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# Coordinated Needs Management Strategy (CNMS) Technical Reference

## Database User's Guide

Version 5.3

May 2013



FEMA

## Document History Supporting Documents

Location
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### List of Acronyms

BFE	Base Flood Elevation
CE	Critical Element (reference the NVUE check list)
CNMS	Coordinated Needs Management Strategy
CTP	FEMA Cooperating Technical Partners
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FGDB	ESRI file geodatabase
FIPS	Federal Information Processing Standard
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FY	Fiscal Year
GIS	Geographic Information System
LFD	Letter of Final Determination
LOMR	Letter of Map Revision
MAS	Mapping Activity Statement
MIP	Mapping Information Platform
MSC	Map Service Center
NAIP	National Agricultural Imagery Program
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NVUE	New, Validated, or Updated Engineering
RSC	Regional Service Center

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SE	Secondary Element (reference the NVUE check list)
SFHA	Special Flood Hazard Area
USGS	United States Geologic Survey

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## Alphabetical List of Definitions

ASSESSED Validation Status	An ASSESSED Validation Status is assigned to flooding source centerlines in unmapped areas considered for a new study. This status is used for: allocation of resources for a new study in the current or a future fiscal year; or a deferment of the new study request. Streams not part of FEMA’s SFHA inventory (e.g., zone X, zone D, or Area Not Included), that have been, or are being considered for a new study, would fall under this category.
Bathymetry	The study of underwater depth.
CNMS	The Coordinated Needs Management Strategy (CNMS) is comprised of processes and data for tracking: New, Validated, Updated Engineering (NVUE); unverified study reaches with identified change characteristics; and requests for the flood mapping program.
CNMS Database	The CNMS database is stored in an ESRI FGDB format. Version 5.3 is comprised of the following tables: Studies Inventory (S_Studies_Ln), Requests (S_Requests_Pt and S_Requests_Ar), County Status Table (County_Status), and unmapped streams not in FEMA’s SFHA inventory (S_Unmapped_Ln). The inclusion of LOMR and coastal study footprint data are likely to necessitate additional tables.
CNMS Inventory	The CNMS Inventory includes flooding source centerlines representing FEMA’s modernized inventory of FIRMs; its unmodernized inventory of FIRMs; and unmapped areas. The centerlines enable calculation of NVUE. The feature classes associated with the CNMS Inventory are S_Studies_Ln and S_Unmapped_Ln. The CNMS FGDB Version 5.3 does not include the coastal portion of FEMA’s SFHA inventory.
CNMS Request Record	A CNMS Request Record represents either a flood data or cartographic mapping need. Flood data requests may address: the lack of an existing floodplain model; areas that remain unstudied; or SFHAs with approximate designations for which models are not available. The feature classes associated with CNMS Request Records are S_Requests_Ar and S_Requests_Pt.

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CNMS Study Record	A CNMS Study Record represents the most current knowledge of a mapped SFHA in FEMA’s inventory, or a stream considered for inclusion in FEMA’s SFHA inventory. The CNMS database feature class for CNMS Study Records is S_Studies_Ln.
CNMS Validation Checklist	The Validation Checklist (Appendix A and B) outlines a suggested format for documenting a Validation Status assignment decision that categorizes flood studies as VALID or UNVERIFIED. The Validation Checklist is used as the basis for data entry while populating CNMS study records.
Critical Element	One of seven elements documenting Physiological, Climatological and Engineering methodology (PCE) 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	Date 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	Ten additional elements, secondary to the Critical Elements, which document PCE changes reviewed during the engineering study validation process. These elements, if evaluated to ‘YES’ as a result of identification of deficiencies, and totaling four or more secondary element deficiencies, 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 studies in FEMA’s mapped SFHA inventory, or 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

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Inventory. Status types are useful in understanding and tracking map update investment decisions.

Study	A study represents a contiguous extent of FEMA's investment to perform an engineering-based evaluation of potential impacts of a flooding source. A single study in CNMS may be represented by one or more stream reaches.
UNKNOWN Validation Status	An UNKNOWN Validation Status is assigned to existing detailed and approximate flood hazard studies for which a CNMS evaluation is planned and in queue; currently being assessed under CNMS; or when CNMS evaluation is deferred. An UNKNOWN Validation status is also assigned to those studies for which inaccessibility of information results in an incomplete evaluation of the 17 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 FIRMs evaluated against the specifications provided in this document. This evaluation could result in a Validation Status of VALID (targeted condition), UNVERIFIED (requires map update investment), or UNKNOWN (needs further investigation). It is assigned for each CNMS Study Record.
VALID Validation Status	All VALID studies are considered NVUE compliant, and contribute to the NVUE Attained metric calculation. A VALID Validation Status is assigned to CNMS study records based on the standards provided in this document.
Vector Data	Typical forms of GIS vector data which include polygons, points, and polylines. Vector data are composed of vertices with relative or geospatially referenced coordinates sometimes containing vertical measurements.

