in S_Studies_Ln at this touchpoint, including the population of "Being Studied" (BS) and BLE tracking fields (see Section 3.2.2). Throughout the life of any project, changes to scope/schedule should be submitted as a FIRM Production Phase Update (see Section 3.2.6).	Migrate flooding source centerline data from S_Unmapped_Ln to S_Studies_Ln for floodplains being studied that are not yet represented in the Inventory. Delete the study-related flooding source centerlines from S_Unmapped_Ln that were migrated to S_Studies_Ln.	No action required.	Update Specific_Needs_Info information where applicable.
Preliminary Issuance (3.2.7)	Set study BS_PRELIM_DATE with actual Preliminary Issuance date and revise the estimated BS_LFD_DATE date. Populate FBS compliance fields.	No action required.	No action required.	Update Specific_Needs_Info information where applicable.
Letter of Final Determination (LFD) (3.2.8)	Set New or Updated studies to "Valid" at this milestone. Once LFD is issued, migrate information in the "Being Studied" (BS) fields to the complementary effective study fields to indicate that the study is completed, and then clear the "Being Studied" (BS) fields. Record actual LFD Issuance date in the STATUS_DATE field. Stream Centerlines from the LFD FIRM database should be the source of S_Studies_Ln linework by this milestone.	No action required.	S_Requests_Ar and S_Requests_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.

(Blank)	"The Inventory" of Studied Streams	Streamlines for Unmapped Areas	Mapping Requests Information	Ancillary Information
Post-Production Updates, MT-1, MT-2, and 5-Year Revalidation	Use Appendices A through C (Validation Assessment Procedures) and Appendix I (LOMA and LOMR Integration) to address S_Studies_Ln updates during Post-Production activities.	No action 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_Requests_Ar / S_Requests_Pt	Specific_Needs_Info
Pre-Discovery (3.9.1)	Review current status of studies within coastal project footprint. Current CNMS Inventory status for the Discovery area of interest is presented on Discovery Map during Discovery Meeting(s).	Review existing Request Records within the coastal project footprint to consider for inclusion in a study Statement of Work. Request Records can be included in the Discovery Map (materials) presented at Discovery meeting(s) for refinement and the collection of new Request Records.	Review information contained within to increase working knowledge of coastal project footprint being considered for the study update process.
Post-Discovery (3.9.2)	Update as necessary based on additional requests from Discovery Meeting(s).	Standard Request Record generation is applied. If a production team discovers mapping issues through the Discovery process or during production that are not covered by the study scope, create Request Records to document the need.	Update Specific_Needs_Info information where applicable.
Scoping Phase (3.9.3)	Update data in S_Coastal_Ln to reflect extent of floodplain study and populate "Being Studied" (BS) fields to reflect study process has been initiated, including estimated Preliminary Issuance and LFD Issuance dates. Throughout the life of the project, changes to scope/schedule should be submitted as a FIRM Production Phase Update (see Section 3.9.4).	No action required.	Update Specific_Needs_Info information where applicable.
Preliminary Issuance (3.9.5)	Set study BS_PRELIM_DATE with actual Preliminary Issuance date and revise the estimated BS_LFD_DATE date. Populate FBS compliance fields.	No action required.	Update Specific_Needs_Info information where applicable.

	"The Inventory" of Studied Coastline	Mapping Requests Information	Ancillary Information
Letter of Final Determination (LFD) (3.9.6)	Set New or Updated studies to "Valid" at this milestone. Once LFD is issued, migrate information in the "Being Studied" (BS) fields to the complementary effective study fields to indicate that the study is completed and then clear the "Being Studied" (BS) fields. Record actual LFD Issuance date in the STATUS_DATE field.	Edit S_Requests_Ar and S_Requests_Pt to indicate resolution of Request Records that have been addressed during the study process.	Update Specific_Needs_Info information where applicable.
Post-Production Updates, MT-1, MT-2, and 5-Year Revalidation	Use Appendices A and D (Validation Assessment Procedures) 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 touchpoints 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 updates. 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 the 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 (POC) 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 that 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 classified as 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 do 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. Such inconsistencies are only anticipated when centerline representation of SFHAs exist in unmodernized areas and areas where certain early CNMS pilots were conducted. Every user should 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 a compilation from various sources, and augmentations and improvements to linework geometry are intended to be an ongoing process. The goal is to have every flood hazard study that is part of FEMA's mapped inventory represented accurately within the 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 CNMS 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 or Medium; 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 that is 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 "True (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 the backwater of modeled streams is to be represented and attributed. Sections 3.2.2 through 3.2.8 outline the updates needed for S_Studies_Ln 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. Existing linework may be modified or new Reaches may be added to capture backwater. Below are guidelines to follow when attributing backwater within the S_Studies_Ln feature class.

Zone A Tributary Scenarios

1. If the backwater effects of the receiving water body (Zone A or detailed) control the floodplain mapping for the entire tributary stream study, update the tributary Reach per Table 3-1.
2. If the backwater effects of the receiving water body (Zone A or detailed) influence only a minor portion of the floodplain mapping for the tributary stream study (e.g., less than 1 mile in length), the tributary Reach should reflect the Zone A tributary stream study extents, typically from the confluence or mouth of the tributary to the upstream limit of the study.
3. If the backwater effects of the receiving water body influence a significant portion of the floodplain mapping for the tributary stream study (e.g., more than 1 mile in length), the user may split the tributary at the limit of the backwater and attribute the downstream Reach of the tributary per Table 3-1. If the receiving water body is Zone A, it is not necessary to split the tributary Reach at the limit of the backwater. If the receiving water body is detailed, the limit of the backwater is typically the zone break between Zone A and Zone AE. Coordination with the Regional Office is recommended when using this option for project planning purposes. If there is a planned study for the Zone A tributary, Scenario 2 above may be the preferred option to capture the full extent of the stream to be studied.

1. If the backwater effects of the receiving water body (Zone A or detailed) control the floodplain mapping for the entire tributary stream study, update the tributary Reach per Table 3-1. An exception to this would be if the tributary has a floodway. In this instance, the tributary Reach should not be attributed as backwater but should reflect the Zone AE tributary stream study extents.
2. If the backwater effects of the receiving water body (Zone A or detailed) control the floodplain mapping for less than the entire tributary stream study, the tributary Reach should reflect the Zone AE tributary stream study extents, typically from the confluence or mouth of the tributary to the upstream limit of the study. If the downstream extent of the tributary stream study is represented by the downstream limit of the tributary's floodway or the zone break between Zone A and Zone AE, then the user may split the tributary at that location and attribute the downstream tributary Reach per Table 3-1.

Table 3-1 is a guide to the required fields that must be populated within S_Studies_Ln when attributing backwater. Note that if both the tributary and receiving water body are detailed studies, users will need to compare the WSELs at the confluence to determine the parent flooding source. If the tributary is Being Studied, STATUS_TYPE, STATUS DATE, FBS fields, and all 'Being Studied" (BS) fields should be maintained. See Appendix F for complete S_Studies_Ln field definitions and data entry descriptions.

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	Populate to match parent flooding source.
CO_FIPS	Populate the 5-digit County FIPS number.
CID	Populate the 6-digit Community Identification Number.
TRIBALLAND	Follow Table F-1 guidance.
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 of flooding source.
FLD_ZONE	Populate to match parent flooding source.
FLOODWAY	Follow Table F-1 guidance.
VALIDATION_STATUS	Populate to match parent flooding source.

Field	Description
STATUS_TYPE	Populate to match parent flooding source (unless tributary is Being Studied).
MILES	Calculate miles to North America Albers Equal Area Conic.
SOURCE	Follow Table F-1 guidance.
STATUS_DATE	Populate to match parent flooding source (unless tributary is Being Studied).
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_CASE_NO	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 (unless tributary is Being Studied).
FBS_CHKDT	Populate to match parent flooding source (unless tributary is Being Studied).
FBS_CTYP	Populate to match parent flooding source (unless tributary is Being Studied).
DUPLICATE	Follow Table F-1 guidance.
HYDRO_DATE_EFFCT	Set to NULL.
HYDRO_MDL	Set to NULL.
HYDRO_MDL_CMT	Set to NULL.
HYDRA_MDL	Set to NULL.
HYDRA_MDL_CMT	Set to NULL.
HYDRA_DATE_EFFCT	Set to NULL.
MODEL_2D	Set to "Unknown".

Field	Description
TOPO_DATE	Set to NULL.
TOPO_SRC	Set to NULL.
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.
VAL_DATE	Set to NULL.
COMMENT	Optional.
BS_CASE_NO **BS_ZONE** **BS_STDYTYP** **BS_HYDRO_M** **BS_HYDRO_CMT** **BS_HYDRA_M** **BS_HYDRA_CMT** **BS_MODEL_2D** **BS_FY_FUND** **BS_PRELM_DATE** **BS_LFD_DATE**	Populate to match the parent flooding source (unless tributary is Being Studied).
EC1_UDEF through ES4_URL	Set to NULL.

3.2.2. BLE AND LSAE STUDY UPDATE

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, using 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 through A4 are completed as part of this assessment process. For each element A1 through A5, the associated Comment, Source, and URL fields will be populated as part of standard validation assessment documentation procedures. Even though all checks A1 through 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., Zones AE, AO, AH, AR) within the BLE or LSAE project footprint will not be subject to assessment checks A1 through 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., Physical Map Revision (PMR)) within the BLE project footprint. For records with this situation (STATUS_TYPE field in the CNMS is already set to BEING STUDIED), the BLE tracking fields should be populated and STATUS_DATE updated. However, the existing "Being Studied" (BS) fields should not be overwritten as those pertain 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 the CNMS.

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

Field	Description
BLE	Distinguishes the category of BLE or LSAE study.
BLE_CASE_NO	The MIP Case Number associated with the BLE study. This value can be the same as the BS_ CASE_NO if the project is BEING STUDIED in support of a FIRM update.
BLE_DATE	Set the date of the hydraulic analysis of BLE or LSAE if applicable. If unknown, use "01/01/2050".

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 data are used to update the regulatory FIRM and are 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 the CNMS by receiving the BEING STUDIED classification. Fully automated LSAE studies that are not being used to update the regulatory FIRM can be leveraged for assessment work only and may have the tracking fields in the 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 the CNMS populated as indicated in Table 3-2.
- Treated as NVUE initiated in the 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 through A4 checks and/or an A5 check is performed or the Study reaches LFD. Until the 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 3-9: S_Unmapped_Ln to S_Studies_Ln Updates.
    - When a Region decides not to move forward with regulatory products for those unmapped miles, they become ASSESSED – DEFERRED in S_Studies_Ln.

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

- Three tracking fields in the CNMS populated as indicated in Table 3-2
- NOT treated as NVUE initiated in the CNMS
    - No change to Status Type.
    - No change to Validation Status unless A1 through A4 checks are performed 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 UPDATE

For the Discovery Phase of a project, S_Studies_Ln records will be reviewed and validation assessment of any studies classified in the CNMS as UNKNOWN – TO BE ASSESSED should be performed (consult RSC). When BLE or LSAE is being performed as part of Discovery efforts, consult the Region and discuss how the CNMS Inventory will be assessed and updated accordingly, using the

Zone A validation procedures (Appendix C) and updating the S_Studies_Ln records according to Section 3.2.2.

3.2.4. S_STUDIES_LN POST-DISCOVERY MEETING PHASE UPDATE

The collection of new community input in the form of CNMS Requests will be added to S_Requests_Ar and/or S_Requests_Pt features without duplication as defined in Section 3.4.1. In addition, comments received during Discovery may provide information about existing studies that could potentially update the validation elements of a Reach (e.g., known repetitive loss outside the SFHA, stream channelization, hydraulic changes).

3.2.5. S_STUDIES_LN SCOPING PHASE UPDATE

When the project scope has been funded and specific study Reaches have been identified, the fields within S_Studies_Ln, shown in Table 3-3, 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 Issuance and LFD Issuance dates are unknown, users will use "01/01/2049" for the Preliminary Issuance date and "01/01/2050" for the LFD Issuance date. When a Scoping update includes new scoped Reaches (never shown on an effective FIRM), S_Unmapped_Ln within the CNMS can be used for the initial linework geometry. Details for using S_Unmapped_Ln for S_Studies_Ln are provided 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.

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.
STUDY_ID	If applicable, update Study_ID to reflect intended cardinality.
STATUS_TYPE	Update 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.
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_CASE_NO	Set the unique project identifier number (MIP Case Number) for the ongoing study if BLE or LSAE is purchased.

Field	Scoping Phase Updates
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. If a MIP Case Number has not yet been assigned, field can be populated with the entry "PTS FUNDED" or "CTP FUNDED".
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_MODEL_2D	Select "True (Yes)", "False (No)", or "Unknown" based on model type.
BS_FY_FUND	Select the appropriate value for the fiscal year funded for the ongoing study.
BS_PRELIM_DATE	Update with accurate Preliminary Issuance date estimate (if unknown, use "01/01/2049").
BS_LFD_DATE	Update with accurate LFD Issuance date estimate (if unknown, use "01/01/2050").

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 are unknown, users will use "01/01/2049" for the Preliminary Issuance date and "01/01/2050" for the LFD Issuance date. Should a study scope of work be altered in any way, S_Studies_Ln should be updated to represent the updated scope, using the guidelines in Section 3.2.5. In addition, de-scoped studies must resume appropriate VALIDATION_STATUS and STATUS_TYPE values as shown in Table 3-4.

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, the fields shown in Table 3-5 must be updated and all fields previously attributed during Discovery and Scoping Phase Updates should be checked for accuracy and updated as appropriate. In addition, where linework in the Preliminary FIRM Database is preferable to or of higher quality than linework currently in S_Studies_Ln (using guidelines established in Section 2.2.5), 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/MIP or, as a last resort, the date when the FBS_CMPLNT field was populated.
FBS_CTYPE	Update to reflect FBS compliance check type.
BS_PRELIM_DATE	Update with actual Preliminary Issuance date.
BS_LFD_DATE	Update with accurate LFD Issuance date estimate.

After Preliminary Issuance, if the scope of work completed is found to differ in any way from that represented in the polylines, S_Studies_Ln must be updated to represent the correct scope. In addition, de-scoped studies must resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.2.6.

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 (i.e., effective) study fields. Stream Centerline geometry should be verified and revised as necessary to match the new study FIRM data sources as published in the LFD FIRM database. Primary consideration should be given to using Profil_BasIn and when not available, S_Wtr_Ln. Stream Centerline effective study attributes should be verified and revised as necessary to reflect the new study as published in the LFD Flood Insurance Study. The Tier classification, Floodway, and Topo fields will be updated at LFD Issuance.

After LFD Issuance, if the scope of work completed is found to differ in any way from that represented in the linework, S_Studies_Ln must be updated to represent the correct scope. In addition, de-scoped studies must resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.2.6.

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

populated, VAL_DATE should be the source of this original date. Otherwise, historical versions of the regional database will need to be consulted. It is important to note that if Reaches restored to their original date of validation are expired as per that date (at least five years old), the Reaches should be updated to UNKNOWN – TO BE ASSESSED. In this way, these Reaches will be classified in CNMS as in need of validation assessment. In addition, for Reaches updated by redelineation, the date of redelineation should be noted in the TOPO_SRC field.

Effective study attributes for all LOMRs not superseded by new or updated hydraulic or hydrologic analysis per the LFD study must be maintained in S_Studies_Ln. CASE_NO should remain populated with the LOMR MIP Case Number and should not be overwritten.

S_Requests_Ar and S_Requests_Pt feature classes should also be updated at this time to document where any Requests have been addressed by the updated Study as defined in Section 3.4.2.

Table 3-6: S_Studies_Ln LFD Phase Updates

Field	LFD Phase Updates
REACH_ID	Update as needed. Follow Table F-1 guidance.
STUDY_ID	Update as needed. Follow Table F-1 guidance.
CASE_NO	If the Reach represents a New or Updated Study, this field should inherit the value stored in the BS_CASE_NO field. For redelineations and digital conversions, this field should retain its current value.
CO_FIPS	Update as needed. Follow Table F-1 guidance.
CID	Update as needed. Follow Table F-1 guidance.
TRIBALLAND	Update as needed. Follow Table F-1 guidance.
WTR_NM	Populate with stream name per new effective study.
WTR_NM_1	Populate with alternate stream name, if applicable.
FLD_ZONE	This field should inherit the value stored in BS_ZONE.
FLOODWAY	Populate with “True (Yes)” or “False (No)” for Detailed Studies with a regulatory floodway.
VALIDATION_STATUS	For Reaches representing New or Updated Studies, this field shall be set to “VALID”. For redelineations and digital conversions, this field will 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.
SOURCE	Select appropriate source of new effective study linework.

Field	LFD Phase Updates
STATUS_DATE	If Reach was Being Studied, set the STATUS_DATE to the actual LFD Issuance date. For redelineations and digital conversions, the date should be restored to the last validation date – see VAL_DATE field (if populated).
REASON	This field should be cleared of all information not pertaining to new effective study.
HUC8_KEY	Update as needed. Follow Table F-1 guidance.
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.
BLE	If populated, leave as is. Do not overwrite or set to null.
BLE_CASE_NO	If populated, leave as is. Do not overwrite or set to null.
BLE_DATE	If populated, leave as is. Do not overwrite or set to null.
LINE_TYPE	Update as needed. Follow Table F-1 guidance.
FBS_CMPLNT	Verify field is populated with accurate FBS information for the new effective study.
FBS_CHKDT	Verify field is populated with accurate FBS information for the new effective study.
FBS_CTYP	Verify field is populated with accurate FBS information for the new effective study.
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 will retain its current value.
HYDRO_MDL	This field should inherit the value stored in BS_HYDRO_M. For redelineations and digital conversions, this field will 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 will retain its current value.
HYDRA_MDL	This field should inherit the value stored in BS_HYDRA_M. For redelineations and digital conversions, this field will retain its current value.
HYDRA_MDL_CMT	This field should inherit the value stored in BS_HYDRA_CMT
MODEL_2D	This field should inherit the value stored in BS_MODEL_2D.
TOPO_DATE	Date the topography dataset was collected or completed.
TOPO_SRC	The source of the LiDAR or topography dataset. If the study is a redelineation, add a note indicating the date the redelineation was performed.

Field	LFD Phase Updates
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 will retain their current values.
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 will 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 will 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 will 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 will retain their current values.
VAL_DATE	If the Reach represents a New or Updated Study, this field should be cleared. For redelineations and digital conversions, this field will 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_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_MODEL_2D	After this value has been migrated to the corresponding effective study field, this field should be cleared.
BS_FY_FUND	This field should be cleared.
BS_PRELIM_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 will retain their current values.

Field	LFD Phase Updates
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 will 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 will retain its current value.

3.3. S_Studies_Ar Feature Class (Discontinued)

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 Reaches 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_Requests_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 is 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.

3.4.1. S_REQUESTS_AR/PT POST-DISCOVERY MEETING PHASE UPDATES

Following a Discovery study meeting, S_Requests_Ar and/or S_Requests_Pt should be updated to incorporate community comments as CNMS Request Records. Table 3-7 lists the fields that need to be updated at this milestone. Refer to the tables in Appendix F for complete feature class field descriptions.

Table 3-7: S_Requests_Ar and S_Requests_Pt Post-Discovery Meeting Phase Updates

Field	Discovery Phase Updates
SRA_ID/SRP_ID	Create SRA_ID/SRP_ID.
REACH_ID	Update with REACH_ID of affected stream.
CASE_NO	Update with MIP Case Number of the Discovery study if applicable.
WTR_NM	Update with stream name if applicable.
POC_ID	Set the POC_ID to reflect the point of contact for the study/request if applicable.
RQST_SRC	Set the source of the request.
RQST_CAT	Update with category of request (either "CARTOGRAPHIC" or "FLOOD DATA").
RQST_LVL	Update with level of analysis requested.
MTHOD_TYPE	Update with the method of analysis requested.
DATE_RQST	Set to date of request.
CARTO_RQST	Update with the type of cartographic change requested if RQST_CAT is Cartographic.
FDATA_RQST	Update with the type of flood data change requested if RQST_CAT is Flood Data.
COMMENT	Optional.
PRIORITY	Update with priority level of request.

3.4.2. S_REQUESTS_AR/PT LFD ISSUANCE PHASE UPDATES

At LFD Issuance, S_Requests_Ar and/or S_Requests_Pt should be revised within the study area and updated according to Table 3-8 for Requests that have been resolved by the Study. Refer to the tables in Appendix F for complete feature class field descriptions.

Table 3-8: S_Requests_Ar/Pt LFD Issuance Phase Updates

Field	LFD Issuance Phase Updates
DATE_RESOL	Set to date of request resolution.
RESOL_STATUS	Update with resolution type.
COMMENT	Optional.

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, see Table 3-9, which lists the required attributes of S_Studies_Ln to be populated.

Table 3-9: 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.
TRIBALLAND	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”.
FLOODWAY	Set to “False (No)”.
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.

Field	Description
BLE_CASE_NO	Set the unique project identifier number (MIP Case Number) for the ongoing study if BLE or LSAE is purchased.
BLE_DATE	Set the date of the hydraulic analysis of BLE or LSAE if applicable. If unknown, use "01/01/2050".
LINE_TYPE	Set to "RIVERINE".
FBS_CMPLNT	Set to "False".
FBS_CHKDT	Set to current date.
FBS_CTYP	Set to "INDIVIDUAL REACH ATTRIBUTION".
DUPLICATE	Set to "CATEGORY 3".
MODEL_2D	Set to "False".
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. If a MIP Case Number has not yet been assigned, field can be populated with the entry "PTS FUNDED" or "CTP FUNDED".
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_MODEL_2D	Select "True (Yes)" or "False (No)" based on model type.
BS_FY_FUND	Select the appropriate value for the fiscal year funded for the ongoing study.
BS_PRELIM_DATE	Update with accurate Preliminary Issuance date estimate; if unknown, use "01/01/2049".
BS_LFD_DATE	Update with accurate LFD Issuance date estimate; if unknown, use "01/01/2050".

When adding new records into S_Unmapped_Ln or removing features from S_Studies_Ln for inclusion into S_Unmapped_Ln, see Table 3-10, which lists the required attributes of S_Unmapped_Ln to be populated. Refer to the tables in Appendix F for complete feature class field descriptions. Note that the COMID and BWIDTH_FT fields must be populated for all newly added features. New S_Unmapped_Ln features can be correlated to NHDPlus data to populate the corresponding COMID and BWIDTH_FT values. If a new feature does not match any stream in the NHDPlus data, then COMID can be left blank and the BWIDTH_FT field should be populated with an

estimated width. The S_Unmapped_Ln structure count fields (STRIN1BW through STRIN20BW and STRIN100FT through STRIN2K_FT) will be updated on an annual basis for all 10 FEMA Regions by the Production and Technical Services (PTS). The structure recount analysis uses the following logic:

- Does the feature already have BWIDTH_FT populated (non-null or >= 0)?
    - If Yes – Use available BWIDTH_FT to determine the search radius for that feature.
    - If No and feature's COMID is official – Look up official NHD drainage area using COMID, and use the drainage area to estimate BWIDTH_FT (for the sake of search radius only, not actually populating BWIDTH_FT here).
    - If No and feature's COMID is invalid – Skip the feature (feature can remain in S_Unmapped_Ln, but structure recount will not be performed for that feature).

The structure recount process will not override any fields except the structure count fields (the field names starting with "STRIN"). Whenever a feature is skipped during recount, it is simply omitted from the structure recount analysis. If the BWIDTH_FT field is populated with a more accurate value (hand-measured perhaps), that custom BWIDTH_FT will be preserved and used for future structure recounts and will not be overridden by any automated methods.

Table 3-10: S_Unmapped_Ln Required Attribute Population

Field	Description
UML_ID	Calculate unique identifier.
COMID	Populate if the COMID can be found in NHDPlusV21 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 and populate as "True (Yes)". All features not within federal land should be populated as "False (No)".
TRIBALLAND	Split segment if within tribal land and populate as "True (Yes)". All features not within tribal land should be populated as "False (No)".
DA_G_1SQMI	Determine if drainage area at downstream end of Reach is 1 or more square miles.
BWIDTH_FT	Populate with estimated width. If left blank, this field will be auto-populated by PTS during annual structure count analysis if COMID is populated with a valid entry.
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 and 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 when 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 are personal in nature, such as POC name, will not be distributed and will be considered private. If a POC is identified, it is suggested that the individual be knowledgeable about the record and be someone whom FEMA can contact 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 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, these data have been determined to provide a manageable foundation for a national coastline within the coastal framework of CNMS in addition to best complementing the existing riverine portion of the CNMS Inventory. The "Coast-Detailed" dataset 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 dataset 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 the November 2016 version of the CNMS schema, the S_Coastal_Ln feature class was 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" (BS) fields.

Sections 3.9.1 through 3.9.6 outline 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 PRE-DISCOVERY PHASE UPDATE

For the Discovery Phase of a project, S_Coastal_Ln records will be reviewed and validation assessment of any studies classified in the CNMS as UNKNOWN – TO BE ASSESSED should be performed (consult RSC).

3.9.2. S_COASTAL_LN POST-DISCOVERY PHASE UPDATE

The collection of new community input in the form of CNMS Requests will be added to S_Requests_Ar and/or S_Requests_Pt features without duplication, as defined in Section 3.4.1. In addition, comments received during Discovery may provide information about existing studies that could potentially update the validation elements of a coastal Reach (e.g., significant storm events, changes to coastal structures, repetitive loss patterns outside the SFHA).

3.9.3. S_COASTAL_LN SCOPING PHASE UPDATE

When project scope has been funded and specific coastal study Reaches have been identified, the fields within S_Coastal_Ln will need to be updated as shown in Table 3-11. 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 Issuance and LFD Issuance dates are unknown, users should use "01/01/2049" for the Preliminary Issuance date and "01/01/2050" for the LFD Issuance date.

Reaches scoped for redelineation or digital conversion must be updated as BEING STUDIED with all scoping fields populated except for BS_SRGMODL through BS_WVDL.

Table 3-11: 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	Update 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 well.
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. If a MIP Case Number has not yet been assigned, populate the field with the entry "PTS FUNDED" or "CTP FUNDED".
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_STATCMT	Additional comments.
BS_SRG2DW	Select if surge model is coupled with 2-D wave analysis for the ongoing study.
BS_SUPMETH	Select the appropriate set-up method for the ongoing study when a 2-D model is not run.
BS_SUPCMT	Additional comments.
BS_RUPMODL	Select the appropriate runup model for the ongoing study.
BS_ERSMETH	Select the appropriate erosion method for the ongoing study.
BS_ERSCMT	Additional comments.
BS_OVLDMDL	Select the appropriate overland wave model for the ongoing study.
BS_WVMDL	Select the appropriate wave model for the ongoing study.
BS_WVCMT	Additional comments.
BS_FY_FUND	Select the appropriate value for the fiscal year funded for the ongoing study.
BS_PRELIM_DATE	Update with the accurate Preliminary Issuance date estimate (if unknown, use "01/01/2049").
BS_LFD_DATE	Update with the accurate LFD Issuance date estimate (if unknown, use "01/01/2050").

3.9.4. 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. If the scope of work is altered in any way, S_Coastal_Ln must be updated to represent the updated scope, using the guidelines in Section 3, Data Entry Process. In addition, de-scoped studies must resume appropriate VALIDATION_STATUS and STATUS_TYPE values as shown in Table 3-12.

Table 3-12: 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

3.9.5. S_COASTAL_LN PRELIMINARY ISSUANCE PHASE UPDATE

At Preliminary Issuance, the fields shown in Table 3-13 must be updated and 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" (BS) fields will be cleared for any lines representing coastlines 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 coastlines.

Table 3-13: S_Coastal_Ln Preliminary Issuance Phase Updates

Field	Preliminary Issuance Phase Updates
FBS_CMPLNT	Update to indicate FBS compliance of Preliminary Issuance 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/MIP or, as a last resort, the date when the FBS_CMPLNT field was populated.
FBS_CTYPE	Update to reflect FBS compliance check type.
BS_PRELIM_DATE	Update with actual Preliminary Issuance date.
BS_LFD_DATE	Update with accurate LFD Issuance date estimate.

After Preliminary Issuance, if the scope of work is found to differ in any way from that represented in the polylines, S_Coastal_Ln attributes must be updated to represent the correct scope. In addition, de-scoped studies must resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.9.4.

3.9.6. S_COASTAL_LN LFD ISSUANCE PHASE UPDATE

At LFD Issuance, values from the "Being Studied" (BS) fields populated for scoping and preliminary data will be migrated into the corresponding primary (i.e., effective) study fields. The effective study attributes should be verified and revised as necessary to reflect the new Study as published in the LFD FIS.

After LFD Issuance, if the scope of work is found to differ in any way from that represented in the linework, S_Coastal_Ln must be updated to represent the correct scope. In addition, de-scoped studies must resume appropriate VALIDATION_STATUS and STATUS_TYPE values as defined in Section 3.9.4.

Reaches updated by redelineation and digital conversion by the LFD study will retain existing effective study information as captured by the effective study fields noted in Table 3-14 below. In addition, the STATUS_DATE for all VALID Reaches should be restored to the original date of validation. If populated, VAL_DATE should be the source of this original date. Otherwise, historical versions of the regional database will need to be consulted. In addition, the date of redelineation should be noted in the TOPO_SRC field.

Table 3-14: S_Coastal_Ln LFD Phase Updates

Field	LFD Phase Updates
CREACH_ID	Update as needed. Follow Table F-7 guidance.
CSTUDY_ID	Update as needed. Follow Table F-7 guidance.
CASE_NO	If the Reach represents a New or Updated Study, this field should inherit the value stored in BS_CASE_NO field. For redelineations and digital conversions, this field will retain its current value.
CO_FIPS	Update as needed. Follow Table F-7 guidance.
CID	Update as needed. Follow Table F-7 guidance.
TRIBALLAND	Update as needed. Follow Table F-7 guidance.
STUDY_NAME	Populate with the new effective study name.
CVALIDATION	For Reaches representing New or Updated Studies, this field should be set to "VALID". For redelineations and digital conversions, this field will retain its current value.
CSTAT_TYPE	For Reaches representing New or Updated Studies, this field should be set to "NVUE COMPLIANT". For redelineations and digital conversions, this field will be de-scoped per Table 3-12.

Field	LFD Phase Updates
MILES	Recalculate for any Reaches where geometry has been modified.
SOURCE	Update as needed. Follow Table F-7 guidance.
STATUS_DATE	If the 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 - see VAL_DATE field (if populated).
REASON	This field should be cleared of all information not pertaining to the new effective Study.
HUC8_KEY	Update as needed. Follow Table F-7 guidance.
STUDY_TYPE	This field should inherit the value stored in BS_SDTYTYP.
TIER	Update to reflect Tier category of the new effective study.
WSEL_AVAIL	Select the appropriate category of WSEL if applicable.
DPTH_AVAIL	Select the appropriate category of depth grids if applicable.
FBS_CMPLNT	Verify field is populated with accurate FBS information for the new effective study.
FBS_CHKDT	Verify field is populated with accurate FBS information for the new effective study.
FBS_CTYP	Verify field is populated with accurate FBS information for the new effective study.
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 will retain its current value.
TOPO_DATE	Date the topography dataset was collected or completed.
TOPO_SRC	The source of the LiDAR or topography dataset. If the study is a redelineation, add a note indicating the date the redelineation was performed.
BATHY_DATE	Date the bathymetry dataset was collected or completed.
BATHY_SRC	The source of the bathymetry dataset.
POP_COAST	Update as needed. Follow Table F-7 guidance.
SURGE_MDL	This field should inherit the value stored in BS_SRGMODL. For redelineations and digital conversions, this field will retain its current value.
STAT_METH	This field should inherit the value stored in BS_STATMETH. For redelineations and digital conversions, this field will retain its current value.
STAT_CMT	This field should inherit the value stored in BS_STATCMT. For redelineations and digital conversions, this field will retain its current value.
SURGE2DW	This field should inherit the value stored in BS_SRG2DW. For redelineations and digital conversions, this field will retain its current value.
SETUP_METH	This field should inherit the value stored in BS_SUPMETH. For redelineations and digital conversions, this field will retain its current value.

Field	LFD Phase Updates
SETUP_CMT	This field should inherit the value stored in BS_SUPCMT. For redelineations and digital conversions, this field will retain its current value.
RUNUP_MDL	This field should inherit the value stored in BS_RUPMODL. For redelineations and digital conversions, this field will retain its current value.
EROS_METH	This field should inherit the value stored in BS_ERSMETH. For redelineations and digital conversions, this field will retain its current value.
EROS_CMT	This field should inherit the value stored in BS_ERSCMT. For redelineations and digital conversions, this field will retain its current value.
OVWAVE_MDL	This field should inherit the value stored in BS_OVLDMDL. For redelineations and digital conversions, this field will retain its current value.
WAVE_MDL	This field should inherit the value stored in BS_WVMDL. For redelineations and digital conversions, this field will retain its current value.
WAVE_CMT	This field should inherit the value stored in BS_WVCMT. For redelineations and digital conversions, this field will retain its current value.
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 will 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 will 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 will 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 will retain its current value.
VAL_DATE	If the Reach represents a New or Updated Study, this field should be cleared. For redelineations and digital conversions, this field will retain its current value.
BS_CASE_NO	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_STATCMT	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.

Field	LFD Phase Updates
BS_SUPCMT	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.
BS_ERSCMT	After this value has been migrated to the corresponding effective study field, this field should be cleared.
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_WVCMT	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_PRELIM_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 the associated CMT, SRC, and URL fields. For redelineations and digital conversions, these fields will 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 will retain their current value.
E_ELEMDATE	This field should be cleared. For redelineations and digital conversions, this field will retain its current value.

Appendix A. Validation Assessment Procedures

A study's VALID status must be reassessed every five years. Once the STATUS_DATE of a VALID study becomes five years old, the VALID status expires and becomes UNKNOWN. Validation assessments are completed for VALID - NVUE COMPLIANT studies approaching their expiration date and for UNKNOWN - TO BE ASSESSED miles. Studies with a VALID - BEING STUDIED designation will not be considered for assessment. The validation assessment process will either confirm the VALID status or change it to UNVERIFIED and the STATUS_DATE should be updated to the date the assessment is completed. This will start a new 5-year clock for VALID studies. VAL_DATE should also be updated to the date the assessment is completed. Although at this point the STATUS_DATE and VAL_DATE are the same, they note two different events. The STATUS_DATE documents when the VALIDATION_STATUS and STATUS_TYPE were last updated and the VAL_DATE documents when a validation assessment was last completed.

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 Coordinated Needs Management Strategy (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)	One Critical Element and/or four Secondary Elements
Riverine – Zone A Studies (Approximate)	One Critical Element. All Zone A assessments (A1-A5) are Critical Elements. Exception, an A5 pass can override a critical fail(s) of A1-A4.
Coastal	One Critical Element and/or three 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 and must be documented in the associated CMT, SRC, and URL fields.

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 to re-visit 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 five 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 fiscal year (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 the Region allocates funds to perform a CNMS evaluation. 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 the CNMS evaluation is deferred. The option to defer an assessment for five 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 FY. UNVERIFIED studies currently being studied or that have been allocated funding for the current FY 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 of TO BE STUDIED.

A.3. VALID Validation Status

CNMS Study Records are categorized as VALID when a new or updated study is performed, or a 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 whether and 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.
(blank)	BEING ASSESSED	Studies currently being assessed per CNMS stream/coastline Reach-level validation described in this document.
(blank)	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.

Validation Status	Status Type	Description
UNVERIFIED	BEING STUDIED	Studies that are currently being studied or have been allocated funding for the current FY captured during the Discovery process.
(blank)	TO BE STUDIED	Studies that need to be studied and are planned for a future FY.
VALID	BEING STUDIED	Studies are currently being studied or have been allocated funding for the current FY captured during the Discovery process.
(blank)	NVUE COMPLIANT	New study performed or study passes stream/coastline Reach-level validation.
(blank)	BEING ASSESSED	Studies currently being assessed per CNMS stream/coastline Reach-level validation.
ASSESSED	BEING STUDIED	Studies that are currently underway or have been allocated funding for the current FY captured during the Discovery process.
(blank)	TO BE STUDIED	Unmapped flood sources prioritized to be mapped with a Special Flood Hazard Area (SFHA).
(blank)	BEING STUDIED	Unmapped flood sources that are currently being studied or have been allocated funding for the current FY.
(blank)	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.

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.

User record retention is important because 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

The validation checks for detailed riverine studies are meant to capture changes that have occurred since the effective study that may impact the validity of the effective study. The effects of these Physiological, Climatological, and Engineering (PCE) changes on the 1-percent-annual-chance Special Flood Hazard Area (SFHA), floodway, and base flood elevation (BFE) are the primary focus.

Seven critical and nine secondary checks are assessed for detailed riverine studies. The failure of any one Critical Element or four or more Secondary Elements would cause the study to become classified as UNVERIFIED, signifying to the Region that a restudy is needed. Table B-1 outlines these assessment checks and the following subsections provide details on each check.

These checks should be assessed for Reaches with the following:

- FLD_ZONE of AE, AH, AO, AR, 1 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED, or 0.2 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED that did not assess coastal affects, OR
- FLD_ZONE of 1 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED that does not have an Approximate STUDY_TYP and that did not assess coastal affects, OR
- Combined coastal-riverine study that has a floodway.

Note that streams can have multiple different effective studies throughout their length. These assessments are to be completed by stream study.

Well-defined guidance for 2D watershed-wide studies has not been fully developed and will be incorporated into a future revision of this document. At this time, engineering judgment should be used to apply the current assessment checks to these studies, keeping in mind that switching a study to an UNVERIFIED status should signal that either the effective study had significant defects or that significant changes have occurred that would impact the BFE.

Table B-1: Detailed Riverine Critical and Secondary Checks

Criteria	Critical or Secondary
C1. Is there a gage record since the effective hydrologic analysis greater than or equal to the published 1-percent-annual-chance discharge?	Critical
C2. Does the effective peak gage discharge fall outside of the 68% confidence interval of the peak gage discharge using the current full gage record?	Critical
C3. Is the effective model methodology no longer appropriate?	Critical
C4. Has there been an addition or removal of a major flood control structure since the effective analysis?	Critical

Criteria	Critical or Secondary
C5. Has the channel been reconfigured to be outside of the effective SFHA since the effective analysis?	Critical
C6. Have five or more hydraulic structures that would impact BFEs been added or removed since the effective analysis?	Critical
C7. Has there been significant channel fill or scour since the effective analysis?	Critical
S1. Was urbanization accounted for in the effective regression equations in urbanized areas or has it become urban since the effective regression analysis?	Secondary
S2. Are there any repetitive loss properties outside of the effective SFHA?	Secondary
S3. Has the urban area of the HUC-12 basin increased by 50% or more in an urban area since the effective hydrologic analysis?	Secondary
S4. Have one to four hydraulic structures that would impact BFEs been added or removed since the effective analysis?	Secondary
S5. Have there been any channel improvements since the effective analysis?	Secondary
S6. Is significantly better topography available than that used in the effective mapping?	Secondary
S7. Have significant changes to vegetation or land use occurred since the effective analysis?	Secondary
S8. Are high water mark (HWM) data available for an event greater than or equal to the 1-percent-annual-chance event that occurred after the effective analysis?	Secondary
S9. Are newer regression equations available than those used in the effective analysis?	Secondary
Total	Seven Critical; Nine Secondary

B.1. Critical Check C1: Gage Record

This element is assessing if a major change in the climatologic data used for the effective study has occurred since the effective analysis. This guidance focuses on gage data, but it would not apply to studies that used rainfall-runoff modeling without calibrating to gage data. In these instances, engineering judgment must be used to assess if a significant change in the climatologic data used has occurred. Specific guidance on how to assess the significance of change in climatologic data other than gage data is planned for inclusion in a future revision of this document.

If any of the following criteria is not met, this element will PASS automatically:

- There is a U.S. Geological Survey (USGS) gage on the stream within 0.5 to 1.5 times the drainage area of the Reach being assessed
- That gage has a minimum of 10 years of records prior to the effective hydrologic analysis
- That gage has at least one new record since the effective hydrologic analysis (or since the last record known to have been used for the effective hydrologic analysis)

If the above criteria are met, then whether an event equal to or greater than the published 1-percent-annual-chance discharge has occurred since the effective hydrologic analysis (or since the last record known to have been used for the effective hydrologic analysis) will have to be determined. The Drainage Area Ratio Method may be needed if a published discharge is not available at the location of the gage to estimate the discharge that should be compared to. The Drainage Area Ratio Method is as follows:

$Q_g = Q_{pk}(DA_g/DA_{pk})^x$

Where,

Q_g = estimated discharge at gage site (based on published values)

DA_g = drainage area at gage site

Q_{pk} = published/known discharge (from effective study)

DA_{pk} = drainage area at published/known discharge (from effective study)

x = regional exponent for area ratio (typically from 0.5 to 1)

Please note that a regional exponent of one (x=1) can be used if a regional exponent is not available in a local regression equation publication.

The occurrence of the highest recorded event to date at that gage or an event equal to or greater than the published 1-percent-annual-chance discharge since the effective analysis would cause this element to FAIL.

One other scenario to look out for is whether the gage record shows flood control starting or ending after the HYDRO_DATE_EFFCT (or since the last record known to have been used for the effective hydrologic analysis). This would also cause this element to FAIL.

The process for completing critical check C1 is depicted in Figure B-1.

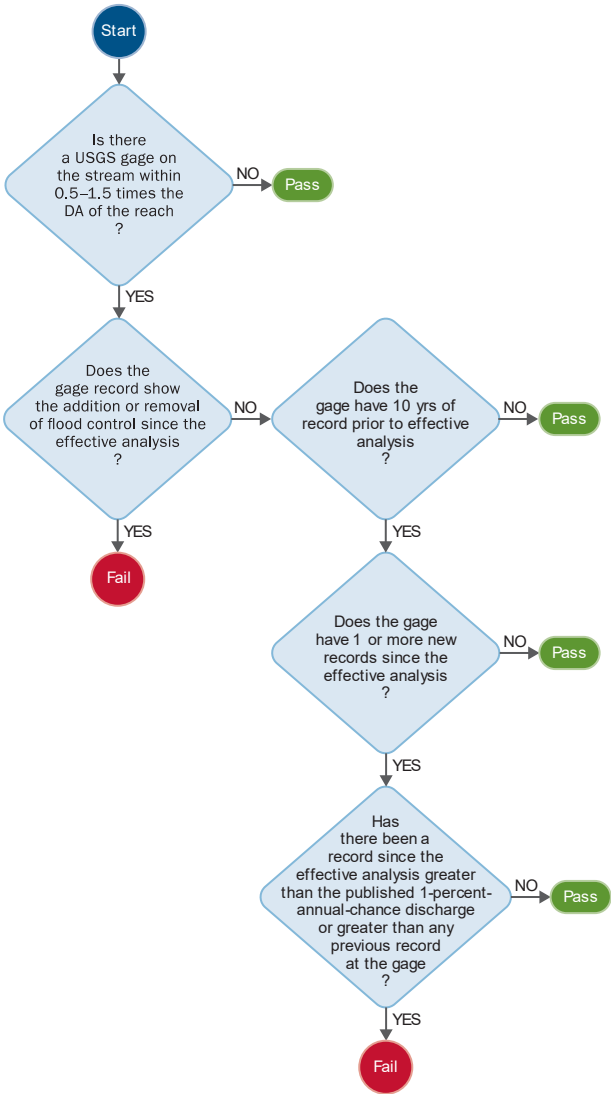


Figure B-1: Critical Check C1 Evaluation Process

B.2. Critical Check C2: Gage Analysis

If any of the following criteria is not met, this element will PASS automatically:

- There is a USGS gage on the stream within 0.5 to 1.5 times the drainage area of the Reach being assessed.
- That gage has a minimum of 10 years of records prior to the effective hydrologic analysis.
- That gage has at least one new record since the effective hydrologic analysis (or since the last record known to have been used for the effective hydrologic analysis).

If the above criteria are met, whether the effective gage discharge for the 1-percent-annual-chance event falls outside of the 68 percent confidence interval of the gage discharge using the current gage record will have to be determined. If the effective Bulletin 17 gage discharge estimate falls outside of the 68 percent confidence interval of the current gage discharge, this element would FAIL. The process for completing critical check C2 is depicted in Figure B-2.

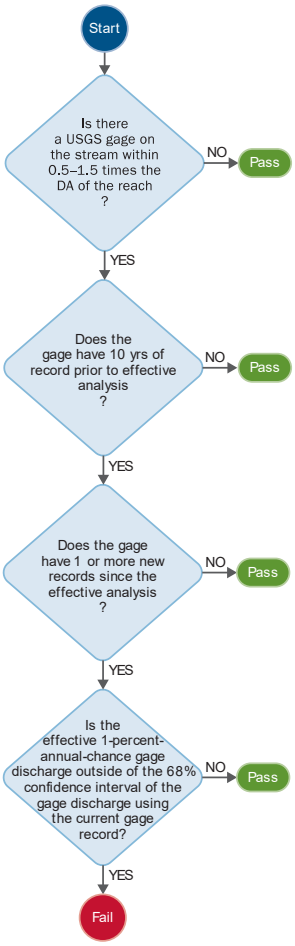


Figure B-2: Critical Check C2 Evaluation Process

B.3. Critical Check C3: Model Methodology

This element assesses if the effective technical methods used at the time of the study or are no longer appropriate. An inappropriate effective methodology would cause this element to FAIL. This element scrutinizes the underlying model methodology, rather than software versions.

The following is not a complete list, but includes examples of scenarios that would be considered inappropriate effective methodology:

- A one-dimensional model was used in an area with a complicated flow regime that requires a two-dimensional model
- Regression equations were used in an area where more than 30 percent of the drainage area is regulated

The process for completing critical check C3 is depicted in Figure B-3.

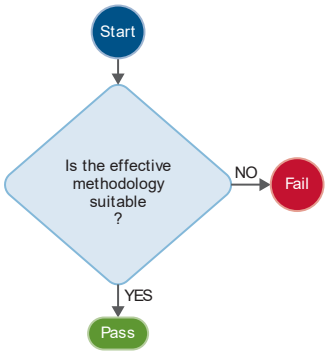


Figure B-3: Critical Check C3 Evaluation Process

B.4. Critical Check C4: Flood Control

This element assesses whether there has been an addition or removal, including a dam breach, of a significant flood control structure since the effective hydrologic analysis or whether a significant mapping issue exists at an accredited or provisionally accredited levee. The occurrence of either of these scenarios would cause this element to FAIL.

Flood control structures include dams, reservoirs, levees, and floodwalls. A significant flood control structure is one that regulates 30 percent or more of the study's drainage area. Levee system mapping issues are tracked as FEMA data in the National Levee Database (username/password required to access). The process for completing critical check C4 is depicted in Figure B-4.

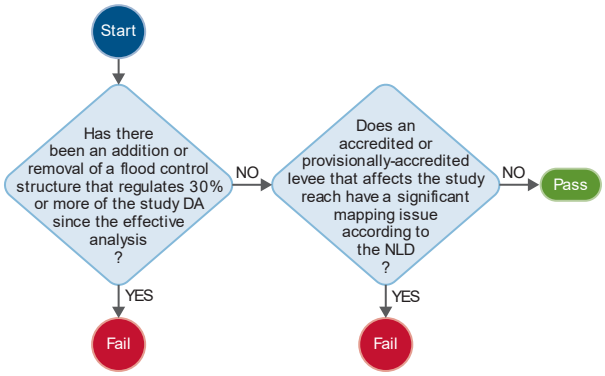


Figure B-4: Critical Check C4 Evaluation Process

B.5. Critical Check C5: Channel Reconfiguration

This element assesses whether the channel has been reconfigured to be outside of the effective SFHA since the effective analysis. The presence of such a reconfiguration would cause this element to FAIL.

Minor deviations outside of the SFHA could be a result of the quality of terrain used for the effective mapping. There should be an actual occurrence of reconfiguration of the channel since the effective analysis for this element to FAIL. The process for completing critical check C5 is depicted in Figure B-5.

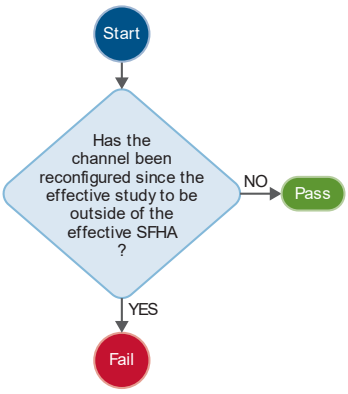


Figure B-5: Critical Check C5 Evaluation Process

B.6. Critical Check C6: Hydraulic Structures

This element assesses whether five or more hydraulic structures that would impact the BFE have been added or removed since the effective analysis. Five or more new or removed structures since the effective study would cause this element to FAIL.

Pipeline crossings (without pier supports) and at-grade bridges (without fill) should not be counted as new hydraulic structures that would impact the BFE. However, if these types of structures were included on the effective profile and have been removed since, then they should be counted as a removed structure.

A replaced structure (widened bridge or bridge rebuilt in same location) should only be counted as one new or removed structure. The process for completing critical check C6 is depicted in Figure B-6.

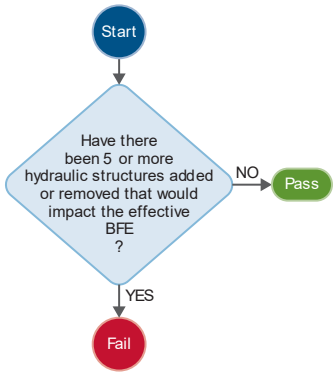


Figure B-6: Critical Check C6 Evaluation Process

B.7. Critical Check C7: Channel Fill or Scour

This element assesses whether significant channel fill or scour has occurred since the effective analysis. The presence of either would cause this element to FAIL. The channel fill or scour should be significant enough that it may affect the BFE. The process for completing critical check C7 is depicted in Figure B-7.

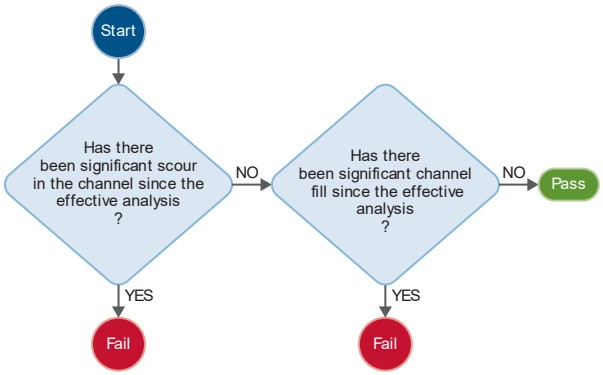


Figure B-7: Critical Check C7 Evaluation Process

B.8. Secondary Check S1: Urban Regression Equations

This element assesses whether rural regression equations were used in the effective analysis for an urbanized area. If all of the following criteria are met, this element will FAIL:

- Regression equations were used in the effective analysis
- The study Reach is an area that meets the minimum threshold to be determined urban (IS_URBAN = “True (Yes)”)
- Urbanization was not accounted for in the effective analysis

The process for completing secondary check S1 is depicted in Figure B-8.

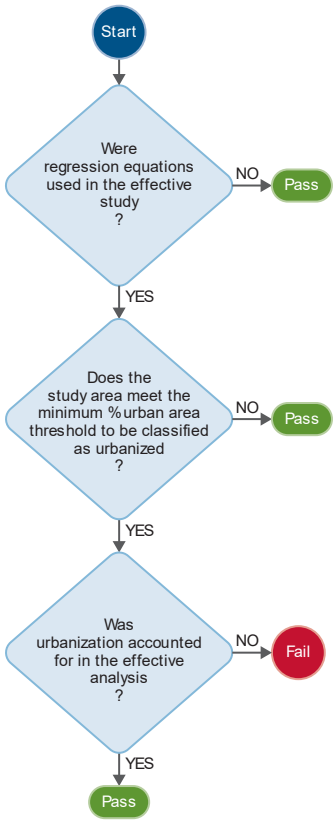


Figure B-8: Secondary Check S1 Evaluation Process

B.9. Secondary Check S2: Repetitive Losses

This element assesses whether any repetitive loss properties exist that fall outside of the effective SFHA on the Reach being assessed. The presence of a repetitive loss property outside the SFHA would cause this element to FAIL.

A repetitive loss property has had more than one paid claim of loss of $1,000 or more in any 10-year period since 1978. This data can be requested from FEMA.

A repetitive loss property outside the SFHA that has a number of other buildings not flagged as repetitive loss properties between the repetitive loss property and the effective SFHA could be an indicator that the flooding is a result of drainage issues and not of flooding for the stream Reach being assessed. In these situations, this element would PASS. Determining whether flooding of a repetitive loss property is a result of flooding from the stream being assessed will require engineering judgment.

Another scenario to keep an eye out for is when a repetitive loss property outside the SFHA is in an area where backwater effects are present from a parent stream. In this situation, the repetitive loss property would be applied to the parent stem and not the tributary. The process for completing secondary check S2 is depicted in Figure B-9.

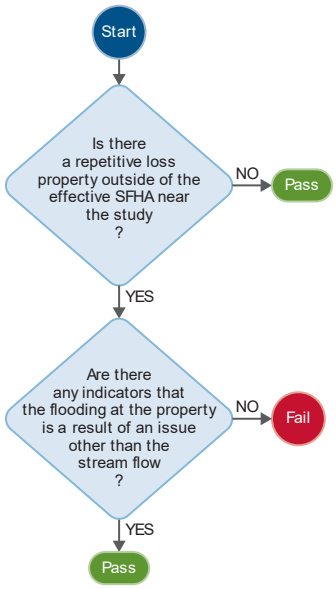


Figure B-9: Secondary Check S2 Evaluation Process

B.10. Secondary Check S3: Urban Area

This element assesses whether the urban area has increased 50 percent or more in the HUC-12 watershed since the effective hydrologic analysis when the watershed meets the minimum threshold to be classified as urbanized. If a significant increase in an urban area has occurred, this element would FAIL.

If the HUC-12 watershed does not meet the minimum threshold to be classified as urbanized (IS_URBAN = "False (No)," then this element would automatically PASS. The minimum threshold to be classified as urbanized can be identified in state regression equation reports. If no threshold is provided, assume 15 percent urban as the minimum. The process for completing secondary check S3 is depicted in Figure B-10.