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## Executive Summary

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

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

Validity of flood hazard studies is determined by identifying study attributes and change characteristics as specified in the Validation Checklist (Appendix A). These changes are evaluated for seven critical elements and ten secondary elements. One or more critical or four or more secondary documented changes will classify a flood hazard study as having an UNVERIFIED Validation Status. An UNVERIFIED Validation Status indicates studies for which resources for restudy have been assigned in the current fiscal year (FY) or will be assigned in a future FY, or those that are currently being restudied.

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

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

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

## 1. Introduction

Flood Insurance Rate Maps are FEMA’s most widely distributed flood hazard identification product. Flood hazard data presented on FIRMs are based on historic, meteorological, hydrologic, and hydraulic data, as well as open-space and land cover conditions, flood control works, and development. Due to the changing nature of the landscape from the influences of physical, engineering, and climatological processes, timely updates to Special Flood Hazard Area 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 is a collection of procedures for the identification and management of flood hazard mapping requirements utilizing a standard database model. In addition to recording and validating studies, CNMS defines an approach for the identification and management of flood hazard mapping needs and requirements that will provide support to data-driven planning and the flood hazard information production planning process. By utilizing and maintaining Geographic Information System and relational database technologies, CNMS has been designed to track the study attributes of the current state of FEMA’s study inventory and the lifecycle of studies from origination of a CNMS Study Record as an identified need or a CNMS Request Record to its resolution as a new, valid, or updated study. As such, CNMS allows tracking and management of existing, ongoing, and planned studies. GIS technology adds the capability of spatial analysis allowing communities and FEMA an effective means to visualize, enter, review, and update its study attributes and to visualize how studies relate spatially to other features. The terms and use of CNMS as it relates to other FEMA initiatives will be dictated and directed by FEMA policy.

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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 Checklist (Appendix A) is designed to guide the assessment of the validity FEMA’s study inventory.

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

A complete CNMS Study Record holds the validation evaluation results. There is potential for an extensive investigative effort to determine appropriate attribute values for a record. Users of CNMS must develop a plan and implement the plan for capturing background information used in the validation and subsequent attribute determination processes. Appendix B outlines the need for capturing this background information and also suggests ways to provide a summary of this information to FEMA. 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 metric is provided in Appendix F. FEMA will utilize the CNMS study records as the basis for reporting NVUE metrics. Appendix G provides procedures to update CNMS resulting from CLOMRs, LOMRs and the LOMA process. Appendix H provides the CNMS Quality Management Plan currently recommended for all CNMS development teams and includes step-by-step instructions for using the CNMS FGDB QC Tool.

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## 2. CNMS Data Development

This section identifies the key CNMS data development milestones and the steps needed to populate the CNMS File geodatabases (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 additional documentation for maintenance of the CNMS FGDBs. Section 2.4 identifies the data that may be created from the CNMS FGDBs. Section 2.5 provides the QA/QC procedures for updating and maintaining CNMS FGDBs.

### 2.1. Workflow and Process

Figure 2.1.1 and 2.1.2, and Sections 2.1.1 – 2.1.8 detail workflows and processes that warrant an update of the Regional CNMS FGDBs. The CNMS Data is organized by FEMA Regions and most ongoing updates and maintenance is conducted at a Regional level by utilizing the Regional CNMS FGDBs.

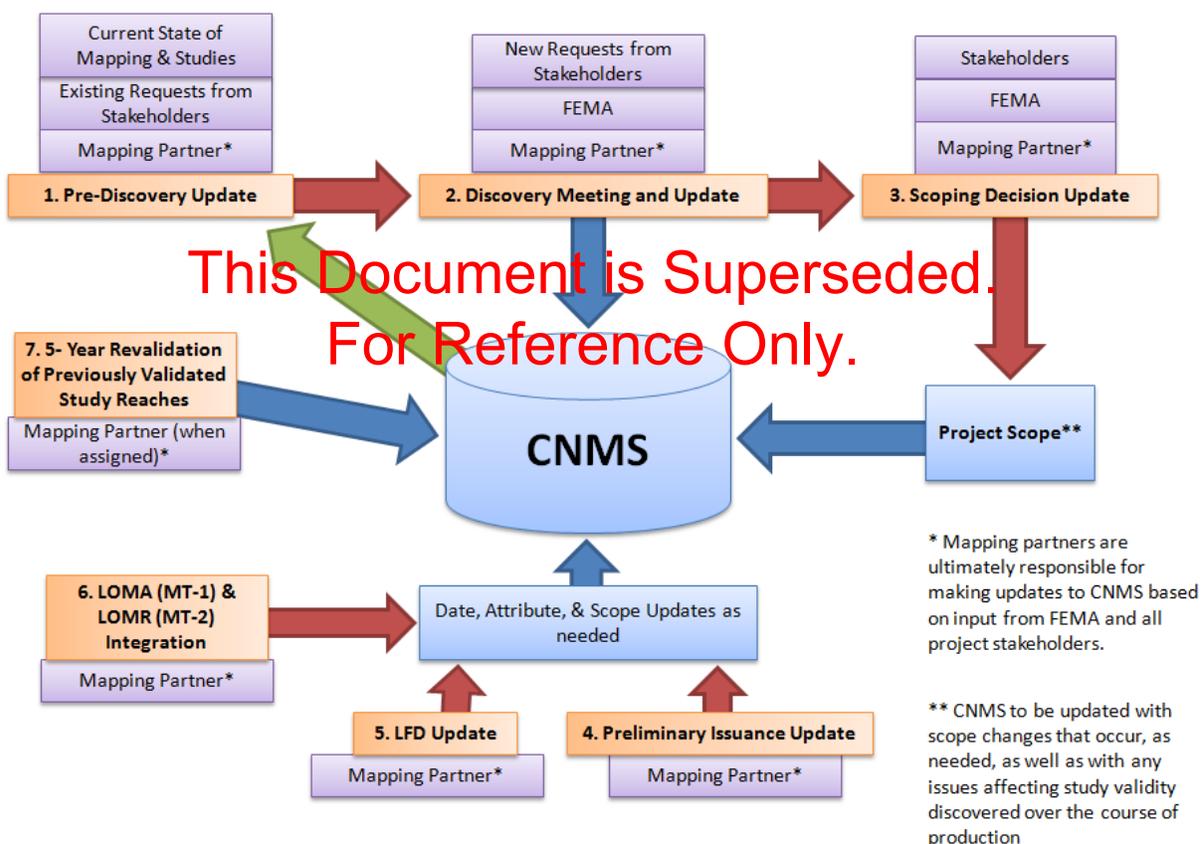
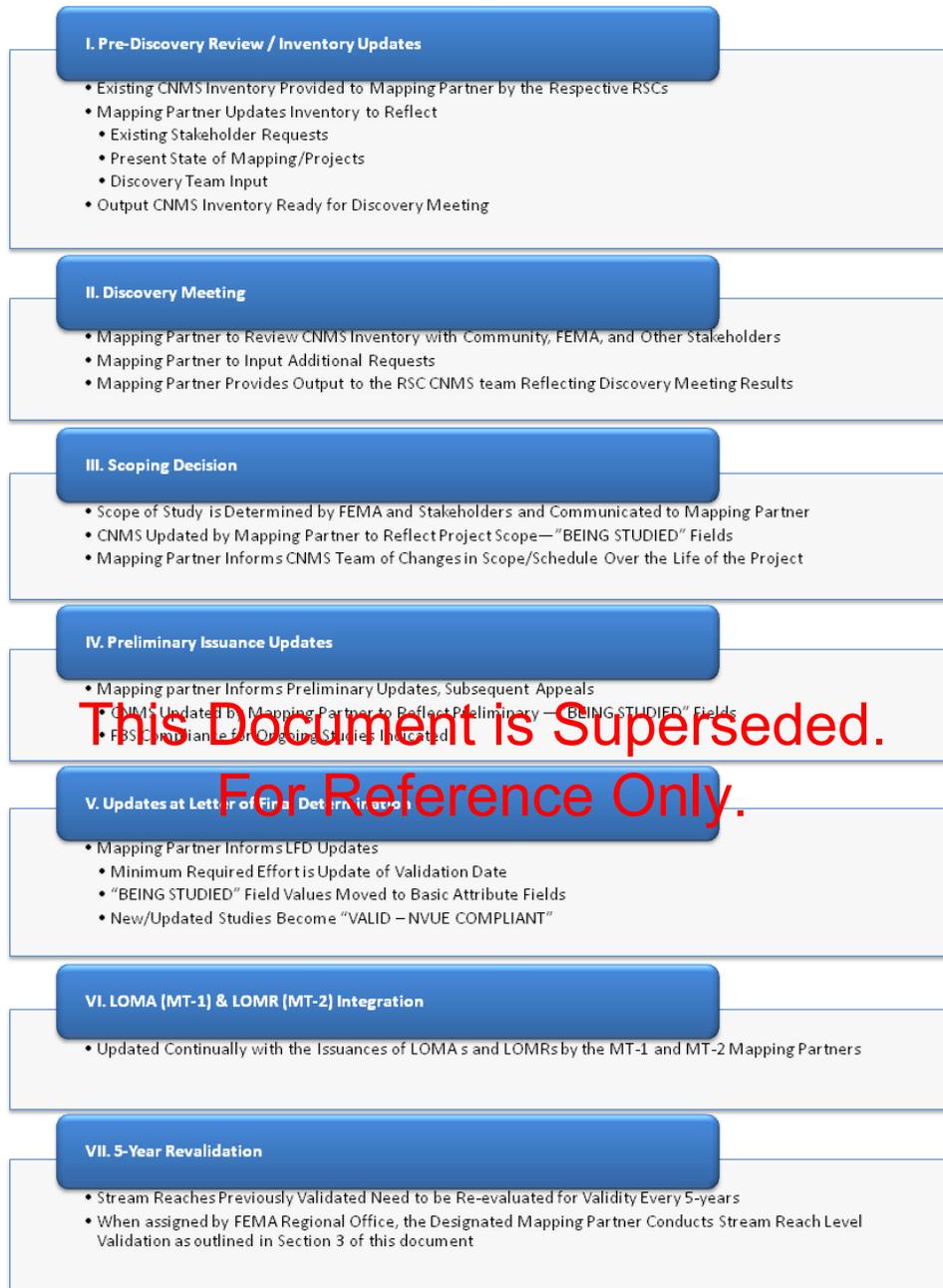