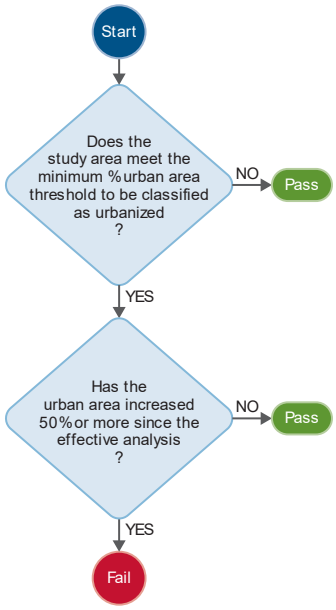


Figure B-10: Secondary Check S3 Evaluation Process

B.11. Secondary Check S4: Hydraulic Structures

This element assesses whether one to four hydraulic structures that would impact the BFE have been added or removed since the effective analysis. The presence of one to four new or removed structures since the effective study would cause this element to FAIL.

This element follows the same rules as Critical Element C6 in determining a new or removed structure.

Pipeline crossings (without pier supports) and at-grade bridges (without fill) should not be counted as new hydraulic structures that would impact the BFE. However, if these types of structures were included on the effective profile and have been removed since, then they should be counted as a removed structure.

A replaced structure (widened bridge or bridge rebuilt in same location) should only be counted as one new or removed structure.

Note that elements C6 and S4 cannot both FAIL. Only one of the two elements can be marked as a FAIL on any Reach. The process for completing secondary check S4 is depicted in Figure B-11.

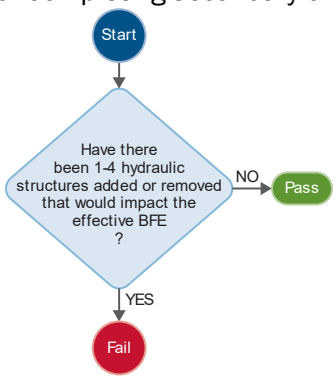


Figure B-11: Secondary Check S4 Evaluation Process

B.12. Secondary Check S5: Channel Improvements

This element assesses whether channel improvements have occurred since the effective analysis. If they have, then this element will FAIL.

The following is not a complete list, but includes examples of what would be considered channel improvements:

- Channel straightening
- Addition or removal of concrete lining
- Installation of rip-rap lining or bank support
- Channel reconfiguration still inside the effective SFHA (note that reconfiguration causing the channel to be outside of the effective SFHA is a critical failure via element C5)

The process for completing secondary check S5 is depicted in Figure B-12.

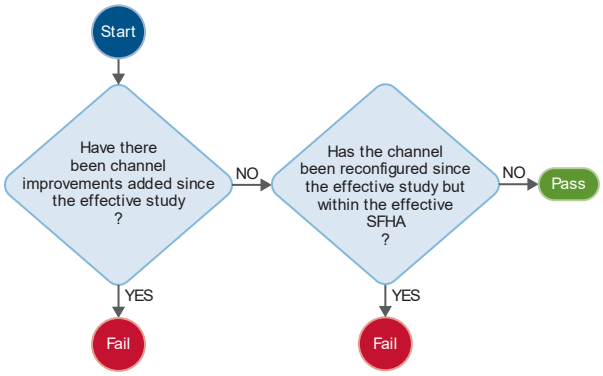


Figure B-12: Secondary Check S5 Evaluation Process

B.13. Secondary Check S6: Topography

This check involves determining whether a topographic data source is available that is significantly better than what was used for the effective detailed modeling and mapping. This check will FAIL if the effective study topographic source does not meet the FEMA SID 43 vertical accuracy requirements and a new LiDAR source is available (complete or in progress) for the study area that meets or exceeds SID 43. If the effective topographic data source was LiDAR that meets SID 43, this element will automatically PASS, even if a newer LiDAR source is available that meets or exceeds SID 43. If a study was redelineated, meaning it was remapped on newer topographic data than that used when effective analyses were completed, then the topographic data used for redelineation should be referenced as the effective topographic source.

While this guidance focuses on LiDAR data sources, it should be noted that survey data that was used to develop floodplain mapping and not solely the channel and structure geometry would also be considered a topographic source that meets FEMA SID 43 standards. This is a scenario that often occurs with reaches updated by a LOMR.

The vertical accuracy requirements are illustrated in Table B-2. For complete definitions of Fundamental Vertical Accuracy (FVA) and Consolidated Vertical Accuracy (CVA), refer to SID 43.

Table B-2: 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

Note: Where there are overlaps in risk deciles between the different levels of flood risk, the most restrictive combination of deciles is to be used for assessment purposes. For example, Flattest High Risk areas include deciles 1, 2, and 3 and Flattest Medium Risk areas include deciles 3, 4, 5, 6, and 7, so for assessment purposes decile 3 is assigned to the High Risk level.

Data required to determine whether a topographic data source meets SID 43:

- Streamline from the effective detailed Coordinated Needs Management Strategy (CNMS) inventory (used for documenting results of this assessment): Record or estimation of the topographic data source used for the effective study.

- National Digital Elevation Program status polygon: This information can be obtained from the Interagency Elevation Inventory website. Consideration of local sources for new topography may be available depending on the State/Region.

- Slope database: Represents the average slope of HUC-12 basins for the U.S. and is categorized into three quantiles (Flattest, Rolling, and Hilly) based on an equal area distribution. This dataset can be obtained for the continental U.S. at: https://rmd.msc.fema.gov/EngineeringModeling/EngineeringServices/Map%20Production%20Documents/CNMS

- Flood Risk Database: Nationwide data are available from FEMA's National Risk Index website https://www.fema.gov/flood-maps/products-tools/national-risk-index. The Riverine Flooding - Individual Hazard Risk Score field ("RFLD_RISKS") provides a flood risk score on the census-tract level that can be parsed into flood risk deciles, aggregated, and combined with the slope database to assign a SID 43 Specification Level per HUC-12 area.

The process for completing secondary check S6 is depicted in Figure B-13.

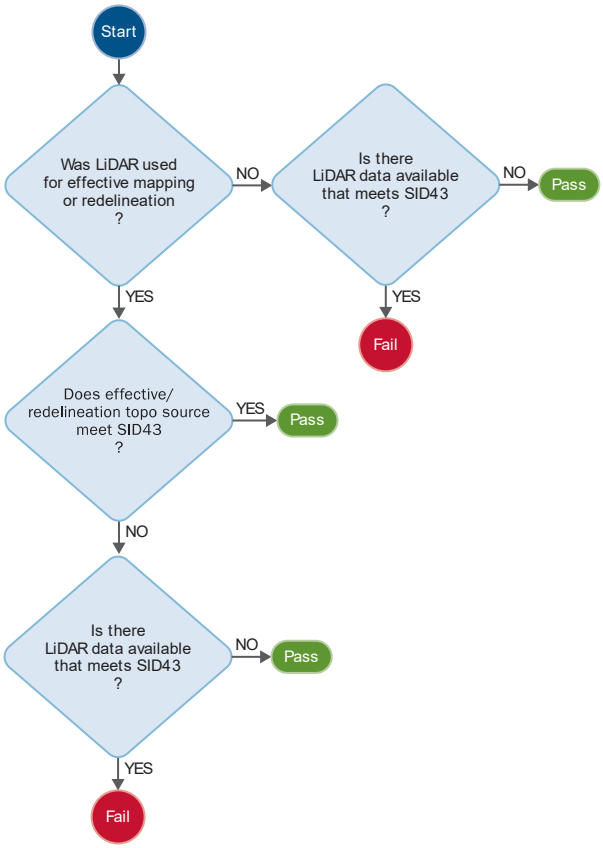


Figure B-13: Secondary Check S6 Evaluation Process

B.14. Secondary Check S7: Vegetation or Land Use

This element assesses whether there has been a significant change to vegetation or land use in the area of the study being assessed since the effective hydrologic analysis. A significant change to vegetation or land use since the effective study would cause this element to FAIL.

A significant change is considered a change of 30 percent or more of the HUC-12 watershed/s a study is in. The USGS National Land Cover Database (NLCD) is typically used for this assessment. The process for completing secondary check S7 is depicted in Figure B-14.

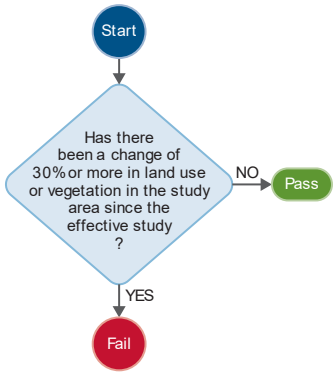


Figure B-14: Secondary Check S7 Evaluation Process

B.15. Secondary Check S8: High Water Marks

This element assessed whether significant High-Water Mark (HWM) data are available that were collected along the study being assessed since the effective analysis. If so, this element would FAIL.

A HWM must meet the following criteria to be counted towards failure of this element:

- It was collected after the effective analysis
- It is for an event equal to or greater than the 1-percent-annual-chance event

A scenario to keep an eye out for is when a HWM that meets the above criteria is in an area where backwater effects are present from a parent stream. In this situation, the HWM would be applied to the parent stem and not the tributary. The process for completing secondary check S8 is depicted in Figure B-15.

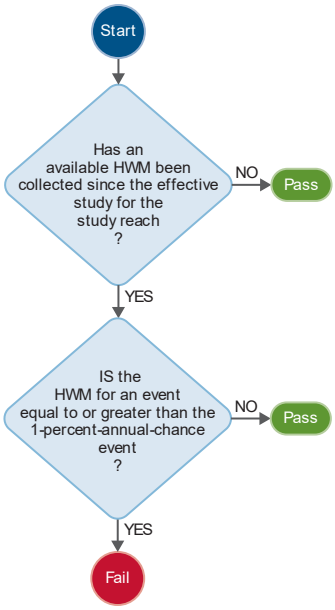


Figure B-15: Secondary Check S8 Evaluation Process

B.16. Secondary Check S9: New Regression Equations

This element assesses whether new regression equations that would impact the BFE are available compared to those used for the effective analysis. If regression equations were not used for the effective analysis, then this element automatically will PASS.

If regression equations were used for the effective analysis and new equations that are applicable to the study area have been issued, whether the new equations would create a significant change to discharge will need to be investigated.

The regression equation comparison involves calculating the 1-percent-annual-chance discharge using the new equations and determining whether that discharge falls outside the standard error of the discharge calculated using the equations from the effective analysis. If the discharge using the new equations does fall outside the standard error of the discharge calculated with the effective equations, this element will FAIL. The process for completing secondary check S9 is depicted in Figure B-1.

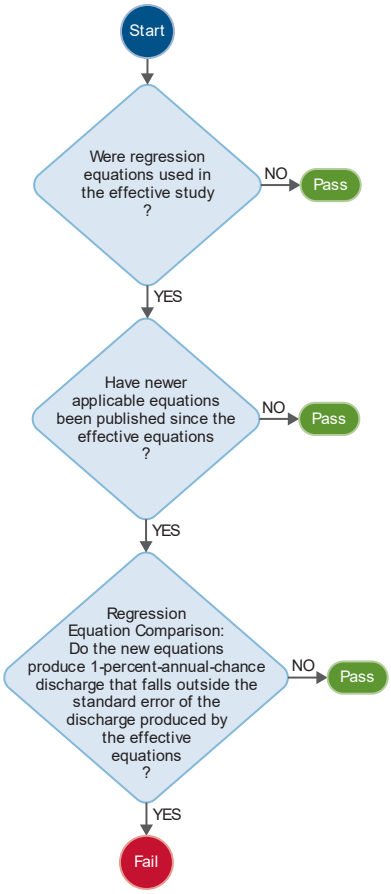


Figure B-16: Secondary Check S9 Evaluation Process

B.17. Assessment of Interior Drainage Areas

In this section, guidance on how to assess the interior drainage area of levees is discussed. Linework with a LINE_TYPE of "Riverine" should be used where possible to represent interior drainage areas. Disconnected SFHA areas in the interior drainage area can be represented by separate Reaches outlining the SFHA and given a LINE_TYPE of "Ponding."

Two assessment scenarios are to be considered:

1. Levee interior drainage areas are modeled as hydraulically dependent on the exterior stream
2. Levee interior drainage areas are modeled as hydraulically independent of the exterior stream

Scenario 1

This is the more typical scenario of the two. In this situation, the validity of the interior drainage areas is dependent solely on the validity of the exterior stream study condition. The interior drainage areas will not be assessed and will simply adopt the leveed stream's Validation Status. Table B-3 provides guidance on how to populate fields within S_Studies_Ln for Scenario 1 interior drainage area Reaches. Table B-3 only includes fields that apply to this special case. Note that the Hydrologic and

Hydraulic fields are not listed. These fields should still be populated to document the hydrologic and hydraulic study attributes of the interior drainage area, which may differ from the exterior stream study.

Table B-3: S_Studies_Ln Attribute Updates for Scenario 1 Interior Drainage Areas

Field	Description
STUDY_ID	Calculate same identifier for related interior drainage area Reaches and the leveed flooding source.
CASE_NO	Match leveed flooding source.
VALIDATION_STATUS	Populate to match leveed flooding source.
STATUS_TYPE	Populate to match leveed flooding source (unless interior drainage area is Being Studied).
STATUS_DATE	Populate to match parent flooding source (unless interior drainage area is Being Studied).
REASON	Populate with "Interior Drainage Area Hydraulically Dependent on [leveed flooding source WTR_NM]".
STUDY_TYPE	Populate to match leveed flooding source.
TIER	Populate to match leveed flooding source.
FBS_CMPLNT	Populate to match leveed flooding source (unless interior drainage area is Being Studied).
FBS_CHKDT	Populate to match leveed flooding source (unless interior drainage area is Being Studied).
FBS_CTYP	Populate to match leveed flooding source (unless interior drainage area is Being Studied).
MODEL_2D	Populate to match leveed flooding source.
TOPO_DATE	Populate to match leveed flooding source.
TOPO_SRC	Populate to match leveed flooding source.
C1_GAGE through S9_REGEQ and associated CMT, SRC, and URL	Set to NULL.
CE_TOTAL and SE_TOTAL	Set to NULL.
VAL_DATE	Set to NULL.

Field	Description
BS_CASE_NO BS_ZONE BS_STDYTYP BS_HYDRO_M BS_HYDRO_CMT BS_HYDRA_M BS_HYDRA_CMT BS_MODEL_2D BS_FY_FUND BS_PRELIM_DATE BS_LFD_DATE	Populate to match leveed flooding source (unless interior drainage area is Being Studied).

Scenario 2

In the case of some Accredited Levees or Provisionally Accredited Levees (PAL), the interior drainage area may be modeled as hydraulically independent of the leveed stream study. In these instances, the interior drainage areas should be assessed using the full 16-check assessment process and not be tied to the validity of the exterior stream. This means that a matching STUDY_ID would not be applied and that all 16 detailed elements get assessed on the interior drainage area as a stand-alone study.

Documentation must be available that supports classifying an area as Scenario 2 and the supporting source documentation should be noted in the HYDRO_MDL_CMT field in S_Studies_Ln for all Reaches in the interior drainage area. Some examples of situations that would classify an interior drainage area as hydraulically independent of the exterior stream are:

- The interior drainage analysis was performed assuming no outflow through gravity drains (i.e., worst-case scenario).
- Anticipated changes to the exterior flooding source identified during assessment would decrease the peak 1-percent-annual-chance exterior water surface elevation to be lower than the interior drainage outfall inverts (i.e., a dam was constructed upstream of the levee system).
- The existing levee pump stations included excess capacity under the effective study and are still anticipated to have excess capacity in the current condition. This facilitates draining of the interior area independently of the exterior stage hydrograph condition.

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 four checks (A1-A4) which serve as an initial screening to categorize some Zone A studies as VALID or UNVERIFIED in the CNMS Inventory. An optional assessment check includes 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. 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 are available, OR
   b. Categorize the study as UNVERFIED in the CNMS Inventory if no Refined Zone A Engineering data are available.
2. If the effective Zone A study passes all initial assessment checks, then:
   a. Categorize the study as VALID in the CNMS Inventory.

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

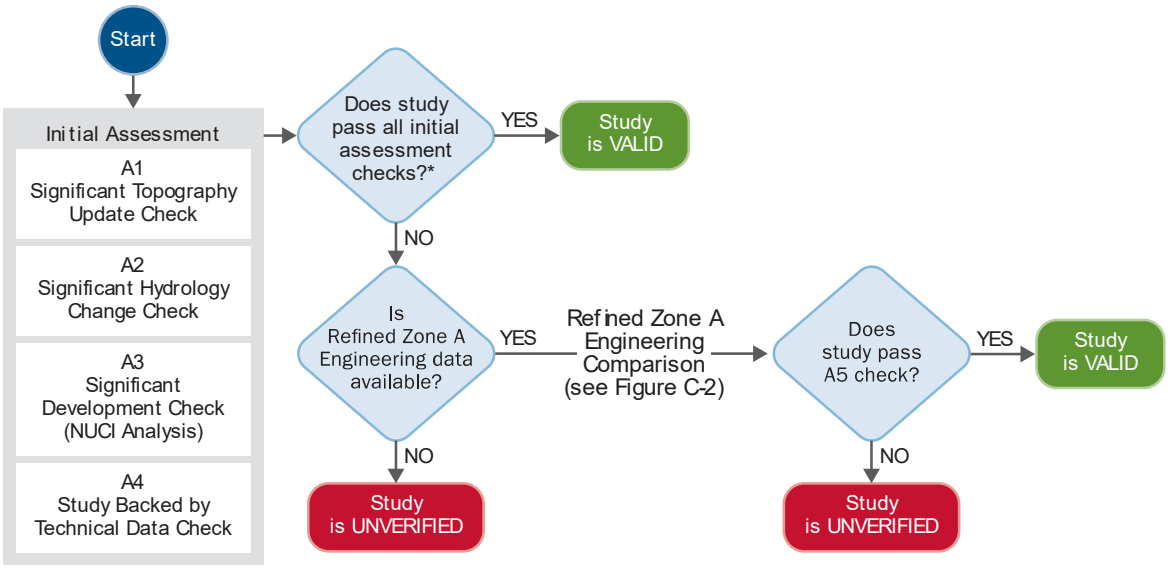


Figure C-1: Validation Procedure for Zone A Studies

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

C.1. Check for Significant Topography Updates (A1)

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. This check will fail if the effective study topographic source does not meet the FEMA SID 43 vertical accuracy requirements and a new LiDAR source is available (complete or in progress) for the study area that does meet or exceed SID 43. If the effective topographic data source was LiDAR that meets SID 43 this element will automatically PASS, even if a newer LiDAR source is available that meets or exceeds SID 43.

The vertical accuracy 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

Note: Where there are overlaps in risk deciles between the different levels of flood risk, the most restrictive combination of deciles is to be used for assessment purposes. For example, Flattest High Risk areas include deciles 1, 2, and 3 and Flattest Medium Risk areas include deciles 3, 4, 5, 6, and 7, so for assessment purposes, decile 3 is considered to be in the High Risk level.

Data required to determine whether a topographic data source meets SID 43:

- Stream Centerline 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: This information can be obtained from the Interagency Elevation Inventory website. Consideration of local sources for new topography may be available depending on the State/Region.

- Slope database: Represents the average slope of HUC-12 basins across the U.S. and is categorized into three quantiles (Flattest, Rolling, and Hilly) based on an equal area distribution. This dataset can be obtained for the continental U.S. at: https://rmd.msc.fema.gov/EngineeringModeling/EngineeringServices/Map%20Production%20Documents/CNMS

- Flood Risk Database: Nationwide data are available from FEMA's National Risk Index website. The Riverine Flooding - Individual Hazard Risk Score field ("RFLD_RISKS") provides a flood risk score on the census tract level that can be parsed into flood risk deciles, aggregated, and combined with the slope database to assign a SID 43 Specification Level per HUC-12 area.

The process for completing this check is depicted in Figure C-2.

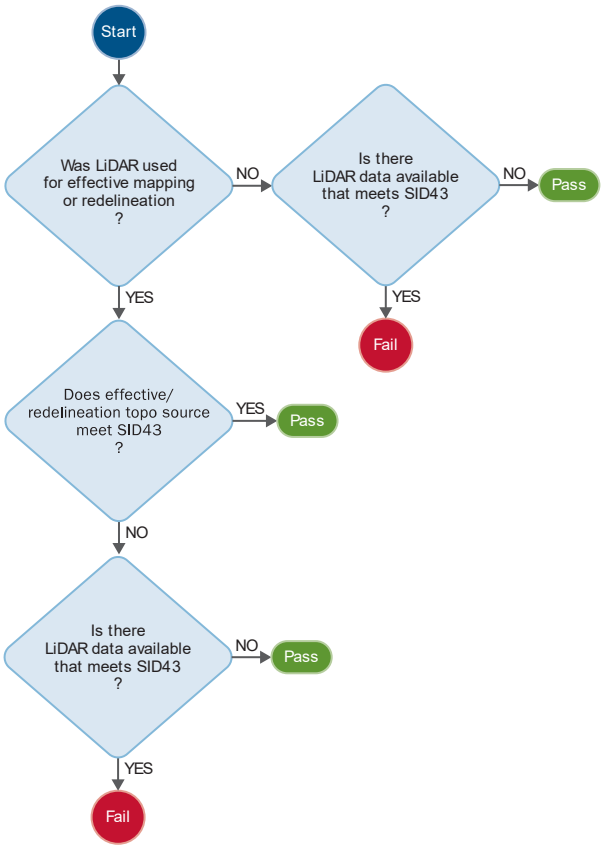


Figure C-2: Check A-1 Evaluation Process

C.2. Check for Significant Hydrology Changes (A2)

This element is assessing whether new regression equations that would impact the base flood elevation (BFE) are available compared to those used for the effective analysis. If regression equations were not used for the effective analysis, then this element automatically will PASS.

If regression equations were used for the effective analysis and new equations that are applicable to the study area have been issued, whether the new equations would create a significant change to discharge will need to be investigated.

The regression equation comparison involves calculating the 1-percent-annual-chance discharge using the new equations and determining whether that discharge falls outside the standard error of the discharge calculated using the equations from the effective analysis. If the discharge using the new equations does fall outside the standard error of the discharge calculated with the effective equations, this element will FAIL.

C.3. Check for Significant Development in the Watershed (A3)

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 HUC-12 watershed containing the Zone A study is urban according to the state regression standards and the percentage of urban area within the watershed has increased by 50 percent 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 Centerline 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 (A4)

This check determines whether the effective Zone A study is supported by modeling or sound engineering judgment and all regulatory products are in agreement. If engineering data other than a model are determined to be sufficient for this check, they should be documented within the CNMS Database and summarized in the deliverable report to FEMA for this assessment.

C.5. Comparison of Refined Zone A Engineering and Effective Zone A (A5) - Optional

When all other initial Zone A validation checks have been conducted as described in previous sections, Zone A studies may be compared to Refined Zone A Engineering results to confirm their

Validation Status. For the purposes of these validation assessment procedures, either LSAE or BLE are appropriate sources for a Refined Zone A Engineering study.

Two alternative comparison methods 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 one-dimensional [1-D] and two-dimensional [2-D] models, then it is permissible to use the width-based method for all the 1-D models and the basic method for the 2-D models). The basic method is simpler, but will tend to lead to lower passing rates for wider floodplains. The width-based method is more complex, and can only be used for 1-D 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 Geographic Information System (GIS) layer attributed with the "1-percent-plus" water surface elevation (WSEL), or a water surface raster or triangulated irregular network (TIN) interpolated from the "1-percent-plus" cross-sections, or a water surface raster or TIN created otherwise from model results.

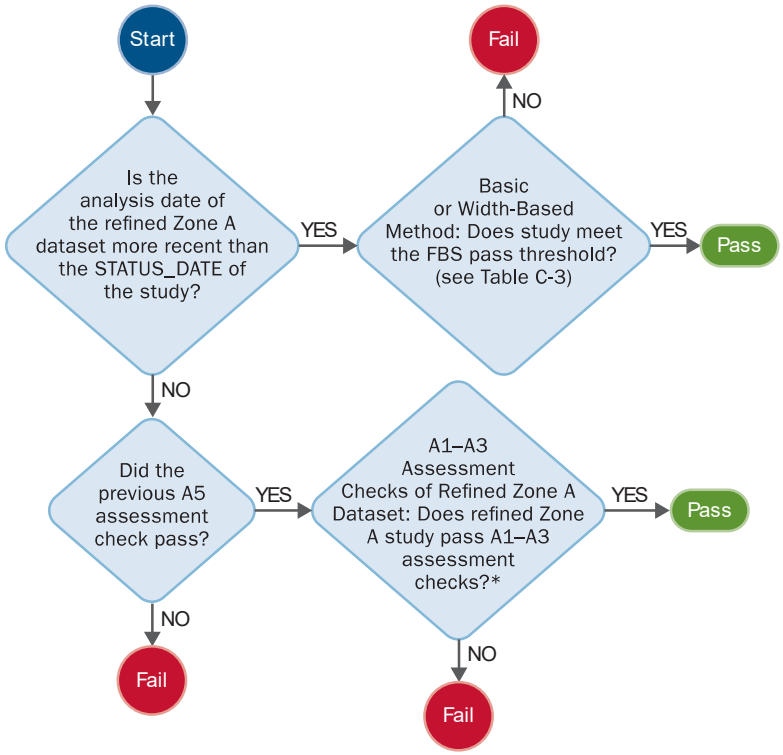
- LSAE/BLE cross-section GIS layer attributed with the "1-percent-minus" WSEL, or a water surface raster or TIN interpolated from the "1-percent-plus" cross-sections, or a water surface raster or TIN created otherwise from model results.

- 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.

During validation of an expired VALID study (STATUS_DATE >= five years old), a previous A5 assessment check may need to be reassessed to determine whether the PASS status can still be considered valid. The validity of a previous A5 assessment should be determined by assessing the A1, A2, and A3 assessment checks on the refined Zone A engineering dataset when the same dataset is being considered for reuse. If A1-A3 all pass for the refined Zone A engineering study, then the previous A5 assessment status of PASS is still valid. If any of the A1-A3 assessment checks on the refined Zone A engineering dataset fail, then the previous A5 status of PASS should be switched to FAIL. Results of the A1-A3 assessment checks for the refined Zone A engineering study should be documented in the A5_CMT field.
The process for completing this comparison is depicted in Figure C-3.



* Results of these checks should be noted in the A5_CMT field

Figure C-3: Refined Zone A Engineering Comparison

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 WSELs from the "1-percent-plus" and "1-percent-minus" models. The sample points and the WSELs can be obtained by using one of the following methods:

a. The sampling points can be obtained by using 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 WSEL 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 WSELs are then assigned to the point by using an interpolated WSEL 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" WSEL >= "1-percent-minus" WSEL. In very rare cases this might not be true. In these rare cases, switch the two WSELs: always use the higher WSEL when the "1-percent-plus" WSEL is referenced, and use the lower WSEL when the "1-percent-minus" WSEL is referenced in the steps below.

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

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

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

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

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

b. 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 modeled using a 1-D model. The steps required for the width-based method, all prefixed with a "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 WSELs from the "1-percent-plus" and "1-percent-minus" models. The sample points and the WSELs can be obtained by using one of the following methods:

a. The sampling points can be obtained by using 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 the modeled WSEL 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 WSELs are then assigned to the point by using an interpolated WSEL 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 whether "1-percent-plus" WSEL >= "1-percent-minus" WSEL. In very rare cases this might not true. In these rare cases, switch the two WSELs in the following steps, e.g., always use the higher WSEL when the "1-percent-plus" WSEL is referenced, and use the lower WSEL when the "1-percent-minus" WSEL is referenced in the steps below.

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

a. Determine whether the maximum topographic elevation within a 37.5-foot radius of the validation point is less than the "1-percent-minus" WSEL minus the half contour interval, or whether the minimum topographic elevation in a 37.5 radius of the validation point is greater than the "1-percent-plus" WSEL plus the half-contour interval. If either of these criteria is true, then the point fails immediately and is assigned a score of zero.

b. Inputs: Minimum and maximum topography elevations within a 37.5-foot radius of the validation point, "1-percent-plus" and "1-percent-minus" WSELs for the point

c. 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" WSELs (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 that 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:

$$\text{Interpolated Top Width} = \frac{(\text{dist. to u/s section}) \times (\text{d/s active top width}) + (\text{dist. to d/s section}) \times (\text{u/s active top width})}{\text{distance between bounding sections}}$$

(where "dist." and "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" WSEL, 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 Table C-2 to determine 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

Final topwidth condition	Inner radius, feet	Outer radius, feet
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 whether either of these conditions hold:

a. Maximum topography elevation within the inner radius < "1-percent-minus" WSEL

b. Minimum topography elevation within the inner radius > "1-percent-plus" WSEL

If either condition is true, the point fails the inner radius horizontal check; proceed to the 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 WSEL using inner circle, "1-percent-plus" WSEL, "1-percent-minus" WSEL

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 whether either of these conditions are true:

a. Maximum topography elevation in the outer radius < "1-percent-minus" WSEL

b. Minimum topography elevation in the outer radius > "1-percent-plus" WSEL

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 WSEL using outer circle, "1-percent-plus" WSEL, "1-percent-minus" WSEL

Outputs: Score determination of 0.5 or zero.

After all points have been scored, 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 that 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 points 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 Zone VE/AE 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 (SWELs) 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 Coordinated Needs Management Strategy (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.

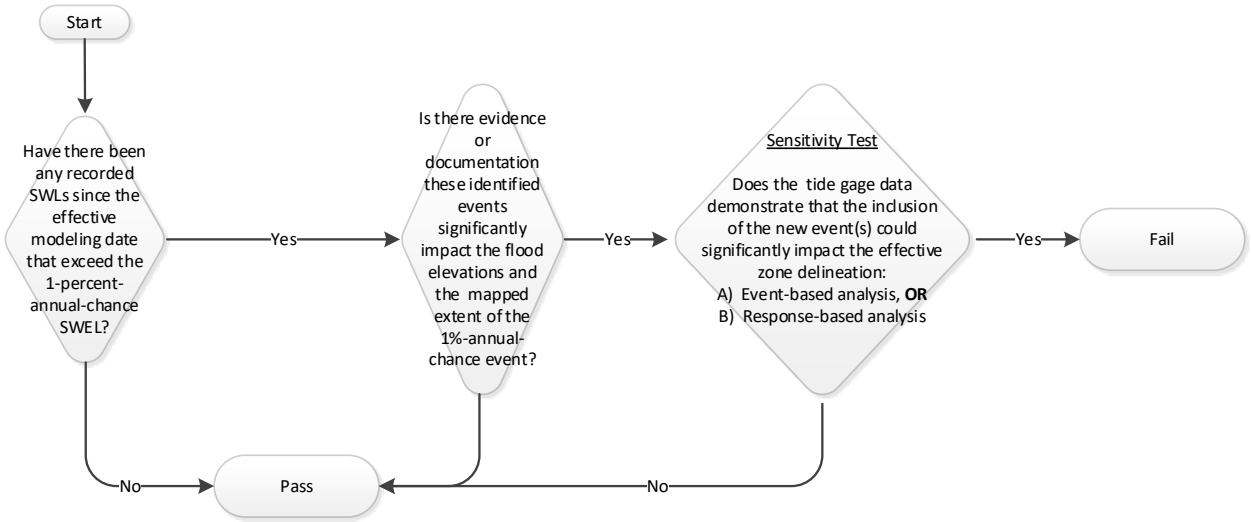
In the following checks, the study area for each effective study undergoing CNMS evaluation should be defined within the effective study results, documentation, and flood maps. The CNMS evaluation is typically applied to a single county, and in these instances, the study area refers to the county boundaries. 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 stillwater level (SWL) exceeds the 1-percent-annual-chance stillwater elevation (SWEL) (i.e., the 100-year SWEL)?	Critical
2. Have any potentially statistically significant storm intensity data been produced 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 Special Flood Hazard Area (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 letters of map revision (LOMRs) indicate that the current base flood elevations (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	Seven Critical; Six 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 stillwater level (SWL) exceeds the 1-percent-annual-chance SWEL (i.e., the 100-year SWEL)?



*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.

Figure D-1: Evaluation Process for Gage 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 Flood Insurance Rate Map (FIRM) accurately capture the 1-percent-annual-chance SWEL. A large storm with a significantly high 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 whether 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 in which a tide gage analysis was used to determine the 1-percent-annual-chance SWEL. This check does not apply to studies in which a numerical model (e.g., the Advanced Circulation (ADCIRC) model) was used to determine the 1-percent-annual-chance SWEL. Studies that used data from a numerical model to determine the 1-percent-annual-chance SWEL will automatically pass this critical check. These include studies in Regions 3, 4, and 6.

To begin this critical check, a reviewer will first review tide gage data that have 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 in Figure D-1. 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 Check13 as described in section D-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 the National Oceanic and Atmospheric Administration (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 whether 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 that there is a separate sensitivity test for each. Differences between the two sensitivity tests are described below.

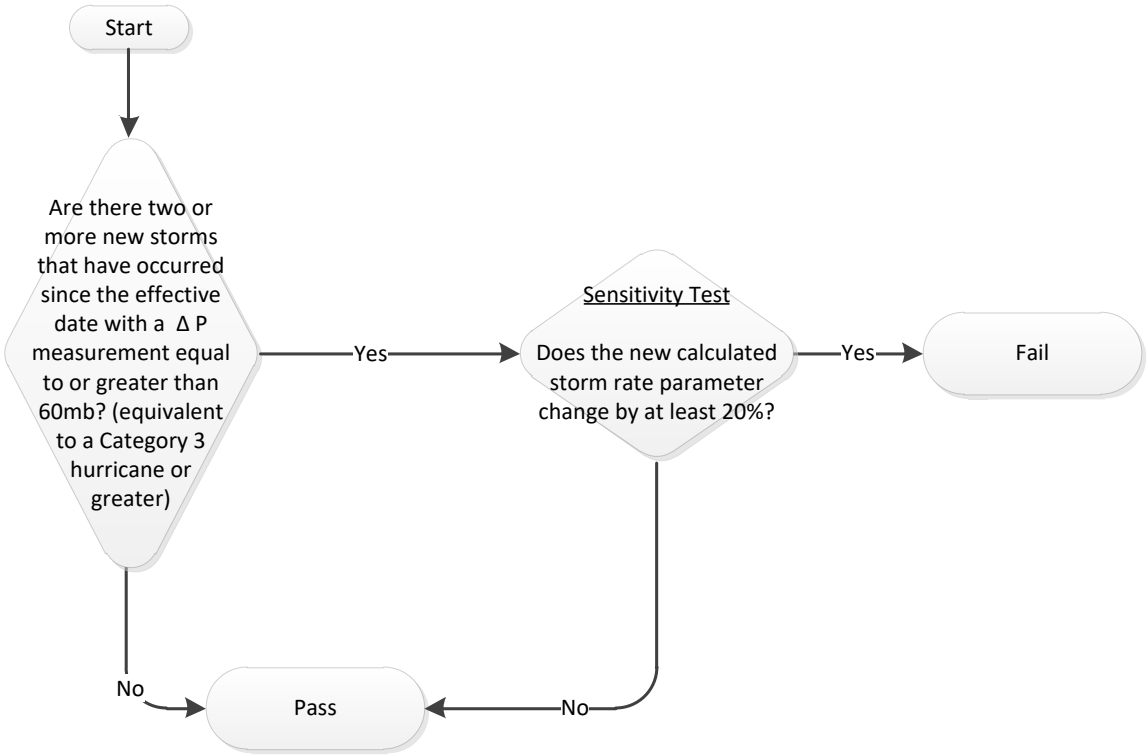
- Event-Based Analysis: In this test, the reviewer will construct a time series of tide gage data. The time series will include all data used for the effective study and the additional data up to and including the storm SWL record(s). The reviewer will then conduct an EVA on the time series using the 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.

- 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. Areas of the open coast, where the 1-percent-annual-chance total water level (TWL) is mapped, would not need to be restudied 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: Have any potentially statistically significant storm intensity data been produced since the effective modeling?



*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.

Figure D-2: Evaluation Process for Storm Data

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 2, 3, 4, 6, and Region 9. 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 millibars 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 millibars. 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 whether 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 percent 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 percent, the study passes this critical check. If the storm rate parameter has increased by at least 20 percent, 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?

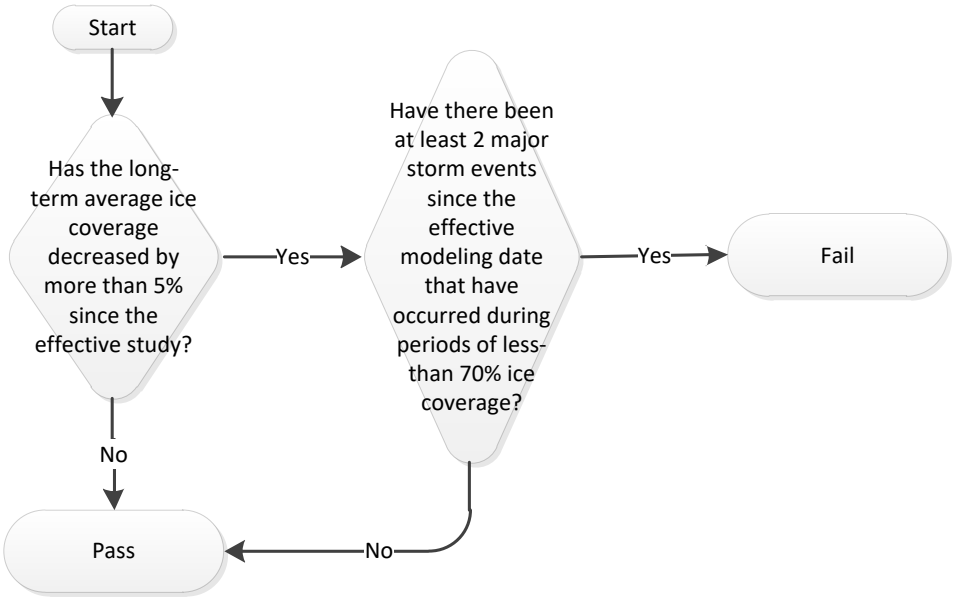


Figure D-3: Evaluation Process for Great Lakes Ice Coverage

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 percent, 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 percent 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 percent 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 percent, the effective study passes this critical check. If the long-term average has decreased by at least 5 percent, 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 percent, the reviewer looks for two major storm events that have occurred during a period of less than 70 percent 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 percent 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/. This site offers 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 percent. 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?

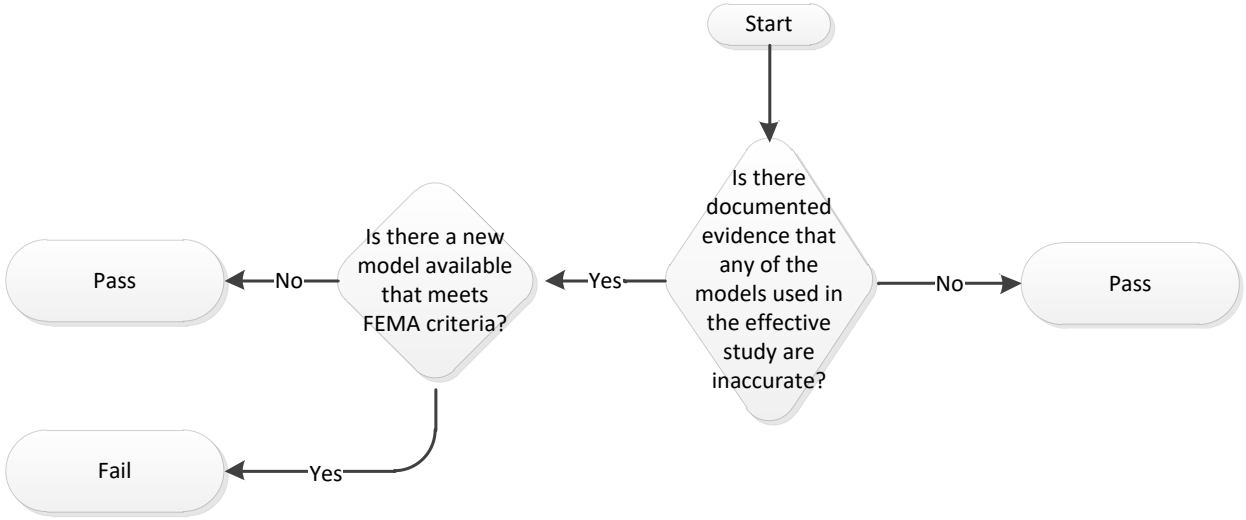


Figure D-4: Evaluation Process for One- or Two-Dimensional Models

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 whether 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 Title 44 of the Code of Federal Regulations Section 65.6(a)(6) of the National Flood Insurance Program (NFIP) regulations. The regulations explain the conditions under which a computer model can be used for flood hazard mapping in the NFIP, including that the model must be:

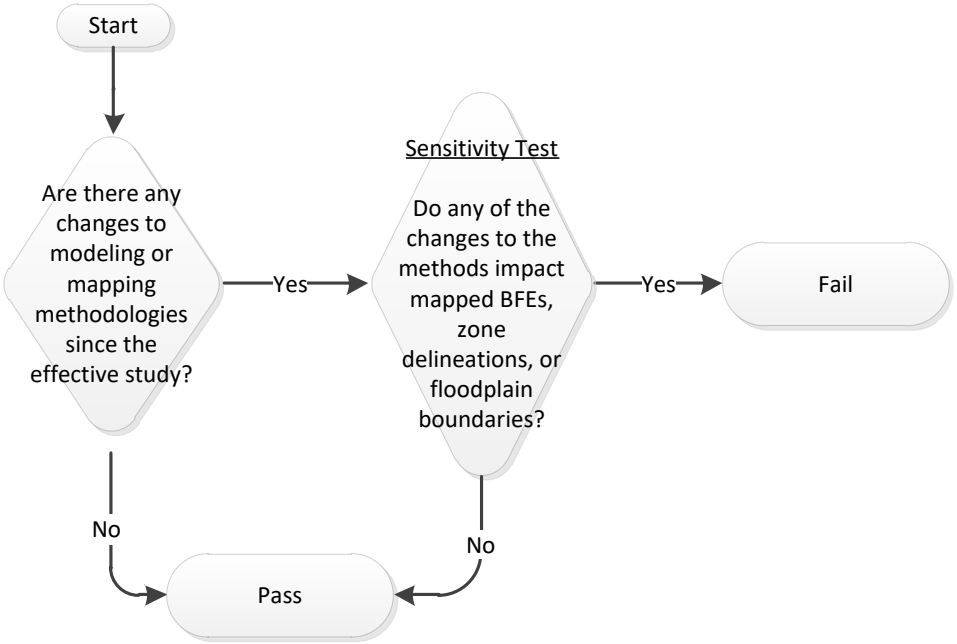
- Reviewed
- Tested and accepted by a government agency
- Well documented
- Available to FEMA and all stakeholders

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 whether 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?



*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.

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

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, these updates may potentially 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 Special Flood Hazard Area (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 whether 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/flood-maps/guidance-reports/guidelines-standards). 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 whether 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.

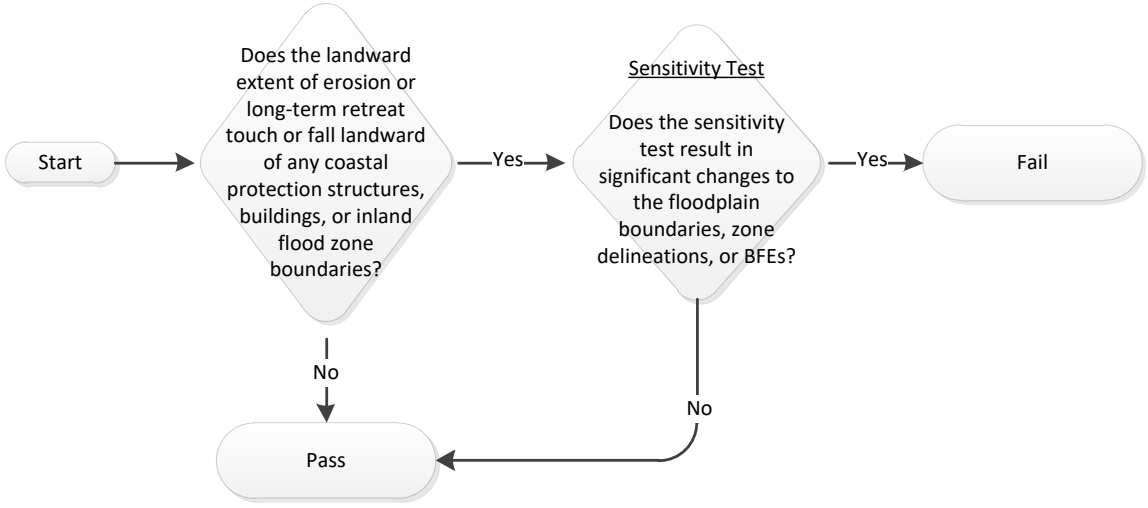
Changes in guidelines, standards, or best practices may only apply to specific regions, water body types, or specific coastal hazards (e.g., surge, erosion, overland wave propagation, wave runup and overtopping, tsunamis). If the study undergoing CNMS evaluation is outside the region where changes apply 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 Zone VE areas 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 whether 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?



*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.

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

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 from 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 Zone VE 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 Geographic Information System (GIS) data of the study area to determine whether 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 whether 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 Letter of Map Revision (LOMR) process.

The reviewer can also use technical reports that document substantial, event-based erosion for a particular study area to answer the first question in this critical check. The U.S. 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 in which 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?

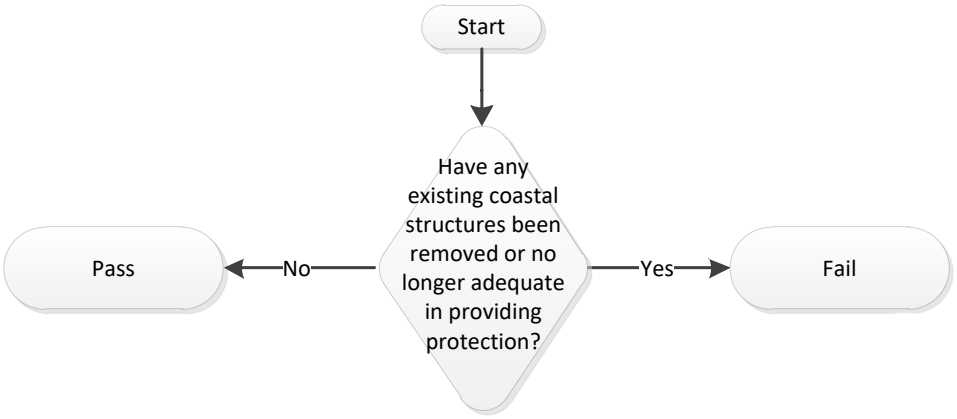


Figure D-7: Evaluation Process for Removal or Deterioration of Coastal Flood Protection Structures

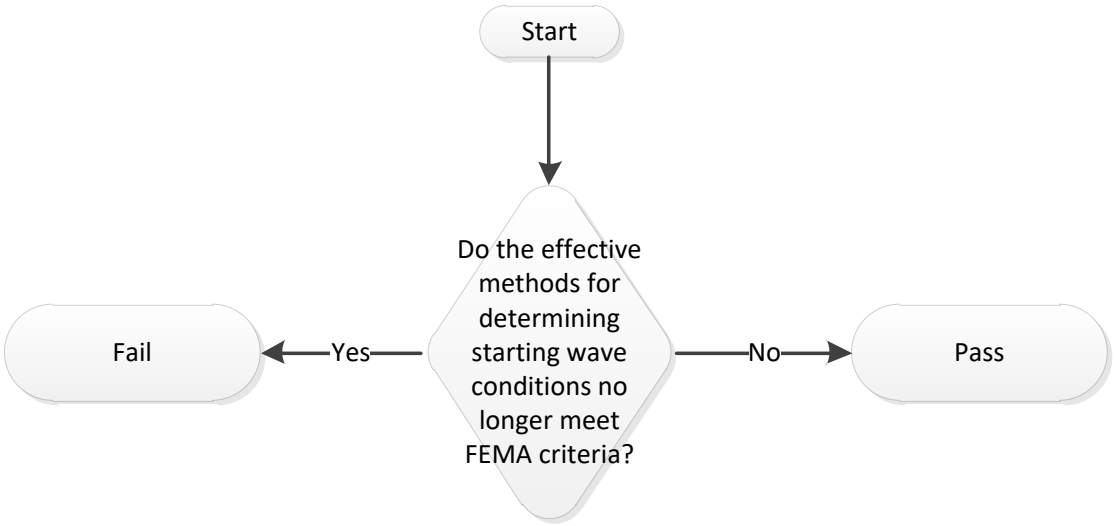
This critical check assesses the impacts that removal or deterioration of coastal protection structures has on the effective flood hazard mapping. Coastal protection structures consist of seawalls, revetments, coastal levees, or other structures that can provide flood protection during the 1-percent-annual-chance 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 that 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.

Accredited structure(s) that have been damaged during storm events are assumed to be 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 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?



FigureD-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 Title 44 of the Code of Federal Regulations Section 65.6(a)(6) of the NFIP regulations. The regulation paragraph explains the conditions under which a computer model can be used for flood hazard mapping in the NFIP, including that the model must be:

- Reviewed
- Tested and accepted by a government agency
- Well documented
- 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 whether 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?

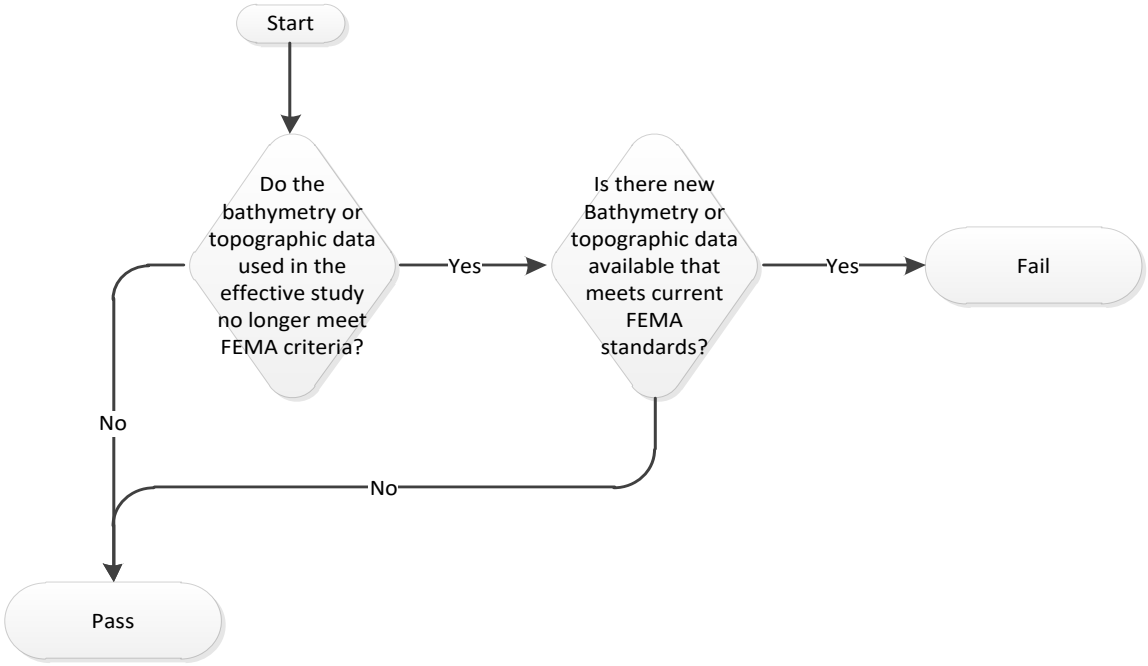


Figure D-9: Evaluation Process for Bathymetric and Topographic Data

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 used 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 datasets 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?

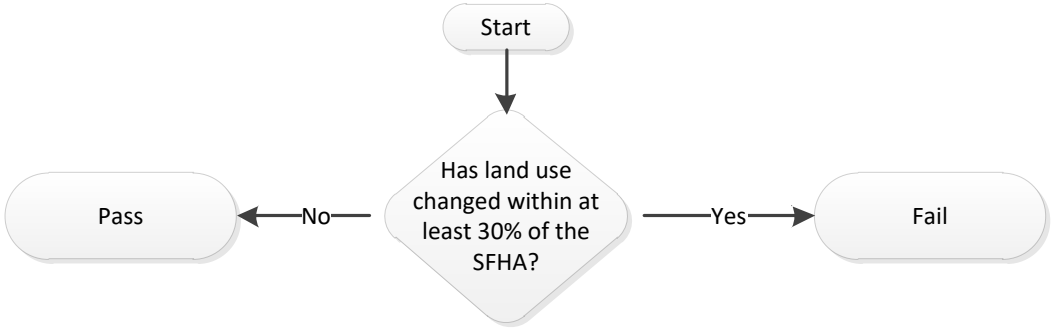


Figure D-10: Evaluation Process for Land Use Changes

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 whether at least 30 percent 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 used 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., Zones VE, AE, AO, and X). If less than 30 percent of the SFHA has switched land use, the study passes this check. If 30 percent or more of the SFHA has switched, the study fails this check.

This secondary check applies to effective studies in which 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?

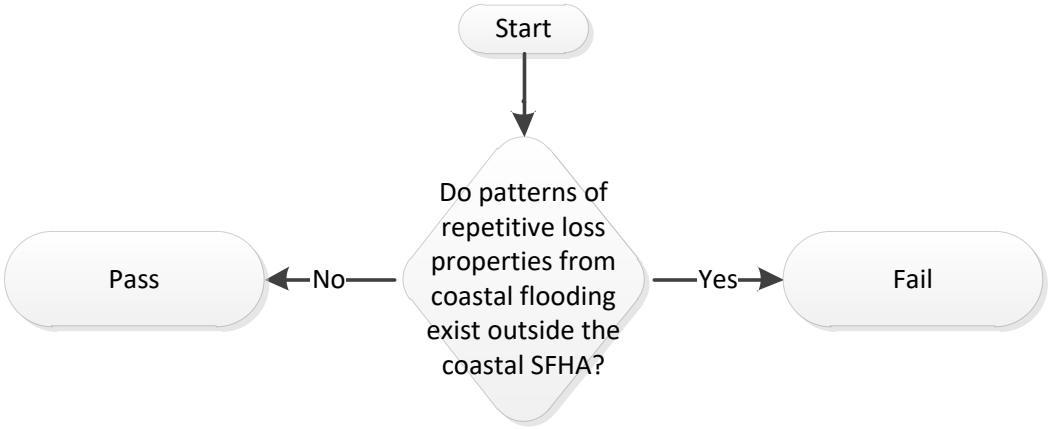


Figure D-11: Evaluation Process for Repetitive Loss Properties

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 whether 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 in which 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?