Figure 2.1.1 : CNMS Update Touchpoints



**Figure 2.1.2: CNMS Update Touchpoints**

## 2.1.1. Discovery and Scoping Phase Updates

Upon initiation of the Discovery phase for a new project, the RSC will export the project area from the Regional CNMS FGDB, and present it to the responsible Mapping Partner for initial review. The Mapping Partner will then provide input regarding the current status of the SFHA inventory for their area of

interest, which will be used to update the CNMS Inventory. 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.

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, and will submit back to the RSC for updating the Regional CNMS FGDB, within 15 days of scope finalization.

The Mapping Partner may choose to utilize the CNMS FGDB to capture CNMS Study and Request data during the course of the Discovery effort. The Mapping Partner is required to submit updated CNMS data only at the conclusion of the Discovery effort or at finalization of project scope, whichever is sooner. The minimum required attributes of the inventory file for all scoped engineering study reaches will be updated as outlined in Sections 3, 3.2, and the Validation Checklist in Appendix A if more detailed stream reach level assessment were to be performed as part of Discovery. The County\_Status table must be updated per guidance in Section 3.7.

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 LFD. For previously unmapped areas where new 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 A indicates which updated values are required or optional for CNMS FGDB feature class attribution. For a complete description of attributes and definitions please refer to Section 3.

The Mapping Partner will follow the quality guidelines in Section 2.5 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 the 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 3-years from date of extraction.

### 2.1.2. FIRM Production Phase Update

The Mapping Partner will use the latest version of the CNMS FGDB within the area of interest to track mapping and engineering issues encountered over the course of the production phase. Issues that will not be resolved by the new or updated engineering or mapping study should be documented appropriately in CNMS per guidelines in Section 3, 3.2, 3.5. The County\_Status table must be updated per guidance in Section 3.7.

### 2.1.3. Preliminary Issuance Phase Update

Within 15 days of Preliminary issuance, 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. This version will incorporate all new and revised geospatial elements of the vector flooding source centerline data developed during the production phase, including flooding sources which may not have been updated during the Risk MAP project, but for which new vector data was produced to align with the current base map. All data should be topologically correct and reflect the CNMS Study Record attribute update requirements per guidelines in Section 3 and 3.2.1. Other CNMS feature class data should be updated, as needed, to reflect changes in the s\_studies\_In feature class. The County\_Status table must be updated per guidance in Section 3.7.1.

Following creation of the updated CNMS FGDB incorporating data from the Preliminary phase, the Mapping Partner and RSC will perform a review and use the CNMS FGDB QC Tool to confirm format consistency and that all required attributes have been populated as outlined above. The RSC will then query and extract the corresponding geographic extent of CNMS FGDB from the regional CNMS FGDB and replace it with the updated version provided by the Mapping Partner. The extract of CNMS data from the regional CNMS database will be archived in the same centralized location mentioned in section 2.1.1. This extract will not replace the prior archived version from the Discovery or Production phase updates. This process should be completed within 15 days following receipt of the updated S\_Studies\_Ln feature class from the Mapping Partner.

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### 2.1.4. LFD Issuance Phase Update

Within 15 days of issuance of LFD, the Mapping Partner will submit data communicating the effective status of the project area of interest to the RSC for updating the regional CNMS FGDB. These data may simply be correspondence acknowledging no change in the data since Preliminary when applicable. If necessary, the Mapping Partner will procure the latest copy of the CNMS data for the geography of interest prior to starting this update. A final version of the CNMS FGDB for the project will be prepared by the RSC. At a minimum, when there are no changes since preliminary issuance of the FIRM, this version will update the validation date attribute to reflect the effective date established by the LFD. All data should be topologically correct and reflect the CNMS study attribute update requirements per guidelines in Section 3 and 3.2.4. Other CNMS feature class data should be updated, as needed, to reflect changes in the S\_Studies\_Ln feature class. The County\_Status table must be updated per guidance in Section 3.7 and specifically 3.7.4.