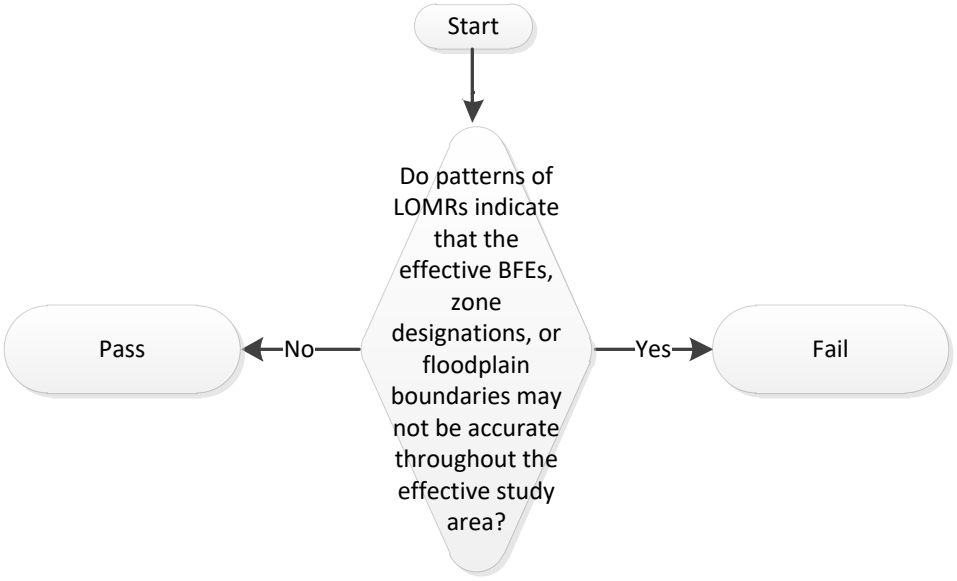


Figure D-12: Evaluation Process for LOMRs

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 whether there are general patterns of LOMRs due to coastal flooding that indicate 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, there is likely a larger, systematic issue with the analysis and mapping and the study fails this check. There is no specific number of LOMRs that 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 in which 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 HWMs been collected that exceed mapped BFEs and/or the inland extent of mapped SFHAs?

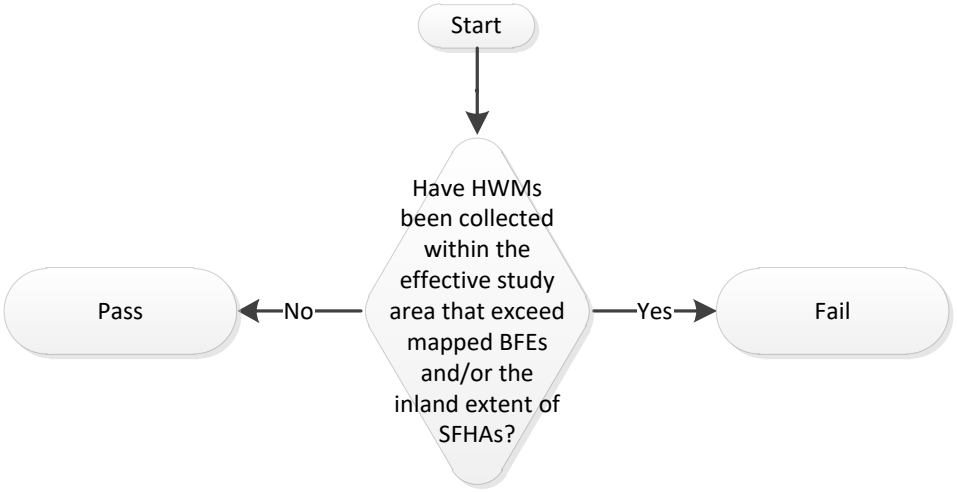


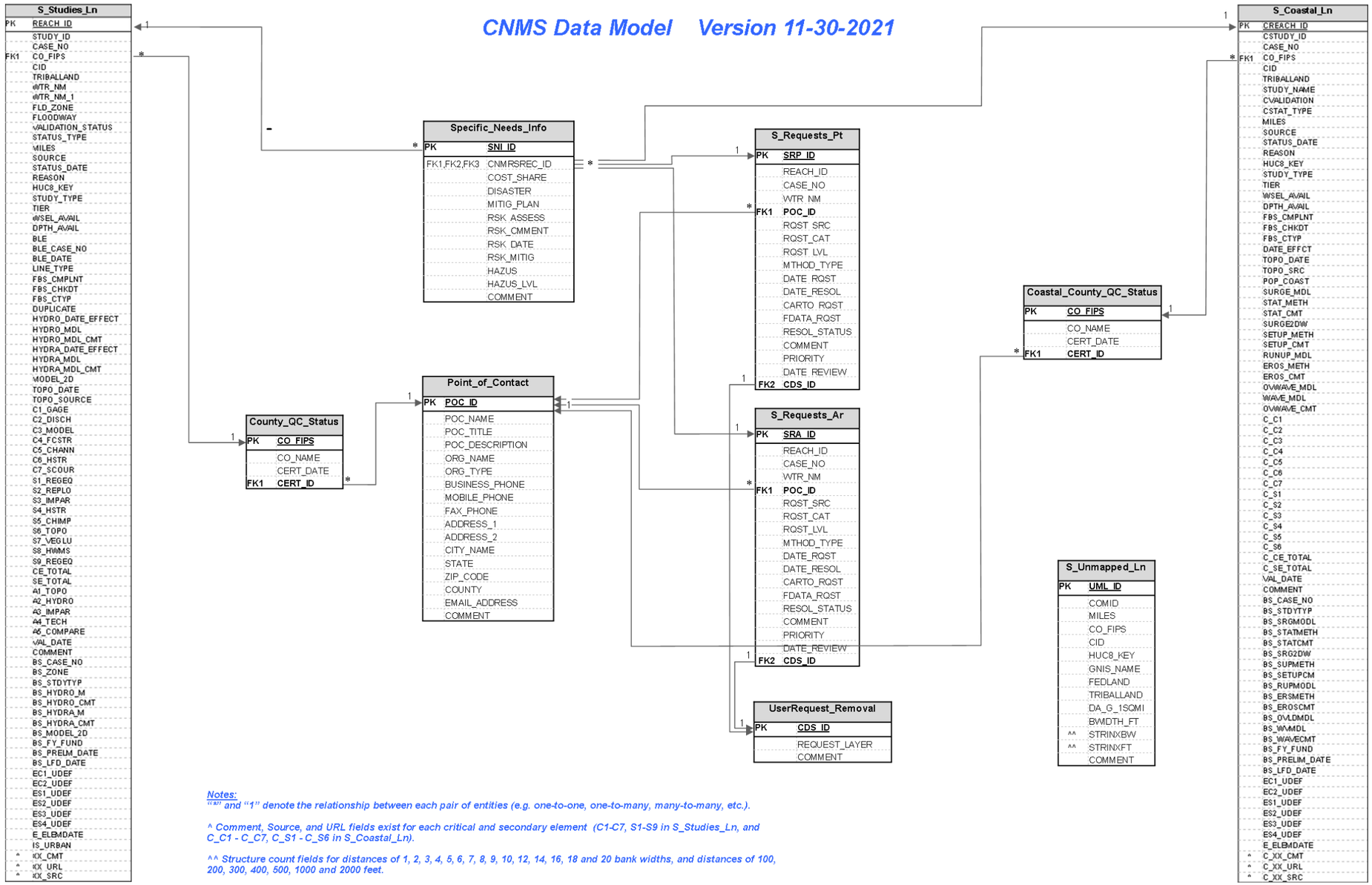
Figure D-13: Evaluation Process for High Water Marks

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 because of 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 whether 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 in which 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



Notes:
"1" and "1" denote the relationship between each pair of entities (e.g. one-to-one, one-to-many, many-to-many, etc.).

^ Comment, Source, and URL fields exist for each critical and secondary element (C1-C7, S1-S9 in S_Studies_Ln, and C_C1 - C_C7, C_S1 - C_S6 in S_Coastal_Ln).

^^ Structure count fields for distances of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18 and 20 bank widths, and distances of 100, 200, 300, 400, 500, 1000 and 2000 feet.

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 represents 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 that represent segments of the same study. This field can also be used to link multiple Reaches to external supporting data that is common among them. The expected relationship between this field and individual S_Studies_Ln features is 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. The MIP Case Number should only reflect effective studies with New or Updated Hydrologic and/or Hydraulic Analysis, including Type 1 LOMR studies. The MIP Case Number should *not* reflect an effective study for which redelineation or digital conversion alone was performed. If a MIP Case Number cannot be determined for older effective studies, this field may also be populated with the standard entries of "PRE-MAP MOD" (before 2005) or "UNKNOWN POST-MAP MOD" (2005 and after).	Yes	String	12	—
Type of data expected	E.g., "10-05-3616S". This case number should be that of the effective study. "Effective study" for CNMS purposes includes a study that has reached LFD Issuance.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				

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

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	Linking project data. MIP Case Number also informs the Fiscal Year the study was funded. Fiscal Year is typically the year before the project case number date (first two digits).				
CO_FIPS	Federal Information Processing Standard code.	Yes	String	12	—
Type of data expected	5-digit FIPS code that 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 the state and/or county within which the data resides.				
CID	Community Identification Number.	Yes	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, FISs, FIRM panels, FIRM indexes.				
Anticipated use for attribute	Catalog and referencing.				
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; FEMA Community Layer 2020 v4.				
Anticipated use for attribute	Used for program planning awareness and outreach.				
WTR_NM	Name of flooding source.	Yes	String	50	—
Type of data expected	Water feature name (e.g., "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, 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.				

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

Field	Description	Required	Type	Length	Domain
WTR_NM_1	Alternate name of flooding source.	No	String	50	—
Type of data expected	Water feature name (e.g., "Mississippi River", "Lake Superior", "Pacific Ocean").				
Potential source to obtain	An alternative name of a flooding source identified from the sources identified for the 'WTR_NM' field can 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 (e.g., "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 on 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.				
FLOODWAY	Is there a regulatory floodway? ("False (No)" / "True (Yes)")	Yes	String	10	D_TrueFalse
Type of data expected	This field is based upon domain lookup table D_TrueFalse.				
Potential source to obtain	Floodways depicted on the FIRM and/or FIRM Database of the NFIP.				
Anticipated use for attribute	Tracking presence of regulatory floodways. Regions may use to distinguish between Detailed Studies (w/ Floodway) and Limited Detailed Studies/Enhanced Approximate Studies (w/o Floodway).				
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.				

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

Field	Description	Required	Type	Length	Domain
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 (e.g., 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 (e.g., NFHL, 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.				
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. When redelineations and digital conversions reach LFD Issuance, the STATUS DATE will be restored to the original date of validation. Source of this date is VAL_DATE (if populated) or historical versions of the regional database. 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). Note that VAL_DATE will also be updated at validation assessment completion. 3. When a new or updated study is initiated (including redelineations and digital conversions), the STATUS_DATE is updated (current date) at each of the various CNMS touchpoints (Scoping, Production, and Preliminary 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 (e.g., "01/01/2022").				
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 ensure all requirements are being adhered to according to mandates set forth within the NFIP.				

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

Field	Description	Required	Type	Length	Domain
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 are 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-1: S_Studies_Ln (Table ID Code: 01)

Field	Description	Required	Type	Length	Domain
TIER	A tracking method within the 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 one 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 the CNMS and/or referencing the effective FIS.				
Anticipated use for attribute	To categorize CNMS studies into five Tiers.				
WSEL_AVAIL	Tracks availability of Water Surface Elevation (WSEL) grids and whether 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 whether 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 FEMA's 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_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". If a MIP Case Number has not yet been assigned to a study, field can be populated with the entry "PTS FUNDED" or "CTP FUNDED".				

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

Field	Description	Required	Type	Length	Domain
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data.				
BLE_DATE	Date of the completed hydraulic analysis of BLE or LSAE study. If study is ongoing or recently funded use "01/01/2050" until analysis is completed.	No	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 online geometry source.				
Anticipated use for attribute	Attribute will allow for the identification of non-riverine flooding sources that 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 Riverine studies.				
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	RSCs 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/MIP 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 (e.g., "01/01/2022").				
Potential source to obtain	RSCs and /or TSDN. This is typically submitted around QR3 and no later than 30 days after Preliminary Issuance.				
Anticipated use for attribute	Tracks attribution of latest FBS compliance value.				

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

Field	Description	Required	Type	Length	Domain
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
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 representing the same Reach along Regional boundaries should be attributed as "CATEGORY 3", 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 > Unmapped (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 two 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 Elements failing). If effective date of engineering study is the same for both counties, priority can be determined by most recent date of published effective FIS. 5. If both Reaches are Zone X and only one Reach is Being Studied, the Being Studied Reach should be set to "CATEGORY 1." If both Zone X Reaches are Being Studied, then the Reach with the more recent Status Date can be set to "CATEGORY 1", though this distinction is not crucial at this level of study.				

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

Field	Description	Required	Type	Length	Domain
Potential source to obtain	While completing this field, one must check the same stream on the neighboring county to see whether 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 are sparse. Data should be entered in the MM/DD/YYYY format. This date should be earlier than or on the same day as the Hydraulic modeling date for the same study.				
Potential source to obtain	The date of the hydro effective analysis can be found in the project's hydrology report or 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 FIS text and the second is the TSDN for the study. A complete domain list of Hydrologic Models recognized by FEMA can be accessed on FEMA's 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	FIS.				
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	—	—

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

Field	Description	Required	Type	Length	Domain
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 are 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 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 FIS text and the second is the TSDN for the study. A complete domain list of Hydraulic Models recognized by FEMA can be accessed on FEMA's MIP and FEMA's website.				
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	FIS.				
Anticipated use for attribute	Additional comments pertaining to the model or indicating a model used not part of domain list.				
MODEL_2D	Is the model type used 2D? ("False (No") / "True (Yes)" / "Unknown").	Yes	String	10	D_TrueFalse
Type of data expected	This field is based upon domain lookup table D_TrueFalse.				
Potential source to obtain	FIS.				
Anticipated use for attribute	To track the availability of 2D models.				
TOPO_DATE	Date the topography dataset was collected or completed.	Yes	Date	—	—
Type of data expected	This field will allow users to know the time period of the topography dataset that was used to create the new or updated effective modeling. This date should be earlier than or the same date as the Hydraulic modeling date for the same study, except for redelineated studies. For cases of redelineation, this date should be the date of the topography used to redelineate the SFHA, which may be later than the Hydraulic modeling date.				
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 are used in conjunction for a number of assessment checks.				
TOPO_SRC	The source of the LiDAR or topography dataset used to create the new or updated effective modeling. For cases of redelineation, use the topographic source that was used to redelineate the SFHA.	Yes	String	255	—

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

Field	Description	Required	Type	Length	Domain
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. Redelineation studies and the date performed are also noted in this field.				
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 are not available but other precipitation indicators are available.	No	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)?	No	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.				
Potential source to obtain	Look at the years of record for each gage. The FIS may tell 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 whether 100-year discharge obtained by running PeakFQ at effective date is still within 68% confidence interval of the Bullet 17B 100-year 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)?	No	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 meets 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.				

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

Field	Description	Required	Type	Length	Domain
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)?	No	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)?	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not any channel reconfiguration outside the effective SFHA have been observed since the effective analysis was completed.				
Potential source to obtain	NAIP or DOQQ imagery can be used to determine whether the mapped SFHAs 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.				
C6_HSTR	Critical Element 6, Hydraulic Change 2. Five or more new or removed hydraulic structures (bridge/culvert) that impact BFEs (PASS/FAIL/UNKNOWN)?	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not five 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 five or more structures (i.e., three new and three removed). This should not be used to supersede the Letter of Map Revision (LOMR) 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)?	No	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.				

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

Field	Description	Required	Type	Length	Domain
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)?	No	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 four 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)?	No	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 four or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
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)?	No	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 four or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S4_HSTR	Secondary Element 4, Hydraulic Structure. More than one and less than five new or removed hydraulic structures (bridge/culvert) impacting BFEs (PASS/FAIL/UNKNOWN)?	No	Short Integer	—	D_ELEMENT
Type of data expected	This PASS/FAIL field is to capture whether or not there have been one to four 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 (LOMR) 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 four 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
S5_CHIMP	Secondary Element 5, Channel Improvements. Channel improvements / shoreline changes (PASS/FAIL/UNKNOWN)?	No	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 (LOMR) 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 four or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S6_TOPO	Secondary Element 6, Topography Data. Significant Topography Update Check..	No	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 detailed modeling and mapping.				
Potential source to obtain	A new topographic data source for the study area of the effective detailed study must be available that meets or exceeds the requirements for vertical accuracy described in Program Standard 43.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S7_VEGLU	Secondary Element 7, Vegetation or Land Use. Changes to vegetation or land use (PASS/FAIL/UNKNOWN)?	No	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 whether the area has experienced changes to vegetation or land use.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
S8_HWMS	Secondary Element 8, High Water Mark. Significant storms with High Water Mark (HWMs) (PASS/FAIL/UNKNOWN).	No	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 (HWM) 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 four 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
S9_REGEQ	Secondary Element 9, Regression Equation. New regression equations available (PASS/FAIL/UNKNOWN)?	No	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 four or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
CE_TOTAL	Total number of Critical Elements.	No	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 VALID vs. UNVERIFIED; UNVERIFIED is CE_Total > 0.				
SE_TOTAL	Total number of Secondary Elements.	No	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 VALID vs. UNVERIFIED; UNVERIFIED is SE_Total >= 4.				
A1_TOPO	Zone A Initial Assessment Check A1. Significant Topography Update Check.	No	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 are available, then the Validation Status may be changed to UNVERIFIED.				
A2_HYDRO	Zone A Initial Assessment Check A2. Significant Hydrology Change Check.	No	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.				

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

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	A determination of FAIL for this initial assessment would trigger a BLE/LSAE data comparison; if no BLE/LSAE data are available, then the Validation Status may be changed to UNVERIFIED.				
A3_IMPAR	Zone A Initial Assessment Check A3. Significant Development Check (NUCI Analysis).	No	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 are available, then the Validation Status may be changed to UNVERIFIED.				
A4_TECH	Zone A check A4. Check of studies backed by technical data.	No	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 whether 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.				
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.				
VAL_DATE	Date when validation assessment of a study (S1 through S9 and C1 through C7 OR A1 through A4 OR A5) is completed (current date).	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	The contractor who performs the validation assessment should populate this field upon completion.				

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

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	This field will document the date the validation assessment was completed for a study. It should only be populated at that time and should not be overwritten or cleared until the study is subsequently revalidated at a later date OR reaches LFD Issuance OR incorporates a new Type 1 LOMR.				
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.	No	String	12	—
Type of data expected	E.g., "10-05-3616S". If a MIP Case Number has not yet been assigned to a study, populate the field with the entry "PTS FUNDED" or "CTP FUNDED".				
Potential source to obtain	FEMA 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.	No	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.	No	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_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 modeling information of a study currently in progress.				
BS_HYDRO_CMT	Being Studied Hydrologic model comment.	No	String	255	—

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

Field	Description	Required	Type	Length	Domain
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 modeling information 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_MODEL_2D	Is the model type used 2D? ("False (No)" / "True (Yes)" / "Unknown").	No	String	10	D_TrueFalse
Type of data expected	This field is based upon domain lookup table D_TrueFalse.				
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.				
Anticipated use for attribute	To track the availability of 2D models.				
BS_FY_FUND	Attribute of the most recent effective FEMA fiscal year funding applied to the stream Reach at the time of study (e.g., Watershed, county).	No	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_PRELIM_DATE	Expected Preliminary Issuance date for Reaches representing areas being actively studied.	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use "01/01/2049" as a default placeholder for Preliminary Issuance date.				
Anticipated use for attribute	Stores the expected Preliminary Issuance date of a study currently in progress.				
BS_LFD_DATE	Expected LFD Issuance date for Reaches representing areas being actively studied.	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				

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

Field	Description	Required	Type	Length	Domain
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use "01/01/2050" 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 that have been deemed Critical. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
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 that have been identified as using 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 that have been deemed Critical. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
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 that have been identified as using 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 that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 (e.g., "01/01/2022").				
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.				

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

Field	Description	Required	Type	Length	Domain
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).				
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.				
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.				
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. The MIP Case Number should only reflect effective studies with New or Updated Hydrologic and/or Hydraulic Analysis, including Type 1 LOMR studies. The MIP Case Number should *not* reflect an effective study for which redelineation or digital conversion alone was performed. If a MIP Case Number cannot be determined for older effective studies, this field may also be populated with the standard entries of "PRE-MAP MOD" (before 2005) or "UNKNOWN POST-MAP MOD" (2005 and after).	Yes	String	12	—
Type of data expected	For example, "10-05-3616S". This case number should be that of the effective study. "Effective study" for CNMS purposes includes a study that has reached LFD Issuance.				
Potential source to obtain	FEMA MIP.				
Anticipated use for attribute	Linking project data.				
WTR_NM	Name of flooding source.	Yes	String	100	—
Type of data expected	Water feature name (e.g., "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				

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

Field	Description	Required	Type	Length	Domain
	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, 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.				
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.				

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

Field	Description	Required	Type	Length	Domain
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.				
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	RSC or relevant Study Managers. Date should represent the date of effective analysis for the study of the associated Reach that 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 related to flood data. 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.				
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.				

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

Field	Description	Required	Type	Length	Domain
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 (Esri file geodatabase) is provided in the North American Datum of 1983 (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.	Yes	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; FEMA Community Layer 2020 v4.				
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 one 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	During initial development of S_Unmapped_Ln, an estimated statistical channel bank width was calculated for each line based on a relationship between bank width 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). For all newly added features, this value can be obtained from the corresponding stream in the NHDPlus dataset (based on COMID) or estimated by the mapping partner if COMID is not available.				
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 bank widths.	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. PTS will update annually.				

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

Field	Description	Required	Type	Length	Domain
Anticipated use for attribute	To help prioritize flooding sources for program planning needs.				
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. PTS will update annually.				
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? ("False (No") / "True (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? ("False (No") / "True (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. In addition, 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? ("False (No") / "True (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? ("False (No") / "True (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 FGDB QC Tool.	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	This field will be populated by the CNMS FGDB 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 FGDB 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 FGDB 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 five record counting digits with the five-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 four 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.).				
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.				
ADDRESS_1	The first line of the point of contact's address.	Yes	String	75	—

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

Field	Description	Required	Type	Length	Domain
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.				
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.				
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.				

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

Field	Description	Required	Type	Length	Domain
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.	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 CREACH_ID of a single Reach among a group of related Reaches.				
Anticipated use for attribute	Key field used to link multiple Reaches that represent segments of the same study. This field can also be used to link multiple Reaches to external supporting data that are 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. The MIP Case Number should only reflect effective studies with New or Updated Hydrologic and/or Hydraulic Analysis. The MIP Case Number should *not* reflect an effective study for which redelineation or digital conversion alone was performed. If a MIP Case Number cannot be determined for older effective studies, this field may also be populated with the standard entries of "PRE-MAP MOD" (before 2005) or "UNKNOWN POST-MAP MOD" (2005 and after.	Yes	String	12	—
Type of data expected	E.g., "10-05-3616S". This case number should be that of the effective study. "Effective study" for CNMS purposes includes a study that has reached LFD Issuance.				
Potential source to obtain	FEMA Mapping Information Platform (MIP).				
Anticipated use for attribute	Linking project data. MIP Case Number also informs the Fiscal Year the study was funded. Fiscal Year is typically the year before the project case number date (first two digits).				
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-7: S_Coastal_Ln (Table ID Code: 08)

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 what state and/or county the data resides in.				
CID	Community Identification Number.	Yes	String	12	—
Type of data expected	A unique 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.				
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; FEMA Community Layer 2020 v4.				
Anticipated use for attribute	Used for program planning awareness and outreach.				
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.				

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

Field	Description	Required	Type	Length	Domain
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.				
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 (e.g., 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 dataset.				
Anticipated use for attribute	Verify and document source of coastal linework used.				

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

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. When redelineations and digital conversions reach LFD Issuance, the STATUS DATE will be restored to the original date of validation. Source of this date is VAL_DATE (if populated) or historical versions of the regional database. 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). Note that VAL_DATE will also be updated at validation assessment completion. 3. When a new or updated study is initiated (including redelineations and digital conversions), the STATUS_DATE is updated (current date) at each of the various CNMS touchpoints (Scoping, Production, and Preliminary 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 (e.g., "01/01/2022").				
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 ensure all requirements are being adhered to according to mandates set forth within the NFIP.				
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.				

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

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 the 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 one 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 the CNMS and/or referencing the effective FIS.				
Anticipated use for attribute	To categorize CNMS studies into five 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-7: S_Coastal_Ln (Table ID Code: 08)

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.				
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.				
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 (e.g., "01/01/2022").				
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 are 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.				

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

Field	Description	Required	Type	Length	Domain
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 to know the time period of the topography dataset that was used to create the new or updated effective modeling. This date should be earlier than or the same date as the Hydraulic modeling date for the same study, except for redelineated studies. For cases of redelineation, this date should be the date of the topo used to redelineate the SFHA, which may be later than the Hydraulic modeling date.				
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 used to create the new or updated effective modeling. For cases of redelineation, use the topo source that was used to redelineate the SFHA. Redelineation studies and the date performed are also noted in this field.	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.				
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.				

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

Field	Description	Required	Type	Length	Domain
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 "False (No)" / "True (Yes)" / "Unknown" 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.				
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.				

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

Field	Description	Required	Type	Length	Domain
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.				
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_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.				
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.				

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

Field	Description	Required	Type	Length	Domain
WAVE_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.				
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.				

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

Field	Description	Required	Type	Length	Domain
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 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 three 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_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 three or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
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 three 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 three 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 three or more Secondary Elements establishes a CNMS record as UNVERIFIED.				
C_S6	Secondary Element 6, Evidence of FIRM Inaccuracy. High Water Marks. Have 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 three 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_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.				
VAL_DATE	Date when validation assessment of a study (C_C1 through C_C7 and C_S1 through C_S6) is completed (current date).	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	The contractor who performs the validation assessment should populate this field upon completion.				
Anticipated use for attribute	This field will document the date validation assessment was completed for a study. It should only be populated at that time and should not be overwritten or cleared until the study is subsequently revalidated at a later date OR reaches LFD Issuance.				
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.	No	String	12	—
Type of data expected	E.g., "10-05-3616S". If a MIP Case Number has not yet been assigned to a study, field can be populated with the entry "PTS FUNDED" or "CTP FUNDED".				
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.	No	String	255	D_STUDY_TYPE

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

Field	Description	Required	Type	Length	Domain
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.				
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_SUPCMT	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).				

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

Field	Description	Required	Type	Length	Domain
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_ERSCMT	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_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_WVCMT	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_FY_FUND	Attribute of the most recent effective FEMA fiscal year funding applied to the stream Reach at the time of study (e.g., 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_PRELIM_DATE	Expected Preliminary Issuance date for Reaches representing areas being actively studied.	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use "01/01/2049" as a default placeholder for Preliminary Issuance date.				
Anticipated use for attribute	Stores the expected Preliminary Issuance date of a study currently in progress.				
BS_LFD_DATE	Expected Letter of Final Determination (LFD) Issuance date for Reaches representing areas being actively studied.	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	MIP, other pending guidance. If a projection or estimate is not available for scoped projects, use "01/01/2050" 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 that have been deemed Critical. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
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 that have been identified as using 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 that have been deemed Critical. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				

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

Field	Description	Required	Type	Length	Domain
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 that have been identified as using 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 that have been deemed Critical. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 based upon domain lookup table D_ELEMENT is to capture the results of additional Region-specific validation processes that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using the Extra Elements, ES3_UDEF will contribute to the Secondary Element count.				