Following creation of the updated CNMS FGDB incorporating data from the LFD Issuance phase, the Mapping Partner and RSC will perform a review and use the CNMS FGDB QC Tool to confirm format consistency and that all required attributes have been populated as outlined above. The RSC will then query and extract the corresponding geographic extent of CNMS FGDB from the Regional CNMS FGDB and replace it with the updated version provided by the Mapping Partner. The extract of CNMS data from the Regional CNMS database will be archived in the same centralized location mentioned in section 2.1.1.

This extract will not replace the prior archived version from the Discovery, Production or Preliminary Issuance phase updates. This process should be completed within 15 days following receipt of the updated S\_Studies\_Ln feature class from the Mapping Partner.

In the event that a revised Preliminary is warranted, the Mapping Partner should follow the process outlined for the Preliminary Issuance phase update.

### 2.1.5. LOMA (MT-1) & LOMR (MT-2) Integration Workflow

Apart from gathering and incorporating LOMRs into CNMS during stream-reach-level validation as outlined in Appendix G, the efforts of the MT-1 and MT-2 teams within the PTS firms must be integrated with CNMS efforts to continually update the CNMS Inventory based on LOMR issuance. The MT-1 & MT-2 teams would incorporate mapping and flood data issues found as CNMS Requests Records using the process described in Sections 2.1.8 and Section 3.4.

### 2.1.6. Validation Checklist

The Validation Checklist in Appendix A guides the assessment of FEMA's study inventory. The central purpose of the Validation Checklist 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 UNKNOWN category is to be used only as a placeholder during the time that a CNMS evaluation is in queue, in progress, deferred, or is found insufficient to assess its validity. Studies with the UNKNOWN Validation Status should transition into one of the other two categories listed above as soon as warranted. As outlined in PM56, the decision to defer CNMS evaluation of studied streams with validation status UNKNOWN shall be coordinated with the FEMA HQ. Regions will need to re-assess streams in the deferred category at least every 5 years with the understanding that such assessment may be required sooner. Studied stream segments with the validation status of 'Invalid' are to be prioritized and funded for study updates. Therefore, as the Regional CNMS data is rolled up for quarterly reporting, Regions will need to review the list of newly invalidated studies and initiate assessment as to how these invalid studies will be prioritized and funded for updates. The CNMS data model also provides for storing information for unmapped streams that have been considered for a new study. Such stream centerlines are stored as CNMS Study Records and assigned a Validation Status of ASSESSED to indicate that the stream has been assessed for a new study. The outcome of such consideration may be that resources are allocated in the current or a future FY, or that the request for new study has been deferred. Section 3.2 outlines the attribution policy for CNMS Study Records.

### 2.1.7. NVUE Metrics Calculation and Reporting

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

## 2.1.8. CNMS Requests

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

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

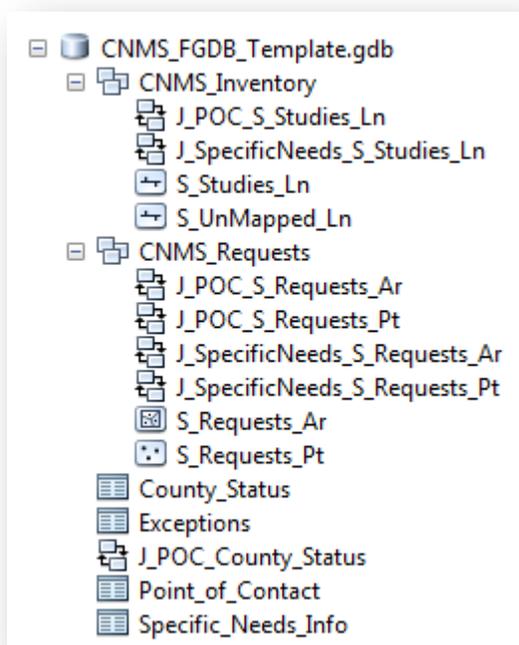
## 2.2. Data Input

### 2.2.1. CNMS Data model

The CNMS data model has three major components:

- CNMS ESRI file geodatabase – This template geodatabase 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 and data tables and associated relationship classes:
  1. the CNMS Inventory Feature Dataset [S\_Studies\_Ln, S\_Unmapped\_Ln], and
  2. the CNMS Requests Feature Dataset [S\_Requests\_Pt, S\_Requests\_Ar].
  3. Figure 2.2.1.1 identifies all other tables and relationship classes within the CNMS FGDB.

Although CNMS information is stored in an ESRI file geodatabase (FGDB) format, information can be extracted for use in other GIS platforms.



**Figure 2.2.1.1:** CNMS FGDB Components as seen in ESRI ArcCatalog

- CNMS E-R Diagram (Appendix C) - This schematic diagram illustrates the entities in the database, their relationships, and domains.
- CNMS Data Dictionary (Appendix D) - This comprehensive dictionary defines the type, format, domains, and field definitions of every entity in the database.

## 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 FIS text may be procured from the FEMA Map Service Center and Preliminary FIS Reports may be procured by accessing the MIP Citrix Drive K. The FIS report documents study engineering and mapping methodology and a list of studied streams associated with the geography represented in the FIS report.