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

Field	Description	Required	Type	Length	Domain
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 that have been deemed Secondary. User-defined elements should be leveraged with permission from the respective FEMA Regional Office.				
Potential source to obtain	Dependent upon Element definition.				
Anticipated use for attribute	Any combination of four or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties that have been identified as using 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 (e.g., "01/01/2022").				
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.				
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 FGDB QC Tool.	No	Date	—	—
Type of data expected	Calendar date (e.g., "01/01/2022").				
Potential source to obtain	This field will be populated by the CNMS FGDB 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 FGDB 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 FGDB 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. Performing field calculations using proper domain codes and ArcGIS "Field Calculator" will avoid incorrectly entered text values that result in CNMS File Geodatabase Quality Control Tool errors.

Acceptable Null Values (Non-Required Fields Only):

All non-populated fields must be field calculated using the value NULL (VB parser) or None (python parser) with no quotes. This includes all field types including text, numeric, date, and domain. There should be no blank/empty text values in the database.

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
FY16	FISCAL YEAR 2016 FUNDED

Fiscal Year Funded	
Coded Value	**Name**
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	HIGHWATER MARKS
ADVANCED ICPR 2.20 (OCTOBER 2000)	HISTORICAL FLOOD DATA
B-292	HY8
B-MAN NORMAL DEPTH ANALYSIS PROGRAM	HY8 4.1
CHAN FOR WINDOWS 2.03 (1997)	HY8 6.0
CRITICAL DEPTH METHOD	ICPR
CULVERT ANALYSIS	ICPR 3.02 (NOVEMBER 2002)
CULVERT MASTER	ICPR 3.10 (APRIL 2008)
CULVERT MASTER 2.0 (SEPTEMBER 2002)	ICPR 4 (2014)
DAMBRK	J-635
DEPTH FREQUENCY METHOD	LAKE ROUTING ANALYSIS
DEPTH-DISCHARGE RATING CURVE	LRD-1
DHM	MIKE 11
DHM 21 (AUGUST 1987)	MIKE 11 HD (2002 D)
DHM 34 (AUGUST 1987)	MIKE 11 HD (2004)
DWOPER	MIKE 11 HD (JUNE 1999)
E431	MIKE FLOOD HD
FAN	MIKE FLOOD HD (2002 D)

Hydraulic Model	
FEQ	MIKE FLOOD HD (2004)
FEQ 8.92 (1997)	MIKE FLOOD HD (2009)
FEQ 8.92 (1999)	NETWORK
FEQ 9.98 (2005)	NETWORK (JUNE 2002)
FEQUTL	NORMAL DEPTH
FEQUTL 4.68 (1997)	NUDALLAS
FEQUTL 4.68 (1999)	OTHER
FEQUTL 5.46 (2005)	PONDPACK
FESWMS 2DH	PONDPACK V 8 (MAY 2002)
FESWMS 2DH 1.1 (JUNE 1995)	PSUPRO
FLDWAV	QUICK
FLDWAV (NOVEMBER 1998)	QUICK-2 1.0
FLDWY	QUICK-2 2.0
FLDWY (MAY 1989)	S2DMM
FLO-2D	S2DMM (FEBRUARY 2005)
FLO-2D 2003.6	SFD
FLO-2D 2004.10	SHEET 2D 9 (JULY 2000)
FLO-2D 2006.1	SHEET 2D9
FLO-2D 2007.06	SLOPE-AREA METHOD
FLO-2D V.2000.11 (DECEMBER 2000)	SOCH
FLO-2D PRO	SRH-2D
GLWRM	STORMCAD
HCSWMM	STORMCAD V 4 (JUNE 2002)
HCSWMM 4.31B (AUGUST 2000)	SWMM
HEC-2	SWMM 3.0
HEC-2 (1983)	SWMM 3.3
HEC-2 4.6.2 (MAY 1991)	SWMM 4.0
HEC-RAS (1D)	SWMM 4.30 (MAY 1994)
HEC-RAS (2D)	SWMM 4.31 (JANUARY 1997)
HEC-RAS 2.2 (SEPTEMBER 1998)	SWMM 5 V 5.0.005 (MAY 2005)
HEC-RAS 3.0.1	TABS-RMA2
HEC-RAS 3.1.1	TABS-RMA4
HEC-RAS 3.1.3	TUFLOW
HEC-RAS 4.0	UNET
HEC-RAS 4.1	UNET 4.0 (APRIL 2001)
HEC-RAS 5.0	UNKNOWN
HEC-RAS 5.0.1	WSP-2
HEC-RAS 5.0.2	WSPGW
HEC-RAS 5.0.3	WSPGW 12.96 (OCTOBER 2000)
HEC-RAS 5.0.4	WSPRO
HEC-RAS 5.0.5	WSPRO (JUNE 1988)
HEC-RAS 5.0.6	XPSTORM
HEC-RAS 5.0.7	XPSTORM 10.0 (MAY 2006)

Hydraulic Model	
HEC RAS 6.0	XP-SWMM
HEC RAS 6.0.1	XP-SWMM 8.52

D_HYDRO

Hydrology Model	
2POND	HYMO
ADVANCED ICPR	ICPR
ADVANCED ICPR 2.20 (OCTOBER 2000)	ICPR 3.02 (NOVEMBER 2002)
AHYMO 97	ICPR 3.10 (APRIL 2008)
AHYMO 97 (AUGUST 1997)	ICPR 4 (2014)
API	LAKE ROUTING ANALYSIS
BULLETIN 13	LOG-PEARSON TYPE III ANALYSIS
BULLETIN 15	MIKE 11 RR
BULLETIN 17	MIKE 11 RR (2002 D)
BULLETIN 17A	MIKE 11 RR (2004)
BULLETIN 17B	MIKE 11 RR (JUNE 1999)
BULLETIN 17C	MIKE 11 UHM
CUHPF/PC	MIKE 11 UHM (2002 D)
CUHPF/PC (MAY 1996)	MIKE 11 UHM (2004)
CUHPF/PC (MAY 2002)	MIKE 11 UHM (JUNE 1999)
CYPRESS CREEK FORMULA	MIKESHE
DBRM	MITCAT
DBRM 3.0 (1993)	MODIFIED PULS ROUTING TECHNIQUES
DEPTH FREQUENCY METHOD	NUDALLAS
DISCHARGE VERSUS DRAINAGE AREA RELATIONS	OTHER
DR3M	PEAKFQ
DR3M (OCTOBER 1993)	PEAKFQ 2.4 (APRIL 1998)
FAN	PEAKFQ 2.5
FLO-2D	PEAKFQ 3.0
GAGE ANALYSIS	PEAKFQ 4.0
HEC-1	PEAKFQ 5.2
HEC-1 4.0.1	PEAKFQ 7.1
HEC-1 4.1	PEAKFQ-REGRESSION EQUATIONS
HEC-FFA	PONDPACK
HEC-FFA 3.1	PONDPACK V 8 (MAY 2002)
HEC-FFA-REGRESSION EQUATIONS	PRECIP
HEC-HMS	PRMS
HEC-HMS 1.1	PRMS 2.1 (JANUARY 1996)
HEC-HMS 2.0	RATIONAL METHOD
HEC-HMS 2.0.3	REGRESSION EQUATIONS
HEC-HMS 2.1.1	REGULATED FREQUENCY CURVES

Hydrology Model	
HEC-HMS 2.1.2	S2DMM
HEC-HMS 2.1.3	SIMFLOW
HEC-HMS 3.1	SNYDER METHOD
HEC-HMS 3.2	SOCH
HEC-HMS 3.3	SOIL CONSERVATION SERVICE NATIONAL ENGINEERING HANDBOOK
HEC-HMS 3.4	SQUARE ROOT OF THE DRAINAGE AREA METHOD
HEC-HMS 3.5	STATISTICAL METHODS IN HYDROLOGY
HEC-HMS 4.0	SWMM
HEC-HMS 4.1	SWMM 3.0
HEC-HMS 4.2	SWMM 3.3
HEC-HMS 4.3	SWMM 4.0
HEC-HMS 4.4	SWMM (RUNOFF) 4.30 (MAY 1994)
HEC-HMS 4.5	SWMM (RUNOFF) 4.31 (JANUARY 1997)
HEC-HMS 4.6	SWMM 5 V 5.0.005 (MAY 2005)
HEC-HMS 4.7	SWMM 5.1
HEC-HMS 4.8	TR-20
HEC-IFH	TR-20 (FEBRUARY 1992)
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
HEC RAS 6.0	VEN TE CHOW - B462
HEC RAS 6.0.1	WIN TR-55 1.0.08 (JANUARY 2005)
HIGHWATER; SLOPE AREA METHOD	WRC
HSPF	XPSTORM
HSPF 10.10	XPSTORM 10.0 (MAY 2006)
HSPF 10.11	XP-SWMM
HSPF 11.0	XP-SWMM 8.52

D_LINE_TYPE

Line Type
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
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

Preliminary Quarter			
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
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_STUDY	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

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 - AREA OF MINIMAL FLOOD HAZARD
X - 0.2-PCT-ANNUAL-CHANCE FLOOD HAZARD
X - 1-PCT DEPTH LESS THAN 1 FOOT
X - 1-PCT DRAINAGE AREA LESS THAN 1 SQUARE MILE

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

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

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

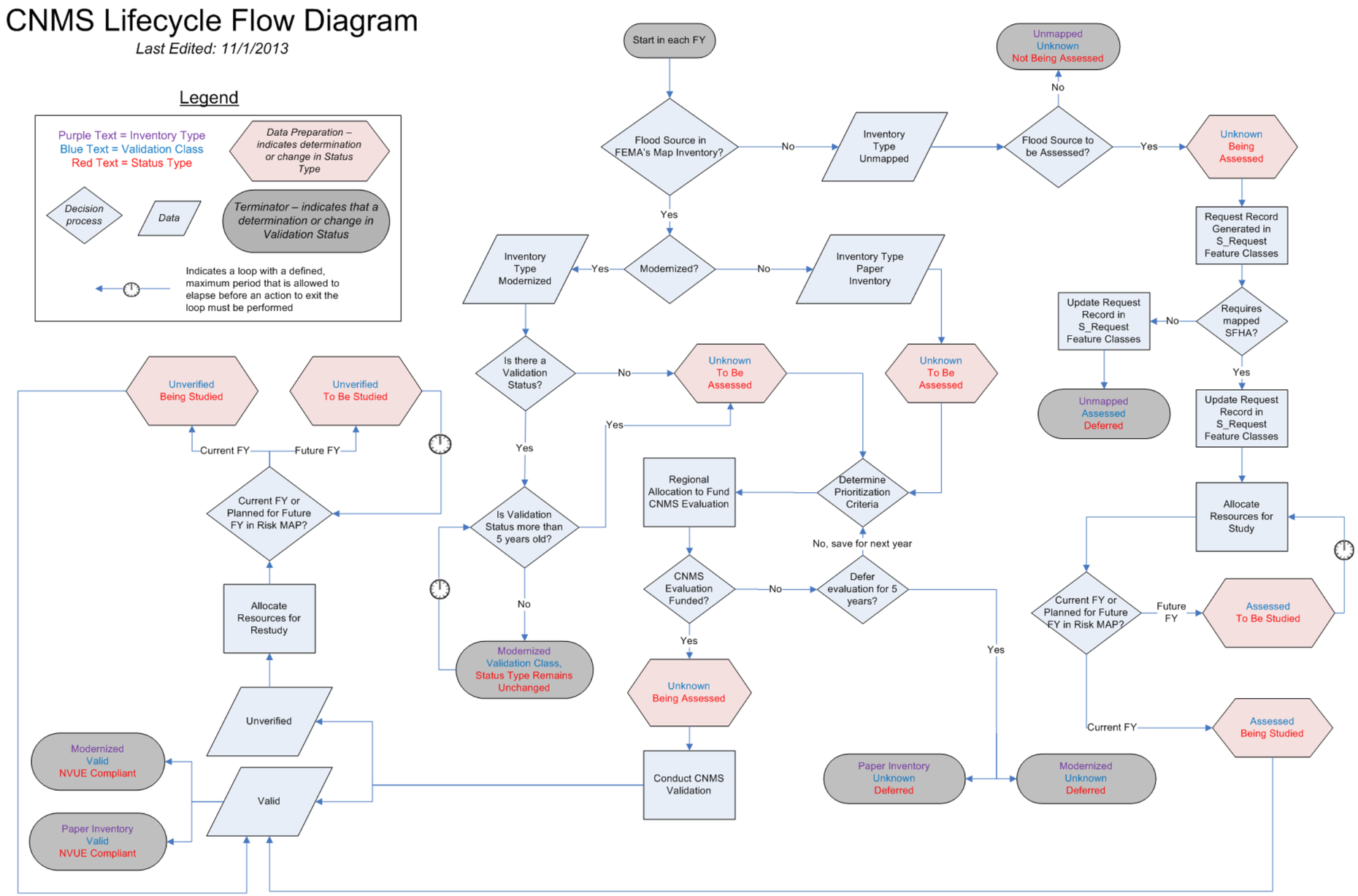
D_WSEL_AVAIL

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 the Coordinated Needs Management Strategy (CNMS) is the sole authority for reporting flood map update needs. The CNMS is also the reporting mechanism for the New, Validated, or Updated Engineering (NVUE) metric. Per Standard #13, reporting of the NVUE metric 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 file geodatabases (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 Attained + Initiated at Preliminary Issuance, and as NVUE Attained at Letter of Final Determination (LFD) Issuance. Any NVUE metric-based planning will assume completion and finalization of all stream miles that are classified in the 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 NVUE Study miles divided by the sum total of all miles in FEMA's Mapped Special Flood Hazard Area (SFHA) inventory. A New or Updated Study is considered NVUE Compliant and thus included in calculations of NVUE Attained after the issuance of the Preliminary Flood Insurance Rate Map (FIRM) (i.e., NVUE measured at Preliminary Issuance). 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 (Tiers 2-5), Unmodernized (Tier 1), and Unmapped (Tier 0) stream Reach inventories. Since the beginning of FY11, 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 that have been funded for new or updated engineering but have not yet been issued as part of a Preliminary FIRM. While a mechanism exists in the 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 dates, 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. These data are then

included in the National NVUE Table, which is distributed to a wide audience to provide NVUE projections into the future. As of FY18 Q2, the reporting of NVUE Attained was expanded to capture both NVUE measured at Preliminary Issuance, which considers both effective study status and ongoing study status if past Preliminary Issuance, and NVUE measured at LFD Issuance, which considers only effective study status. The addition of NVUE Attained at LFD provides an informative calculation of total VALID miles in the CNMS Inventory regardless of initiated miles past Preliminary Issuance.

Sections H.2 and H.3 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 Headquarter's CNMS Development team. There are several nuances in geospatial data processing; however, capturing these is 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 developing the CNMS NVUE Attained and Initiated National Table. The primary bins into which Study mileages get sorted are represented by the different allowed Validation Status and Status Type combinations 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, as reflected in the Tier categories that describe the maturity of the flood hazard data product.

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 the FEMA Inventory.

FIPS

Federal Information Processing Standard (FIPS) is the 5-digit county code that 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 reporting based on a political boundary 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 (i.e., they do not get a detailed or approximate assignment and do not contribute to NVUE), leaving A, AE, AO, AH, 1 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED and 0.2 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED. 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 into 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. In addition, any BEING STUDIED record past Preliminary Issuance with FLD_ZONE = "X" is factored into the numerator and denominator of the NVUE metric measured at Preliminary Issuance.

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 a brief description of bins and sub-bins, as well as a description of legal combinations of Validation Status and Status Type attributes for a CNMS Study Record to count towards the NVUE Calculation. When calculating NVUE Attained measured at LFD Issuance, the following Validation Status and Status Types are included in the numerator:

- VALID – NVUE COMPLIANT

- VALID – BEING ASSESSED
- VALID – BEING STUDIED

When calculating NVUE Attained (+ Initiated) miles measured at Preliminary Issuance, in addition to the Validation Status and Status Types listed above, the following combinations are also included in the numerator if the associated records have reached their projected Preliminary FIRM Issuance date:

- UNKNOWN – BEING STUDIED
- UNVERIFIED – BEING STUDIED
- ASSESSED – BEING STUDIED

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. All ASSESSED miles are omitted from the denominator, as they represent unmapped Reaches, unless these miles have a Status Type of BEING STUDIED and are past Preliminary Issuance.

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

The STUDY_TYPE field is primarily used to identify which records are classified as BEING STUDIED. Being Studied records that have reached their projected Preliminary FIRM Issuance date are considered Valid if supported by New or Updated engineering and are factored into the NVUE metric measured at Preliminary Issuance. Records with a BS_PRELIM_DATE in the past are classified and reported in the NVUE summary tables according to the values in the BS_ZONE and BS_STDY_TYP fields, instead of FLD_ZONE and STUDY_TYPE. The importance of maintaining an accurate value in the PRELIM_DATE field is based on the significant impact this date has on NVUE metric calculations and reporting.

The STUDY_TYPE field is also used to determine whether a Study is modernized (digital) or unmodernized (non-digital / paper inventory), or represents an unmapped area. The inventory can be categorized using Study Type field values as follows: If “UNMAPPED,” the flooding source is not yet identified on a regulatory FIRM; if “NON-DIGITAL APPROXIMATE” or “NON-DIGITAL DETAILED,” the Study is unmodernized; if any other value, 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 (digital) and unmodernized (non-digital).

It is important to note, however, that the introduction of the Tier classification in FY18 Q1 as described below is now used as the primary means to distinguish between modernized (Tiers 2-5) and unmodernized (Tier 1) inventory.

TIER

The TIER field is used to determine whether a Study is modernized (digital) or unmodernized (non-digital), or represents an unmapped area. Tiers 2, 3, 4, and 5 represent digital products of varying levels of model availability and quality; Tier 1 represents non-digital products (paper inventory), and Tier 0 represents unmapped flooding sources not yet identified on a regulatory FIRM. For further breakdown of the Tier classification, see Section 2.1.9 of this document. 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 to classify all records with New or Updated engineering ("NEW OR UPDATED DETAILED", "NEW OR UPDATED APPROXIMATE") as Tier 3 (digital, model-backed). These Tier classification business rules are also used to generate the National Tier Maturity Summary Table measured at both Preliminary Issuance and LFD Issuance. Although these Tier inventory metrics do not factor into NVUE, they provide a summary of the maturation of Risk MAP studies as reflected in the CNMS.

LINE_TYPE

The LINE_TYPE field is used to communicate the type of study representation the linework captures. In some cases, linework exists that depicts stillwater flooding or lakes and ponds. In these instances, one linear mile of study in the inventory does not represent the same required effort to study one linear mile of true riverine study. To correct this, the business rule was established 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 breakdowns. This rule applies no matter what level of roll-up 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 at a political boundary, but it requires further application of business rules as described in the DUPLICATE field entry.

DUPLICATE (only needed 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 overcounting 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 portion 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

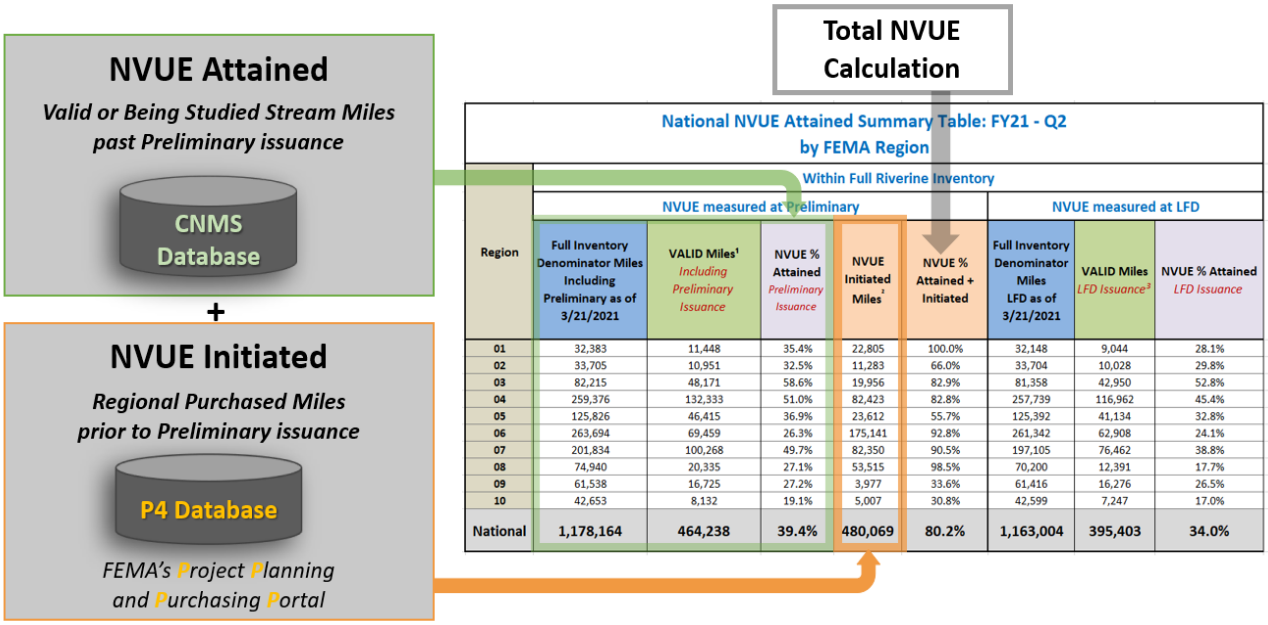
See the VALIDATION_STATUS entry above, as these two fields work together to form the bins into which study miles are separated in the National NVUE Table.

H.3. NVUE Calculation

When reporting at a political boundary level, all mapped mileage (Tiers 1 through 5) included in the NVUE numerator and denominator with a non-riverine LINE_TYPE classification is halved (see above). The NVUE Attained numerator at Preliminary Issuance sums all miles representing New, Validated, or Updated effective studies and ongoing studies past Preliminary Issuance. This mileage total, considered as VALID, is added to the NVUE Initiated mileage pulled from the Risk MAP P4 database, which represents all ongoing studies with New or Updated engineering (planned or in progress) that have not yet reached Preliminary Issuance. The resulting NVUE Attained + Initiated numerator is then divided by the total mapped mileage (denominator), which includes all BEING STUDIED miles that have reached Preliminary Issuance. The NVUE Attained numerator at LFD Issuance sums all miles representing New, Validated, or Updated effective studies and divides this total by the total mapped 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 that are part of the KPI1 Map Mod metric, at the time it attained 92 percent (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 (that are not BEING STUDIED and past Preliminary Issuance) within the CNMS Inventory do not count 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.

Figure H-1 below shows the input used to calculate the NVUE metric as described above and provides an example of a National NVUE Attained and Initiated Summary Table.



National NVUE Attained Summary Table: FY21 - Q2 by FEMA Region

Region	Within Full Riverine Inventory							
	NVUE measured at Preliminary					NVUE measured at LFD		
	Full Inventory Denominator Miles Including Preliminary as of 3/21/2021	VALID Miles[1] *Including Preliminary Issuance*	NVUE % Attained *Preliminary Issuance*	NVUE Initiated Miles[2]	NVUE % Attained + Initiated	Full Inventory Denominator Miles LFD as of 3/21/2021	VALID Miles *LFD Issuance*[3]	NVUE % Attained *LFD Issuance*
01	32,383	11,448	35.4%	22,805	100.0%	32,148	9,044	28.1%
02	33,705	10,951	32.5%	11,283	66.0%	33,704	10,028	29.8%
03	82,215	48,171	58.6%	19,956	82.9%	81,358	42,950	52.8%
04	259,376	132,333	51.0%	82,423	82.8%	257,739	116,962	45.4%
05	125,826	46,415	36.9%	23,612	55.7%	125,392	41,134	32.8%
06	263,694	69,459	26.3%	175,141	92.8%	261,342	62,908	24.1%
07	201,834	100,268	49.7%	82,350	90.5%	197,105	76,462	38.8%
08	74,940	20,335	27.1%	53,515	98.5%	70,200	12,391	17.7%
09	61,538	16,725	27.2%	3,977	33.6%	61,416	16,276	26.5%
10	42,653	8,132	19.1%	5,007	30.8%	42,599	7,247	17.0%
National	**1,178,164**	**464,238**	**39.4%**	**480,069**	**80.2%**	**1,163,004**	**395,403**	**34.0%**

[1]New, validated, or updated riverine studies, including new or updated riverine studies issued Preliminary as of 3/21/2021.

[2]Total miles from Risk MAP P4. FEMA has committed funding toward new or updated riverine studies, but studies have not yet been issued as part of a Preliminary (Flood Insurance Rate Map) FIRM.

[3]New, validated, or updated riverine studies issued LFD as of 3/21/2021.

Figure H-1: Calculating the NVUE Metric

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

I.1. Identifying Mapping Needs/Requests Due to LOMC Processing

When processing MT-1 and MT-2 case files, occasionally issues are identified that could affect data stored in Coordinated Needs Management Strategy (CNMS). To capture these issues appropriately, the LOMC Analysts should complete Request Records in the 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 team will contact the respective Regional Service Center (RSC) to create a Request Record. These 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 Letter of Map Revision (LOMR) be submitted. Often 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 the 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 standards outlined in FEMA's latest Data Capture Technical Reference, the full extent of these data can be used.

- *Existing-conditions-modeling developed during the Conditional Letters of Map Revision (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, this new data could be lost and therefore should be recorded in the CNMS.

- *BFE Determination:* If an applicant submits a complete study to determine a BFE in an Approximate Zone A 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 the CNMS. In order to maintain an accurate database, the Riverine CNMS Inventory (S_Studies_Ln) should be updated at least once a quarter to reflect approved LOMRs. Coastal study LOMRs are not integrated into the Coastal CNMS Inventory (S_Coastal_Ln) but instead are evaluated as part of the coastal validation assessment procedures as described in Appendix D. For the Riverine CNMS Inventory, 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), it is suggested that the LOMR case number be recorded in the REASON field. The LOMRs encountered can be classified into the following two categories:

Type 1

LOMRs reflecting newly studied or restudied streams (or portions of streams) that use new or updated modeling (including updates to hydrology and/or hydraulics) should be represented in S_Studies_Ln by Reaches that are "broken out" from the adjacent Reaches not updated by the LOMR study. These Reaches updated by the LOMR study should then be 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.

It is important to remember that if a 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 effects.

If the Effective Date (i.e., the STATUS DATE) of a LOMR Study being incorporated is over five years old, the Reach(es) must be updated to UNKNOWN – TO BE ASSESSED and the Study must be validated as outlined in the Validation Assessment Procedures (Appendix A) and Section 3.2.

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

Field	Description
REACH_ID	Update as needed; add if a new study Reach or revise if Reach is 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.
TRIBALLAND	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.

Field	Description
FLOODWAY	Populate with "True (Yes)" or "False (No)" for Detailed Studies with a regulatory floodway.
VALIDATION_STATUS	Set to "VALID" if LOMR study is less than five years old. If LOMR study is over five years old, set to "UNKNOWN".
STATUS_TYP	Set to "NVUE-COMPLIANT" if LOMR study is less than five years old. If LOMR study is over five years old, set to "TO BE ASSESSED". If Reach is BEING STUDIED, do not update and inform the RSC to coordinate with the Mapping Partner to determine whether the Reach should be de-scoped.
MILES	Calculate to North America Albers Equal Area Conic.
SOURCE	Update as needed.
STATUS_DATE	Update with Effective Date of LOMR.
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_CASE_NO	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.

Field	Description
HYDRA_MDL_CMT	Update as needed.
HYDRA_DATE_EFFCT	Update as needed.
MODEL_2D	Update as needed.
TOPO_DATE	Update as needed.
TOPO_SRC	Update as needed.
C1_GAGE through S9_REGEQ and associated CMT, SRC, and URL	Set to NULL.
CE_TOTAL and SE_TOTAL	Set to NULL.
A1_TOPO through A5_COMPARE and associated CMT, SRC, and URL	Set to NULL.
VAL_DATE	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_MODEL_2D	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 reflecting an update to only a portion of an existing study, typically to update only mapping or topographic data, fall into the Type 2 category. These stream Reaches should not be updated according to Table I-1 above or broken out from existing studied stream Reaches. A user may add the LOMR Basis of Request to the COMMENT field to document a Type 2 LOMR.

Appendix J. CNMS Quality Management Plan (QMP)

J.1. Introduction

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

To ensure that the data attributes in the CNMS FGDBs are appropriately populated for consistent reporting of the NVUE and SFHA study status, FEMA has established the requirement to use the CNMS FGDB Quality Control (QC) Tool for quality assurance and quality control. The 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 stand-alone 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 through 10.6.
- Has an easy-to-use interface that presents issues found by the CNMS FGDB 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 that the CNMS FGDBs can support Risk MAP program needs.

Sections J.2 through J.4 below outline (1) the targeted user groups that 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 the key features of the CNMS FGDB QC Tool's user interface.

User Groups

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

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

- User has a knowledge of CNMS Policies and Procedures and is well versed with the *CNMS Technical Reference*.
- User is a CNMS liaison representing a FEMA Regional Office, RSC, Production and Technical Services (PTS), or Cooperating Technical Partner (CTP) responsible for 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 data from a single or multiple counties or an entire CNMS FGDB. The CNMS FGDB used with the CNMS FGDB QC Tool should be in the schema that is reflected in this current CNMS Technical Reference. The list of checks 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 to which the QC check is being applied. By accepting inputs at various geographic resolutions, the tool can also be used to check quality at any phase of the database roll-up, either locally at the production centers or during a quarterly Regional/National Roll-up. CNMS Database updates warranted by Map Production, Discovery efforts, Preliminary Flood Insurance Rate Map (FIRM) Issuance, Letter of Final Determination (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 it can be operated independent of a license. The CNMS FGDB QC Tool functions within the Esri ArcGIS 10.2 through 10.6 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 a Validation Mode (Single/Multiple Counties or Entire Database) and a QC Mode (Riverine or Coastal), and also provide an FGDB file location. The CNMS FGDB QC Tool will then auto-populate a list of the counties included in the FGDB for the user to select, or will continue without a message if an entire database (e.g., regional database) is to be validated. Note that the CNMS feature classes S_Unmapped_Ln, S_Requests_Pt, S_Requests_Ar, and the POC table are automatically validated when either the Riverine (S_Studies_Ln) or Coastal (S_Coastal_Ln) QC Mode is selected.

The CNMS FGDB QC Tool will perform a series of checks as shown in Table J-1 in Section J.3 below and will prompt the user for input in several ways. The results of these checks are documented and displayed in a table that categorizes them as either “Critical Errors” or “Secondary Errors”. Critical Errors are values or combinations of values deemed to violate schema and/or quality rules, and/or

are suspected to cause issues in the quarterly roll-up of the Regional CNMS FGDBs. These errors must be addressed by the user prior to advancing the CNMS FGDB to the next stage of roll-up. Secondary Errors are typically values or combinations of values that also indicate inconsistency with data quality guidelines outlined in the CNMS Technical Reference, but in some instances may be considered exceptions. The user will be required to provide brief documentation for any exceptions for Secondary Errors that will not be addressed prior to self-certifying and advancing the CNMS FGDB to the next roll-up. Both Critical and Secondary Errors are identified by a Unique ID that corresponds to a CNMS FGDB feature primary key, and also by the associated CNMS feature class and field name. This table of records can be used to associate the errors with the appropriate CNMS features, allowing users to identify and correct the data issues. The records are also classified by error type that describes the issue found during the automated check along with options for addressing (either "Zoom to Selection" or "Mark as Exception").

After addressing the errors listed in the QC check output table, the CNMS FGDB should be resubmitted for an iterative run through the UI described above 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 to 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 are collected for the Self-Certification and for entry in the Point_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 redocument the request for exception. Users should note that exceptions are linked to CNMS FGDB feature primary key values (e.g., REACH_ID, UML_ID, SRA_ID), and so in order for the exceptions to be carried forward, those values would need to be retained within the linework as appropriate.

J.3. Quality Control Criteria

This section outlines the types of checks that will be performed by the CNMS FGDB QC Tool in the following tables below: Table J-1: S_Studies_Ln Checks, Table J-2: S_Coastal_Ln Checks, Table J-3: S_Requests_Ar/Pt Checks, Table J-4: S_Unmapped_Ln Checks, Table J-5: County_QC_Status Checks, Table J-6: Coastal_County_QC_Status Checks, Table J-7: Point_of_Contact Checks, and Table J-8: Specific_Needs_Info Checks. In addition to several logical consistency requirements, the quality check 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 the associated five-digit 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
CO_FIPS	No	Must be five characters in length.	S	—	Critical
CID	No	Must be six characters in length.	S		Critical
TRIBALLAND	No	D_TrueFalse domain value	S	—	Critical
FLD_ZONE	No	Coastal Flood Zones not allowed.	Q	FLD_ZONE = V or VE should not exist in this feature class.	Critical
		D_ZONE domain value	S	—	Critical
FLOODWAY	Yes	"True (Yes)" value only allowed for detailed studies with a regulatory floodway.	Q	If FLOODWAY = "True (Yes)", FLD_ZONE must be Zone AE OR Zone AH.	Critical
		D_TrueFalse domain value	S	—	Critical
VALIDATION_STATUS	No	Validation Status – Status Type combination must pass check against list of acceptable combinations.	Q	Acceptable combinations defined in the CNMS Technical Reference Appendix H, Section H.2.	Critical
		A Validation Status of "VALID" cannot be applied to non-SFHA FLD_ZONE values.	Q	Non-SFHA flood zone values include all "X" values, D, AREA NOT INCLUDED, and OPEN WATER.	Critical
		A Validation Status of "ASSESSED" can only be applied to Unmapped FLD_ZONE values with Study Type "UNMAPPED".	Q	Unmapped flood zone values include all "X" values, D, and AREA NOT INCLUDED. Validation Status of ASSESSED cannot be applied to Zone A/AE/AH/AO/AR.	Critical
		D_VALID_CAT domain value	S	—	Critical
STATUS_TYPE	No	If STATUS_TYPE is "BEING STUDIED", the required "Being Studied" (BS) fields must be populated.	Q	Required "Being Studied" (BS) fields include BS_ZONE, BS_STDYTYP, BS_MODEL_2D, BS_FY_FUND, BS_PRELIM_DATE, and BS_LFD_DATE.	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		If STATUS_TYPE is "BEING STUDIED", BS_CASE_NO should be populated.	Q	Null values only allowed if a MIP Case Number has not been assigned to the Study yet. Best practice is to populate with the entry "PTS FUNDED" or "CTP FUNDED" at a minimum.	Secondary
		D_STATUS_TYPE domain value	S	—	Critical
MILES	No	Should be greater than zero and not null.	Q	—	Critical
SOURCE	No	D_SOURCE domain value	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
HUC8_KEY	No	Must be eight characters in length.	Q	—	Critical
		Must be an existing HUC8.	Q	Regions 2 through 10, use 2010 HUC8 WBD. Region 1, use 2015 HUC8 WBD.	Critical
STUDY_TYPE	No	Detailed STUDY_TYPE values are not permissible for Zone A.	Q	If NON-DIGITAL DETAILED, DIGITAL CONVERSION DETAILED, DIGITAL DETAILED, or NEW OR UPDATED DETAILED, cannot have FLD_ZONE = A.	Critical
		Approximate STUDY_TYPE values are not permissible for Zone AE/AH/AO/AR/0.2 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED.	Q	If NON-DIGITAL APPROXIMATE, DIGITAL CONVERSION APPROXIMATE, DIGITAL APPROXIMATE, or NEW OR UPDATED APPROXIMATE, cannot have FLD_ZONE = AE, AH, AO, AR.	Critical
		D_STUDY_TYPE domain value	S	—	Critical
TIER	No	"TIER 0" should only be applied to Unmapped Flood Zones.	Q	If TIER 0, cannot have FLD_ZONE = A/AE/AH/AO/AR/1 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED/0.2 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED.	Critical
		"TIER 0" can only have the STUDY_TYPE "UNMAPPED".	Q	—	Critical
		"TIER 1" should only be applied to non-digital Study Types.	Q	If TIER 1, STUDY_TYPE must be NON-DIGITAL APPROXIMATE or NON-DIGITAL DETAILED. If TIER 2, 3, 4, or 5, STUDY_TYPE cannot be NON-DIGITAL APPROXIMATE or NON-DIGITAL DETAILED.	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		"TIER 2" should not be applied to Detailed Studies.		If FLD_ZONE = AE, AH, AO, AR, then TIER cannot = TIER 2.	Secondary
		D_TIER domain value	S	—	Critical
WSEL_AVAIL	Yes	D_WSEL_AVAIL domain value	S	—	Critical
DPTH_AVAIL	Yes	D_DEPTH_AVAIL domain value	S	—	Critical
BLE	Yes	D_BLE domain value	S	—	Critical
BLE_CASE_NO	Yes	If BLE field is populated, cannot be null.	Q	—	Critical
BLE_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
		If BLE field is populated, cannot be null.	Q	—	Critical
LINE_TYPE	No	D_LINE_TYPE domain value	S	—	Critical
FBS_CMPLNT	No	D_TrueFalse domain value	S	—	Critical
FBS_CHKDT	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
FBS_CTYP	No	D_FBS_CTYP domain value	S	—	Critical
DUPLICATE	No	D_DUPLICATE domain value	S	—	Critical
HYDRO_DATE_EFFCT	Yes	Date of effective Hydrologic Analysis must be earlier or same day as date of effective Hydraulic Analysis.	Q	HYDRO_DATE_EFFCT must be <= HYDRA_DATE_EFFCT.	Secondary
		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
HYDRA_DATE_EFFCT	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
HYDRO_MDL	Yes	D_HYDRO domain value	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
HYDRA_MDL	Yes	D_HYDRA domain value	S	—	Critical
MODEL_2D	No	Known 2-D models must be “True (Yes)”.	Q	If HYDRA_MDL = 'FESWMS 2DH 1.1 (JUNE 1995)' OR 'FLO-2D' OR 'FLO-2D 2003.6' OR 'FLO-2D 2004.10' OR 'FLO-2D 2006.1' OR 'FLO-2D 2007.06' OR 'FLO-2D PRO' OR 'FLO-2D V.2000.11 (DECEMBER 2000)' OR ‘HEC-RAS (2D)’ OR ‘S2DMM' OR ‘S2DMM (FEBRUARY 2005)' OR ‘SHEET 2D 9 (JULY 2000)' OR ‘SHEET 2D9' OR ‘SRH-2D' OR 'TABS-RMA2' OR 'TABS-RMA4' OR 'TUFLOW', MODEL_2D must be “True (Yes)”.	Secondary

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		Known 1-D models must be "False (No)".	Q	If HYDRA_MDL = 'ADVANCED ICPR', 'ADVANCED ICPR 2.20 (OCTOBER 2000)', 'ICPR 3.02 (NOVEMBER 2002)', 'ICPR 3.10 (APRIL 2008)', 'B-292', 'B-MAN NORMAL DEPTH ANALYSIS PROGRAM', 'CHAN FOR WINDOWS 2.03 (1997)', 'CRITICAL DEPTH METHOD', 'CULVERT ANALYSIS', 'CULVERT MASTER', 'CULVERT MASTER 2.0 (SEPTEMBER 2002)', 'DAMBRK', 'DEPTH FREQUENCY METHOD', 'DEPTH-DISCHARGE RATING CURVE', 'DHM', 'DHM 21 (AUGUST 1987)', 'DHM 34 (AUGUST 1987)', 'DWOPER', 'E431', 'FAN', 'FEQ', 'FEQ 8.92 (1997)', 'FEQ 8.92 (1999)', 'FEQ 9.98 (2005)', 'FEQUTL', 'FEQUTL 4.68 (1997)', 'FEQUTL 4.68 (1999)', 'FEQUTL 5.46 (2005)', 'FLDWAV', 'FLDWAV (NOVEMBER 1998)', 'FLDWY', 'FLDWY (MAY 1989)', 'GLWRM', 'HCSWMM', 'HCSWMM 4.31B (AUGUST 2000)', 'HEC-2', 'HEC-2 (1983)', 'HEC-2 4.6.2 (MAY 1991)', 'HEC-RAS (1D)', 'HEC-RAS 2.2 (SEPTEMBER 1998)', 'HEC-RAS 3.0.1', 'HEC-RAS 3.1.1', 'HEC-RAS 3.1.3', 'HEC-RAS 4.0', 'HEC-RAS 4.1', 'HIGHWATER MARKS', 'HISTORICAL FLOOD DATA', 'HY8', 'HY8 4.1', 'HY8 6.0', 'J-635', 'LAKE ROUTING ANALYSIS', 'LRD-1', 'MIKE 11', 'MIKE 11 HD (2002 D)', 'MIKE 11 HD (2004)', 'MIKE 11 HD (JUNE 1999)', 'NETWORK', 'NETWORK (JUNE 2002)', 'NORMAL DEPTH', 'NUDALLAS', 'PONDPACK', 'PONDPACK V 8 (MAY 2002)', 'PSUPRO', 'QUICK', 'QUICK-2 1.0', 'QUICK-2 2.0', 'SFD', 'SLOPE-AREA METHOD', 'SOCH', 'STORMCAD', 'STORMCAD V 4 (JUNE 2002)', 'SWMM', 'SWMM 3.0', 'SWMM 3.3', 'SWMM 4.0', 'SWMM 4.30 (MAY 1994)', 'SWMM 4.31 (JANUARY 1997)', 'UNET', 'UNET 4.0 (APRIL 2001)', 'WSP-2', 'WSPGW', 'WSPGW 12.96 (OCTOBER 2000)', 'WSPRO', 'WSPRO (JUNE 1988)', MODEL_2D must be "False (No)".	Secondary
		D_TrueFalse domain value	S	—	Critical
TOPO_DATE	Yes	Topo date should be earlier than or the same date as the Hydraulic Modeling date for the same study, if the Study Type is not Redelineation. Topo date for redelineation studies may be later than the Hydraulic Modeling date.	Q	TOPO_DATE =< HYDRA_DATE_EFFCT if STUDY_TYPE is not "REDELINEATED".	Secondary
		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

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
C1 to C7, S1 to S9, A1 to A5	Yes	D_ELEMENT domain value	S	—	Critical
CE_TOTAL	Yes	This value should accurately reflect the number of failed Critical Elements, including user-defined elements EC1-EC2.	Q	—	Critical
SE_TOTAL	Yes	This value should accurately reflect the number of failed Secondary Elements, including user-defined elements ES1-ES4.	Q	—	Critical
VAL_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
BS_CASE_NO	Yes	Field should be populated for all "BEING STUDIED" Reaches.	Q	Null values only allowed if a MIP Case Number has not been assigned to the Study yet. Best practice is to populate with the entry "PTS FUNDED" or "CTP FUNDED" at a minimum.	Secondary
BS_ZONE	Yes	If FLD_ZONE is AE/AH/AO/AR/0.2 PCT-ANNUAL-CHANCE FLOOD HAZARD CONTAINED, BS_ZONE should not be set to "A".	Q	Detailed studies are rarely studied as approximate (Zone A) studies. Exceptions to this check include Zone A tributaries attributed as backwater from detailed flooding sources.	Secondary
		Check if STATUS_TYPE is "BEING STUDIED".	Q	If the STATUS_TYPE value is BEING STUDIED, the BS_ZONE field must be populated; otherwise, field must be null.	Critical
		D_ZONE domain value	S	—	Critical
BS_STDYTYP	Yes	Check if STATUS_TYPE is "BEING STUDIED".	Q	If the STATUS_TYPE value is BEING STUDIED, the BS_STDYTYP field must be populated; otherwise, field must be null.	Critical
		If FLD_ZONE is an Unmapped value OR STUDY_TYPE is "UNMAPPED", then BS_STDYTYPE cannot be set to "REDELINEATED", "DIGITAL CONVERSION DETAILED", or "DIGITAL CONVERSION APPROXIMATE".	Q	Unmapped Flood Zone values include all 'X' values, D, and AREA NOT INCLUDED.	Critical
		If FLD_ZONE is "A" and BS_ZONE is "AE", then BS_STDYTYPE cannot be set to "REDELINEATED" or "DIGITAL CONVERSION DETAILED".	Q	Approximate studies cannot be redelineated as or digital conversions of detailed studies.	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		Detailed BS_STUDYTYP values are not permissible for BS_ZONE A.	Q	If BS_STUDYTYP = DIGITAL CONVERSION DETAILED or NEW OR UPDATED DETAILED, cannot have BS_ZONE = A.	Critical
		Approximate BS_STUDYTYP values are not permissible for BS_ZONE AE, AH, AO, AR.	Q	If BS_STUDYTYP = DIGITAL CONVERSION APPROXIMATE or NEW OR UPDATED APPROXIMATE, cannot have FLD_ZONE = AE, AH, AO, AR.	Critical
		BS_STDYTYP must be "UNMAPPED" if BS_ZONE is an Unmapped Flood Zone value.	Q	Unmapped Flood Zone values include all 'X' values, D, and AREA NOT INCLUDED.	Critical
		D_STUDY_TYPE domain value	S	—	Critical
BS_HYDRO_M	Yes	D_HYDRO domain value	S	—	Critical
BS_HYDRA_M	Yes	D_HYDRA domain value	S	—	Critical
BS_MODEL_2D	Yes	Check if STATUS_TYPE is "BEING STUDIED".	Q	If the STATUS_TYPE value is BEING STUDIED, the BS_MODEL_2D field must be populated, otherwise field must be null.	Critical
		Known 2D models must be "True (Yes)".	Q	See MODEL_2D check above for known 2D models that must be set to "True (Yes)".	Secondary
		Known 1D models must be "False (No)".	Q	See MODEL_2D check above for known 1D models that must be set to "False (No)".	Secondary
		D_TrueFalse domain value	S	—	Critical
BS_FY_FUND	Yes	Check if STATUS_TYPE is "BEING STUDIED".	Q	If the STATUS_TYPE value is BEING STUDIED, the BS_FY_FUND field must be populated, otherwise field must be null.	Critical
		D_FY_FUNDED domain value	S	—	Critical
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 is "BEING STUDIED".	Q	If the STATUS_TYPE value is BEING STUDIED, BS_PRELIM_DATE field must be populated, otherwise field must be null.	Critical
BS_LFD_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

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		Check if STATUS_TYPE is "BEING STUDIED".	Q	If the STATUS_TYPE value is BEING STUDIED, the BS_LFD_DATE field must be populated, otherwise field must be NULL.	Critical
		If STATUS_TYPE is "BEING STUDIED", BS_LFD_DATE should be later than BS_PRELIM_DATE.	Q	If the LFD Issuance date is prior to the Preliminary Issuance date, it must be corrected.	Secondary
		If STATUS_TYPE is "BEING STUDIED", BS_LFD_DATE should be a date in the future.	Q	If the LFD Issuance date is in the past, it either needs to be corrected or the CNMS update for LFD Issuance Phase is overdue and must be incorporated.	Secondary
EC1_UDEF and EC2_UDEF	Yes	D_ELEMENT domain value	S	—	Critical
ES1_UDEF through ES4_UDEF	Yes	D_ELEMENT D domain value	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
NULL values	—	All non-populated fields must be field calculated using the value NULL (no quotes).	Q	This includes all field types including text, numeric, date, and domain. There should be no blank/empty text values in the database.	Secondary

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 the associated five-digit FIPS field value.	S	—	Critical
		The two characters following the FIPS must be "08".	S	—	Critical
		Each CREACH_ID must be unique.	S	—	Critical
CSTUDY_ID	Yes	If populated (non-null), must be 12 characters in length.	S	—	Secondary
CO_FIPS	No	Must be five characters in length.	S	—	Critical
CID	No	Must be six characters in length.	S	—	Critical
TRIBALLAND	No	D_TrueFalse domain value	S	—	Critical
CVALIDATION	No	Validation Status – Status Type combination must pass check against list of acceptable combinations.	Q	Acceptable combinations defined in the CNMS Technical Reference Appendix H, Section H.2.	Critical
		Validation Status of "ASSESSED" can only be "TIER 0".	Q	—	Critical
		D_VALID_CAT domain value	S	—	Critical
CSTAT_TYP	No				
		If CSTAT_TYP is "BEING STUDIED", the required "Being Studied" (BS) fields must be populated.	Q	Required "Being Studied" (BS) fields include BS_CASE_NO, BS_STDYTYP, BS_FY_FUND, BS_PRELIM_DATE, and BS_LFD_DATE.	Critical
		D_STATUS_TYPE domain value	S	—	Critical
MILES	No	Should be greater than zero and not null.	Q	—	Critical
SOURCE	No	D_SOURCE domain value	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
HUC8_KEY	No	Must be eight characters in length.	Q	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		Must be an existing HUC8.	Q	Regions 2 through 10, use 2010 HUC8 WBD. Region 1, use 2015 HUC8 WBD.	Critical
STUDY_TYPE	No	D_STUDY_TYPE domain value	S	—	Critical
TIER	No	"TIER 0" can only have the Study Type value "UNMAPPED".	Q	—	Critical
		"TIER 0" should only have the Validation Status values "ASSESSED" or "UNKNOWN".	Q	—	Critical
		"TIER 1" should only be applied to non-digital Study Types.	Q	If TIER 1, STUDY_TYPE must be NON_DIGITAL_APPROXIMATE or NON-DIGITAL DETAILED. If TIER 2, 3, 4, or 5, STUDY_TYPE cannot be NON-DIGITAL APPROXIMATE or NON-DIGITAL DETAILED.	Critical
		D_TIER domain value	S	—	Critical
WSEL_AVAIL	Yes	D_WSEL_AVAIL domain value	S	—	Secondary
DPTH_AVAIL	Yes	D_DEPTH_AVAIL domain value	S	—	Secondary
FBS_CMPLNT	No	D_TrueFalse domain value	S	—	Critical
FBS_CHKDT	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
FBS_CTYP	No	D_FBS_CTYPE domain value	S	—	Critical
DATE_EFFECT	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.	
TOPO_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
BATHY_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

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
POP_COAST	No	If POP_COAST is "False (No)" records should only have the Validation Status values "ASSESSED" or "UNKNOWN".	Q	—	Secondary
		D_TrueFalse domain value	S	—	Critical
SURGE_MDL	Yes	D_SURGEMDL domain value	S	—	Critical
STAT_METH	Yes	D_STATMETH domain value	S	—	Critical
SURGE2DW	Yes	D_SURGE2DW domain value	S	—	Critical
SETUP_METH	Yes	D_SETUPMETH domain value	S	—	Critical
RUNUP_MDL	Yes	D_RUNUPMDL domain value	S	—	Critical
EROS_METH	Yes	D_EROSMETH domain value	S	—	Critical
OVWAVE_MDL	Yes	D_OVWVMDL domain value	S	—	Critical
WAVE_MDL	Yes	D_WVDL domain value	S	—	Critical
C_C1 to C_C7, C_S1 to C_S6	Yes	D_ELEMENT domain value	S	—	Critical
C_CE_TOTAL	Yes	This value should accurately reflect the number of failed Critical Elements, including user-defined elements EC1-EC2..	Q	—	Critical
C_SE_TOTAL	Yes	This value should accurately reflect the number of failed Secondary Elements, including user-defined elements ES1-ES4.	Q	—	Critical
BS_CASE_NO	Yes	Field should be populated for all "BEING STUDIED" Reaches.	Q	Null values only allowed if a MIP Case Number has not been assigned to the Study yet. Best practice is to at a minimum populate with the entry "PTS FUNDED" or "CTP FUNDED."	Secondary
BS_STDYTYP	Yes	Check if CSTAT_TYPE is "BEING STUDIED".	Q	If the CSTAT_TYPE value is BEING STUDIED, the BS_STDYTYP field must be populated; otherwise, field must be null.	Critical
		D_STUDY_TYPE domain value	S	—	Critical
BS_SRGMODL	Yes	D_SURGEMDL domain value	S	—	Critical
BS_STATMETH	Yes	D_STATMETH domain value	S	—	Critical
BS_SRG2DW	Yes	D_SURGE2DW domain value	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
BS_SUPMETH	Yes	D_SETUPMETH domain value	S	—	Critical
BS_RUPMODL	Yes	D_RUNUPMDL domain value	S	—	Critical
BS_ERSMETH	Yes	D_EROSMETH domain value	S	—	Critical
BS_OVLDMDL	Yes	D_OVWVMDL domain value	S	—	Critical
BS_WVMDL	Yes	D_WVDL domain value	S	—	Critical
BS_FY_FUND	Yes	Check if CSTAT_TYPE is "BEING STUDIED".	Q	If the CSTAT_TYPE value is BEING STUDIED, the BS_FY_FUND field must be populated; otherwise, field must be null.	Secondary
		D_FY_FUNDED domain value	S	—	Critical
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 CSTAT_TYPE is "BEING STUDIED".	Q	If the CSTAT_TYPE value is BEING STUDIED, the BS_PRELIM_DATE field must be populated; otherwise, field must be null.	Critical
BS_LFD_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 CSTAT_TYPE is "BEING STUDIED".	Q	If the CSTAT_TYPE value is BEING STUDIED, the BS_LFD_DATE field must be populated; otherwise, field must be null.	Secondary
		If CSTAT_TYPE is "BEING STUDIED", BS_LFD_DATE should be later than BS_PRELIM_DATE.	Q	If LFD date is prior to the Preliminary Issuance date, it must be corrected.	Secondary
		If CSTAT_TYPE is "BEING STUDIED", BS_LFD_DATE 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 and must be incorporated.	Secondary
EC1_UDEF and EC2_UDEF	Yes	D_ELEMENT domain value	S	—	Critical
ES1_UDEF through ES4_UDEF	Yes	D_ELEMENT domain value	S	—	Critical
E_ELEMDATE	Yes	Should be in expected data format (Date).	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		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_IDs 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
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 value	S	—	Critical
RQST_CAT	No	D_RQST_CAT domain value	S	—	Critical
RQST_LVL	Yes	D_RQST_LVL domain value	S	—	Critical
MTHOD_TYPE	Yes	D_MTHOD_TYPE domain value	S	—	Critical
DATE_RQST	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
DATE_RESOL	Yes	Should be in expected data format (Date).	S	—	Critical

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
		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
		DATE_RESOL should be later than DATE_RQST.	S	—	Secondary
CARTO_RQST	No if RQST_CAT = 'CARTOGRAPHIC'. Otherwise, null values allowed.	D_CARTO_RQST domain value	S	—	Critical
FDATA_RQST	No, if RQST_CAT = 'FLOOD DATA'. Otherwise, null values allowed.	D_FDATA_RQST domain value	S	—	Critical
RESOL_STATUS	Yes	D_RESOL_STAT domain value	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 value	S	—	Critical
DATE_REVIEW	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
		DATE_REVIEW should be later than DATE_RQST.	S	—	Critical

CNMS S_Unmapped_Ln Table

Table J-4: S_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

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
MILES	No	Should be greater than zero and not null.	Q	—	Critical
CO_FIPS	No	Must be five characters in length.	S	—	Critical
CID	No	Must be six characters in length.	S	—	Critical
HUC8_KEY	No	Must be eight characters in length.	S	—	Critical
		Must be an existing HUC8.	Q	Regions 2 through 10, use 2010 HUC8 WBD. Region 1, use 2015 HUC8 WBD.	Critical
FEDLAND	No	D_TrueFalse domain value	S	—	Critical
TRIBALLAND	No	D_TrueFalse domain value	S	—	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	Must be five characters in length.	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	Must be five characters in length.	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

Parameter / Attribute	Allow Nulls	Validity	Validation Category	Note	Critical / Secondary
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 value	S	—	Critical
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 value	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 value	S	—	Critical
DISASTER	Yes	None	—	—	N/A
MITIG_PLAN	Yes	D_TrueFalse domain value	S	—	Critical
RSK_ASSESS	Yes	D_TrueFalse domain value	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 value	S	—	Critical
HAZUS	Yes	D_TrueFalse domain value	S	—	Critical
HAZUS_LVL	Yes	D_HAZUS_Lvl domain value	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 through 10.6. The user does not need to be an administrator to install and use this tool.