## 2.2.3. LOMRs

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

## 2.2.4. FEMA Library

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

## 2.2.5. FIRM Data and Linework Sources

Sources of polylines to enter into the CNMS Studies Feature Class are varied and are the responsibility of the user to determine, but some potential sources of stream centerlines in a recommended order of priority are: 'S\_Profil\_Basln' from FIRM Database, 'S\_Wtr\_Ln' from the FIRM Database; National Hydrography Dataset (NHD) High, Medium, Low resolutions; or heads up digitization of a representative line for the SFHA. The above guidance is provided for S\_Studies\_Ln features representing SFHAs that are mapped for riverine flooding sources.

Effective FIRM Databases may be procured from the FEMA MSC and Preliminary FIRM Databases may be procured from the MIP Citrix Drive K.

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 F.

## 2.3. Documentation

The following is a list of documentation for CNMS:

- Appendix B describes the requirements for documentation of the validation process. Most data processed during the CNMS pilots and CNMS Phase 3 have associated documentation in a validation process documentation checklist described in Appendix B.
- Procedure Memorandum 56, revised June 2011, describes CNMS as the official reporting mechanism for the NVUE Attained metric and the source-of-record for stream-reach-level study status information.
- The Flood Study MAS (issued one per FY) that contains Discovery and Study scope related to CNMS activities.

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## 2.4. 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 removed structures against trends in urbanization

- Other Critical and Secondary validation element issues
- For CTP regional or national planning and reporting
  - Multi-Year Planning
  - Post-Purchase Management
  - NVUE Attained Metric
  - Life Cycle Cost Model (LCCM)

### 2.5. Quality

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

To meet the quality standards set forth by FEMA, the Mapping Partner will use the *CNMS FGDB 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 H to verify the attribute quality and database integrity of the data submitted for the phases identified in Section 2.1. It is possible for the Mapping Partner to procure the CNMS FGDB QC tool from the FEMA RSC to conduct a final quality review of the CNMS FGDB prior to submission.

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

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		Component GIS Feature Classes and Business Tables of the CNMS File Geodatabase Model						
		<i>"The Inventory" of Studied Streams</i>	<i>Streamlines for Unmapped Areas</i>	<i>Mapping Requests Information</i>		<i>County_Status</i>	<i>Floodplain Studies SMEs</i>	<i>Ancillary Information</i>
CNMS Touchpoints		S_Studies_Ln (3.2)	S_Unmapped_Ln (3.5)	S_Request_Ar (3.4)	S_Request_Pt (3.4)	County_Status (3.7)	Point_of_Contact (3.8)	Specific_Needs_Info (3.6)
<b>CNMS Usage Matrix for Floodplain Studies</b>	<b>Pre-Discovery</b>	Review current status of studies within Watershed	Review unmapped stream reaches within Watershed for awareness purposes	Review for Request Records on file within the Watershed to consider for inclusion in a study SOW		Review information contained within to increase working knowledge of Counties within the watershed being considered for the study update process	Review information contained within to refresh working knowledge of local persons and contact information to facilitate communication with SMEs	Review information contained within to increase working knowledge of watershed being considered for the study update process
	<b>Discovery Meeting</b>	Current CNMS inventory status for the Discovery area of interest is presented on Discovery Map (Section 3.2.1)	If necessary, unmapped streams are displayed in the Discovery Map.	Normal Request Record generation is applied. Should a production team discover mapping issues through the Discovery process or during production that are not covered by the study MAS/SOW, Request Records should be developed to capture the details of a request		No actions required (Section 3.7.1)	Update POC names and contact information where applicable	No actions required
	<b>Post-Discovery (3.2.2, 3.7.2)</b>	Data in S_Studies_Ln are to be updated to reflect extent of flooding in study that the study process has been initiated, and the estimated Preliminary Issuance and LFD dates are entered. (Section 3.2.2)	Migrate flooding source centerline data for floodplains being studied that are not yet represented in S_Studies_Ln (the Inventory)	Request Records can be included in the Discovery Map (maps/GIS) presented at Discovery Meeting for refinement and the collection of new Request Records.		Update records as needed (Section 3.7.2)	Update POC names and contact information where applicable	Update Specific_Needs_Info information where applicable
	<b>Preliminary Issuance (3.2.3, 3.7.3)</b>	Set study PRELM_DATE with actual Preliminary Issuance date and revise the estimated LFD date (Section 3.2.3). Update other attributes for these reaches to reflect Preliminary, and populate fields indicating FBS Compliance.	Suggestion: Delete the study related flooding source centerlines from the S_Unmapped_Ln feature class data (specifically, the lines that were migrated to S_Studies_Ln)	Request_Ar and Request_Pt should be edited to indicate resolution of Request Records that have been addressed during the study process		Update records as needed (Section 3.7.3)	Update POC names and contact information where applicable	Update Specific_Needs_Info information where applicable
	<b>Letter of Final Determination (LFD) (3.2.4, 3.7.4)</b>	New or Updated studies are to be set to "Valid" at this milestone. Information in the "Being Studied" (BS) Fields is to be migrated to the complimentary S_Studies_Ln fields to indicate that the study is completed once LFD is issued. The actual LFD date is to be recorded, and the "Being Studied" (BS) fields should be cleared after their values are migrated (Section 3.2.4)	No actions required	Resume/maintain fundamental, ongoing Request capture process		Update records as needed (Section 3.7.4)	Update POC names and contact information where applicable	Update Specific_Needs information where applicable
	<b>Post-Production Updates - LOMA, LOMR, 5-Year Revalidation</b>	Use Appendix A and G to address S_Studies_Ln updates during Post-Production Activities	No actions required	Resume/maintain fundamental, ongoing Request capture process		Update records as needed (Section 3.7)	Update POC names and contact information where applicable	Update Specific_Needs information where applicable