How to Install and Access the Tool:

- 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.

- 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.

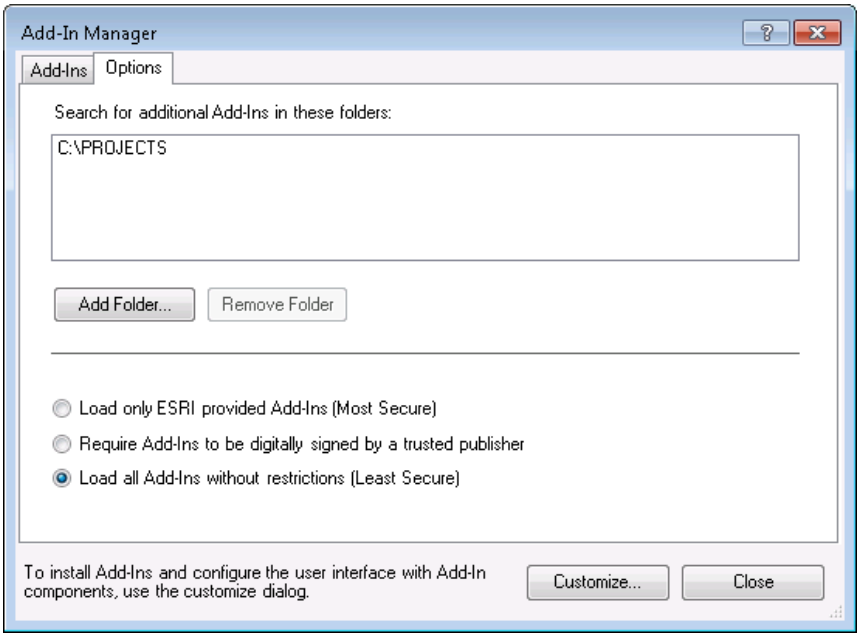


Figure J-1: CNMS FGDB QC Tool - Add-In Manager

- 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.

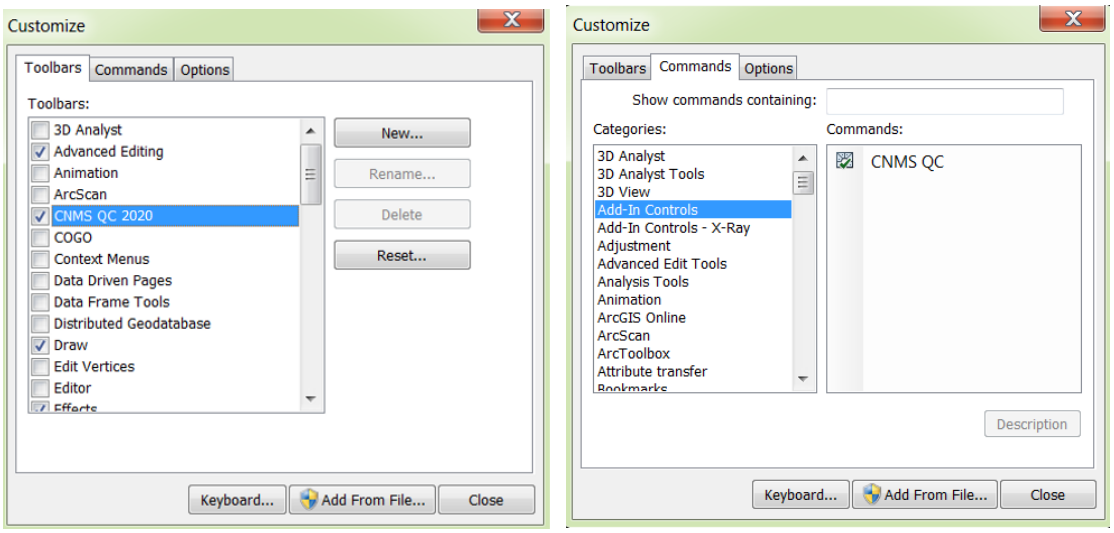


Figure J-2: CNMS FGDB QC Tool - Add-In Controls

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

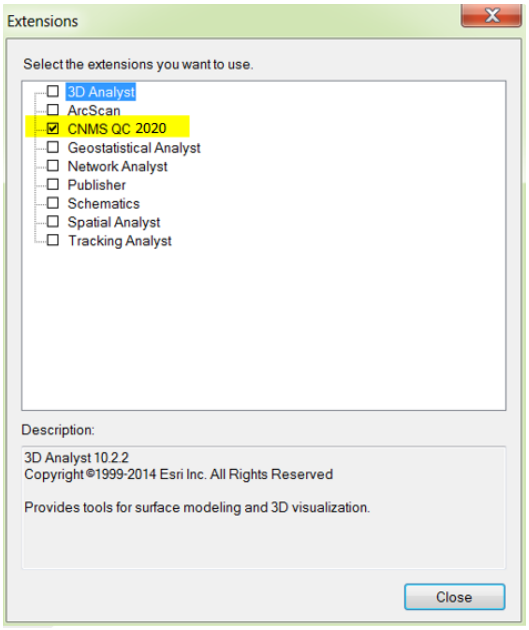


Figure J-3: CNMS FGDB QC Tool - QC Extension

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:

- Start the CNMS FGDB QC Tool by clicking on the icon previously added to either an existing or custom toolbar

- 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.

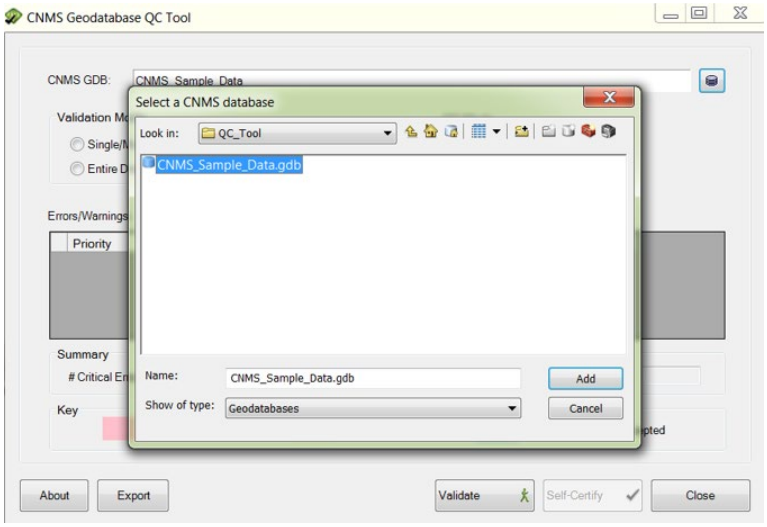


Figure J-4: CNMS FGDB QC Tool - Select FGDB

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

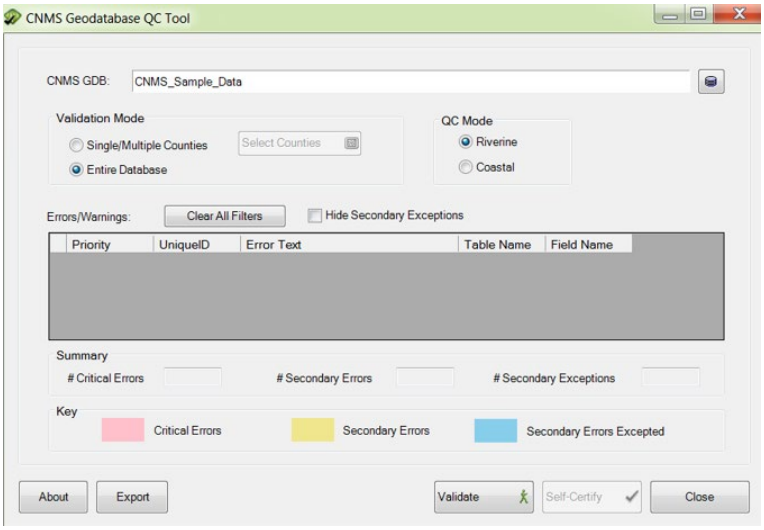


Figure J-5: CNMS FGDB QC Tool - FGDB Selected

- 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.

- 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.

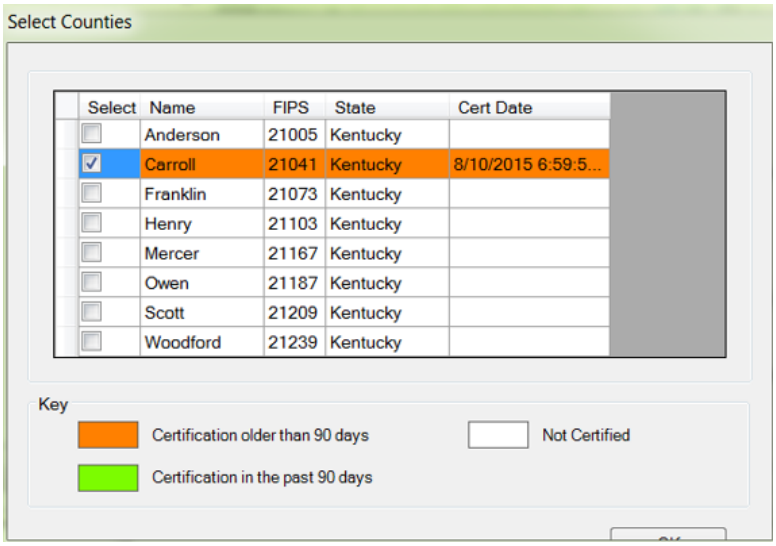


Figure J-6: CNMS FGDB QC Tool - Select Counties

- 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.

- The context-menu available on the grid allows the following actions:

  - Zoom to the selected record on the map. The selection occurs based on the Reach_ID field for S_Studies_Ln, UML_ID field for S_Unmapped_Ln, SRA_ID field for S_Requests_Ar and SRP_ID field for S_Requests_Pt. (Right click – Zoom to Selection)

  - Add a validation exception (Right click – Mark as exception)

  - Edit an existing validation exception (Right click – Edit exception)

  - Delete an existing validation exception (Right click – Delete exception)

  - Export the QC results (critical and secondary errors) to a comma-delimited text file.

  - 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.

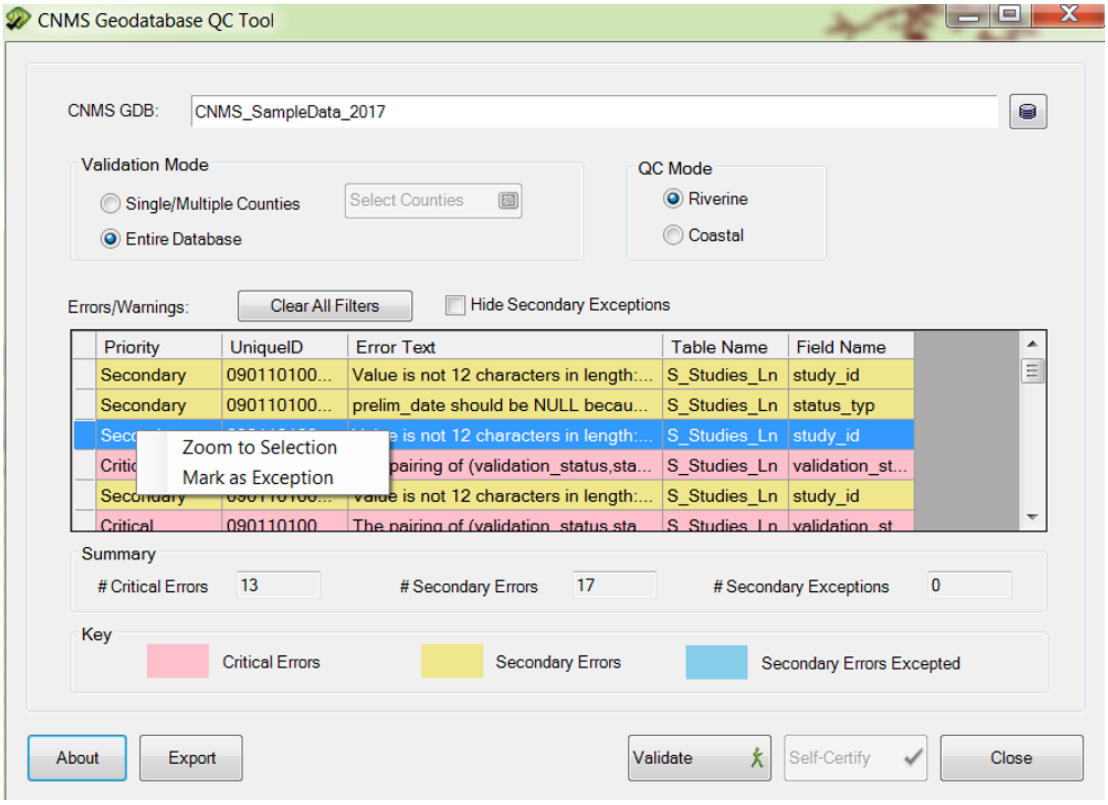


Figure J-7: CNMS FGDB QC Tool - Zoom to Error

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

- **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.

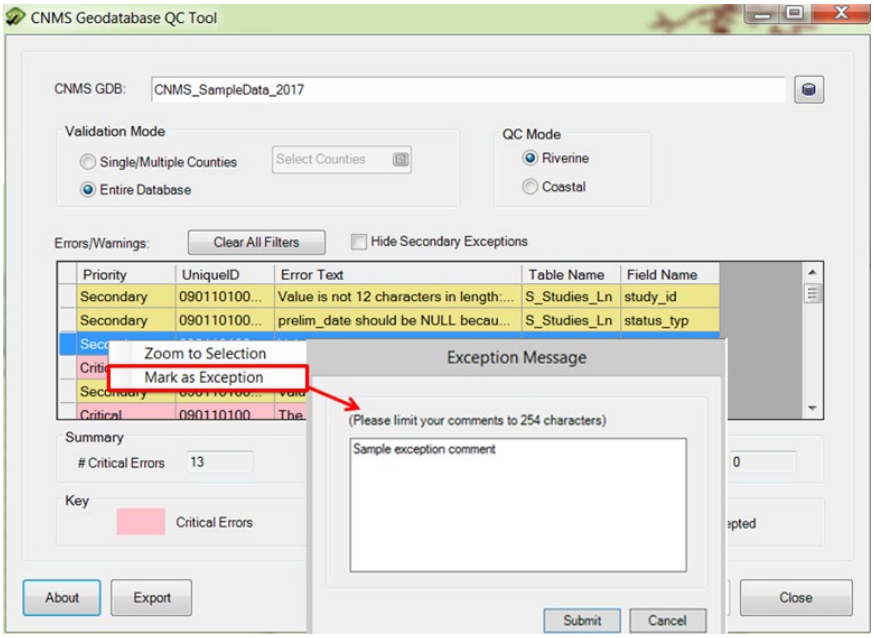


Figure J-8: CNMS FGDB QC Tool - Mark as Exception

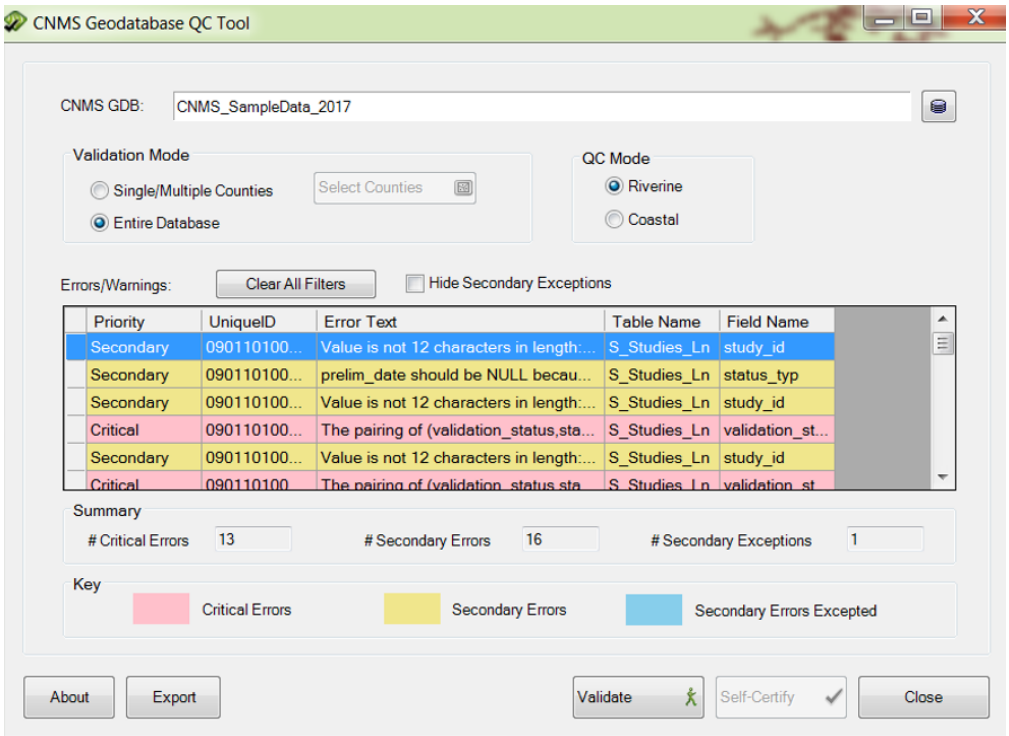


Figure J-9: CNMS FGDB QC Tool - Exception Entered

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

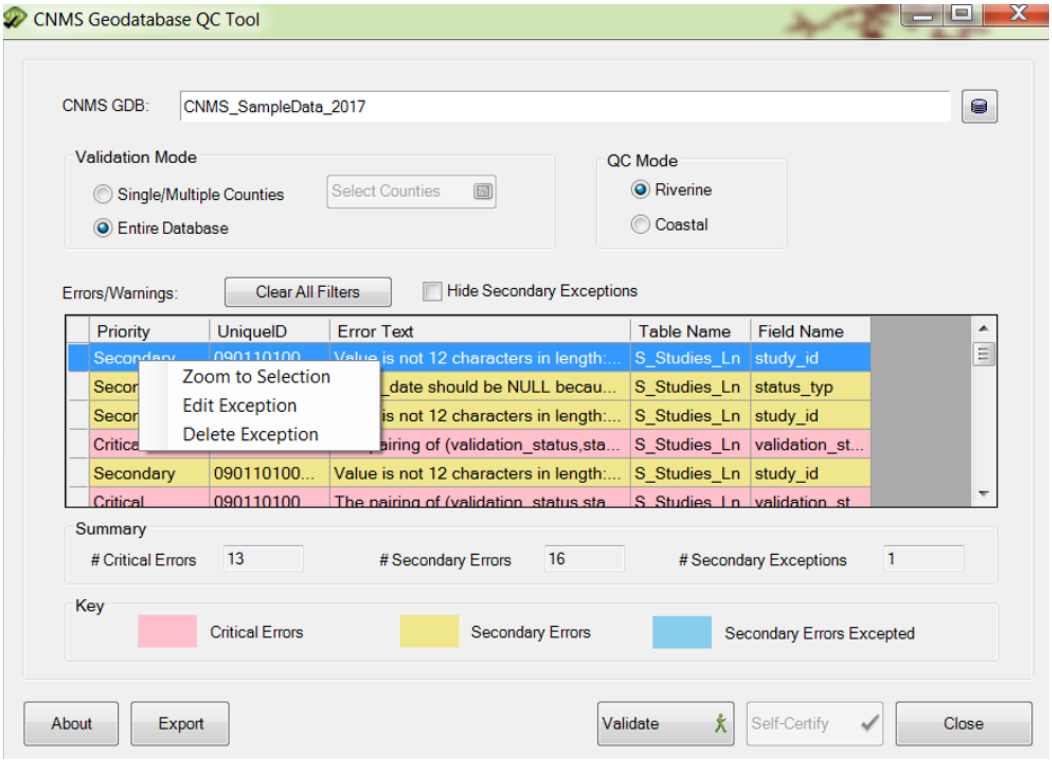


Figure J-10: CNMS FGDB QC Tool - Edit Exception

- 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.

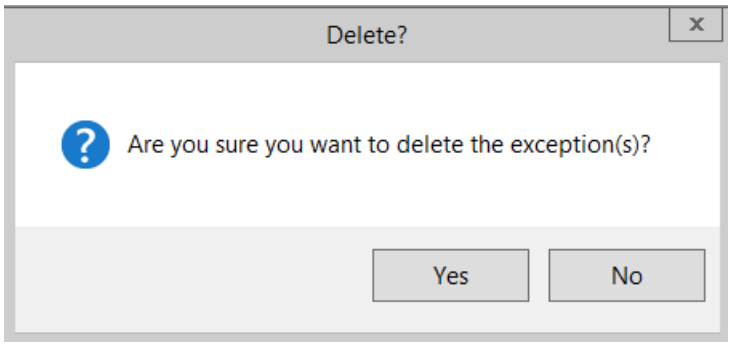


Figure J-11: CNMS FGDB QC Tool - Delete Exception

- 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:
  - All Critical validation items have been addressed.

- All Secondary validation items have been addressed or marked as exceptions with user documentation.

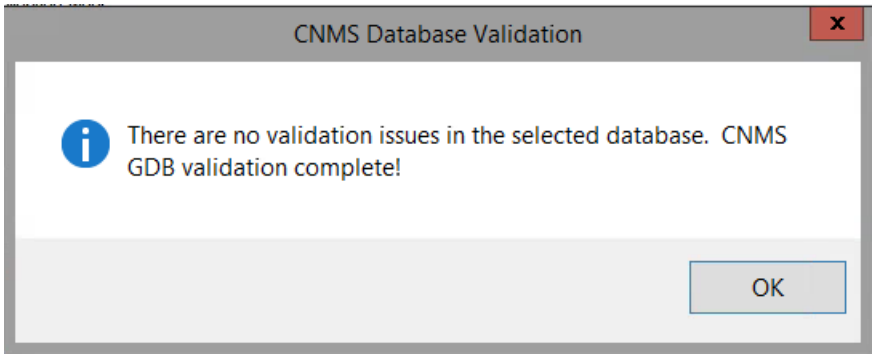


Figure J-12: CNMS FGDB QC Tool - Validation Complete

- 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.

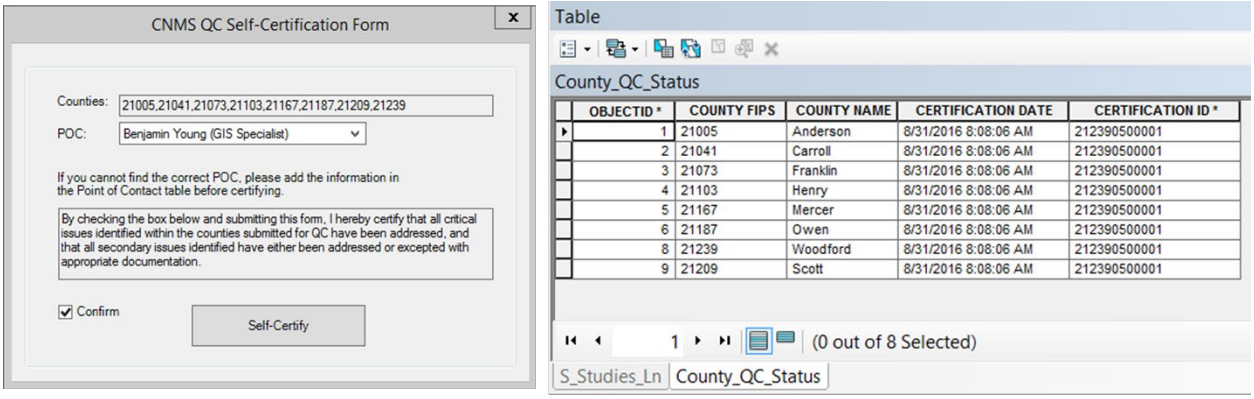


Figure J-13: CNMS FGDB QC Tool - Self-Certification Form and County_QC_Status Table

Additional CNMS FGDB QC Tool Features:

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

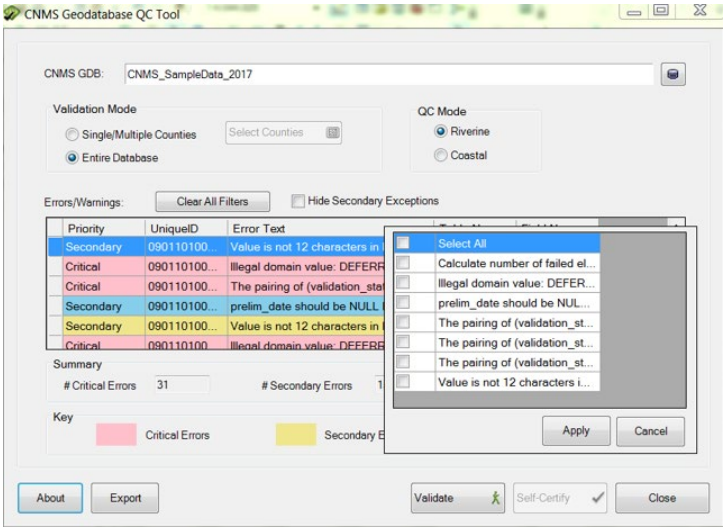


Figure J-14: CNMS FGDB QC Tool - Filtering

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

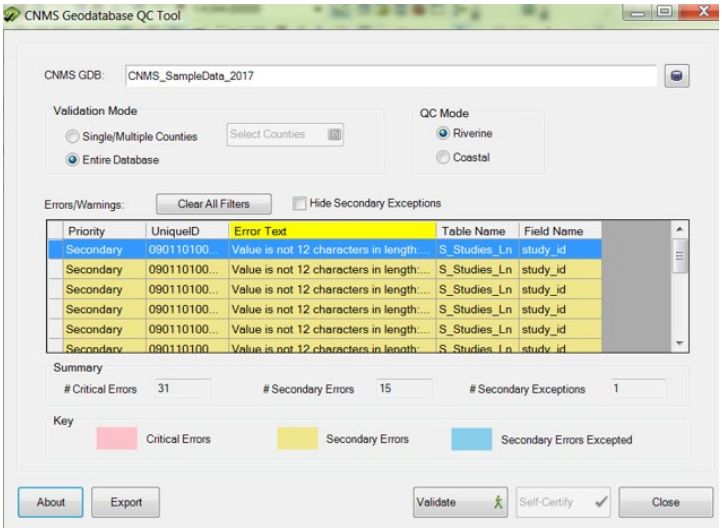


Figure J-15: CNMS FGDB QC Tool - Sorting

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