**Figure 3.1. CNMS Record Entry Determination (Section titles are in parentheses)**

## 3. Data Entry Process

Figure 3.1 summarizes the workflows and touch points that warrant CNMS data inputs. Structurally, these data inputs are separated into two types of feature classes: the CNMS Inventory feature dataset with feature classes ‘S\_Studies\_Ln’ and ‘S\_Unmapped\_Ln’, and the CNMS Requests feature dataset: with feature classes ‘S\_Requests\_Ar ‘ and ‘S\_Requests\_Pt’. In addition to these feature datasets, several tables within the CNMS FGDB require specific update. Attribute population policies for each feature class and table are outlined in sections 3.1 – 3.9.

The validation checklist table in Appendix A may be used as a working document while performing stream-reach-level validation, results of which need to be transferred to the Validation Process Documentation Checksheet in Appendix B and to the appropriate CNMS Study Records in the CNMS FGDB.

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

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### 3.1. Primary Key Considerations

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

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

Primary key generation for most tables within CNMS is based upon a standard scheme consisting of the concatenation of the appropriate 5 digit County FIPS code, a 2 digit table identification code, and a 5 digit counter in which leading zeros are always populated and serve as place holders. For example, to generate a REACH\_ID in S\_Studies\_Ln, 201190100001 would be an appropriate assignment where 20119 is the county FIPS code, 01 is the table identification code for S\_Studies\_Ln and 00001 is the counter value for the first record in S\_Studies\_Ln for Meade County, Kansas. For tables following the standard scheme and variations thereof, the length of the key is expected to be 12. Tables such as Point\_of\_Contact allow for

variations of the scheme. For example, a state-level POC record might substitute the 2 digit state FIPS followed by three zeros for the 5 digit county FIPS. The only table within the CNMS data model which does not follow the standard primary key scheme is the County\_Status table, for which CO\_FIPS is the primary key by virtue of its inherent uniqueness.

### 3.2. S\_Studies\_Ln Feature Class (Polyline)

The S\_Studies\_Ln feature class resides in the CNMS Inventory feature dataset. Each feature within S\_Studies\_Ln is meant to fully encompass the physical extent, upstream and downstream, of a reach that is regulated by an SFHA under the National Flood Insurance Program (NFIP). Records representing unmapped reaches and bodies of water may optionally be present in this feature class, provided that they have been ASSESSED for new study prioritization.

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

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

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

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

Unlike riverine flooding sources, lakes and ponds that are part of FEMA’s mapped SFHA inventory are often disconnected from stream centerlines and are two dimensional, making linear representations of these areas a challenge. Ignoring lakes and ponds altogether would underestimate the representative miles used for NVUE percentage calculations while including the entire shoreline of these areas would overestimate the representative miles used. If the stream centerline sources identified above for riverine flooding sources have line work passing through the lakes or ponds, those may be used to represent these flooding sources (this includes center line digitization). If none of the datasets has line work usable as described above, to the appropriate manner in which to address these flooding sources is to then store the actual polyline representing the lake or pond shore in the CNMS Inventory and to then 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 standard will have a value of ‘YES’ in the FBS\_CMPLNT field. This value is updated upon Preliminary issuance with information typically received from the Regional Support Centers.

Sections 3.2.1 – 3.2.4 outlines the updates needed for the S\_Studies\_Ln table at various Risk MAP phases.

**Table 3.2.1. S\_Studies\_Ln (Table ID Code: 01)**

Field	Description
<b>REACH_ID</b>	Primary key for table. Assigned by table creator.
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.
Potential source to obtain	A programmatic approach that prefixes five record counting digits with the 5 digit County FIPS code and a 2 digit feature class ID will produce a number like 201190100001 (20119 is the county FIPS code, 01 is the feature class ID for S_Studies_Ln and 00001 represent record counting digits) for the first record in S_Studies_Ln for Meade County, Kansas. No repeat counting digits should be used within the same county.
Anticipated use for attribute	Unique identification of each individual CNMS record.
<b>STUDY_ID</b>	Internal key used to establish relationship between reaches.
Type of data expected	This field will be a 12 digit string
Potential source to obtain	The value in this field will typically represent the existing REACH_ID of a single reach amongst a group of related reaches.
Anticipated use for attribute	Key field used to link multiple reaches which represent segments of the same study. This field can also be used to link multiple reaches to external supporting data which is common among them. The expected relationship between this field and individual S_Studies_Ln features in one to many, with a single STUDY_ID being represented by one or more features.
<b>CO_FIPS</b>	Federal Information Processing Standard code
Type of data expected	Five-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 EPA: <a href="http://www.epa.gov/enviro/html/codes/state.html">http://www.epa.gov/enviro/html/codes/state.html</a>
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.
<b>CID</b>	Community Identification Number

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Field	Description
Type of data expected	A unique five or six-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
<b>WATER_NAME</b>	Name of flooding source
Type of data expected	Water feature name (ex. Mississippi River, Lake Superior, Pacific Ocean).
Potential source to obtain	The name of the flooding source should come from the FIS, FIRM, FIRM DB, or source stream network, and should be given that order of importance. The FIS lists profiles in alphabetical order in the table of contents and usually discusses them in other FIS sections in that same order. Section 1.2 should list all of these streams and the dates they were studied. Section 2.1 should also list all the streams studied by detailed methods, and should also list all the streams studied by approximate methods. Note that the FIRM Database should not be the sole source of information that is used to evaluate stream reaches. Often times there are graphic features or annotation on the PDF map panel that will help identify a stream reach.
Anticipated use for attribute	This attribute provides a geographic place name reference.
<b>WATER_NA_1</b>	Alternate name of flooding source
Type of data expected	Water feature name (ex. Mississippi River, Lake Superior, Pacific Ocean).
Potential source to obtain	If an alternative name of a flooding source is identified from the sources identified for the 'WATER_NAME' field, which will be stored here. Any other indications of an alternate name will also be captured in this field.
Anticipated use for attribute	This attribute provides a geographic place name reference.
<b>FLD_ZONE</b>	Zone type of the SFHA the polyline represents (ex. Zone AE, Zone A)
Type of data expected	Entry from domain lookup table D_ZONE
Potential source to obtain	Flood zones depicted in the FIRM and/or FIRM Database of the NFIP
Anticipated use for attribute	Query into the characteristics of the inventory: type of study, Validation Status, mileage.
<b>VALIDATION_STATUS</b>	This attribute establishes the latest evaluation condition of a flooding source centerline in relation to the criteria set forth in the <i>CNMS Technical Reference</i> , any procedure memorandums, or previous work.
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 <i>CNMS Technical Reference</i> , 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.
<b>STATUS_TYPE</b>	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 <i>CNMS Technical Reference</i> , any procedure memorandums, or previous work.
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 <i>CNMS Technical Reference</i> , 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.
<b>MILES</b>	An attribute of the calculated miles of the data record entry
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

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Field	Description
	local or State projections. During National data consolidation and analysis, the projection will be standardized across all Regions and mileage recalculated to a National standard.
Anticipated use for attribute	Quantifies the CNMS Inventory in stream miles for reporting (ex. NVUE, quarterly reports)
<b>SOURCE</b>	Source of polyline segment represented in the inventory
Type of data expected	Entry from domain lookup table D_SOURCE
Potential source to obtain	User sourced dataset used for the polyline entry (ex. NFHL, RFHL, FIRM Database, NHD)
Anticipated use for attribute	Verify source of polyline used, and also determine whether it could be updated to a more accurate polyline feature if one becomes available.
<b>STATUS_DATE</b>	Date when CNMS stream reach validation is completed or a validation assessment of the stream reach has been made. UNVERIFIED records will have the date the CNMS evaluation triggered the UNVERIFIED status. If an unverified study becomes VALID, the date of the status change is recorded.
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	Calendar
Anticipated use for attribute	Determine the most recent analysis and condition of the polyline. Will track and maintain the currency of the inventory, to insure all requirements are being adhered to according to mandates set forth within the NFIP.
<b>FY_FUNDED</b>	Attribute of the most recent effective FEMA fiscal year funding applied to the stream reach engineering at the time of study (ex. Watershed, county)
Type of data expected	Entry from domain lookup table D_FY_FUNDED
Potential source to obtain	MIP case numbers (as they are associated with fiscal year first funded), RSC Management
Anticipated use for attribute	Determine the latest FEMA funding year for the underlying SFHA engineering study.
<b>REASON</b>	Attribute allows for user input of detailed description of considerations or special circumstances and is being cataloged at attributes VALIDATION_STATUS, SOURCE, or any pertinent information in the data creation process.
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.
<b>HUC8_KEY</b>	8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds known 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.
Type of data expected	8-digit Hydrologic Unit Code
Potential source to obtain	Originator: United States Geological Survey (USGS): <a href="http://nhd.usgs.gov/data.html">http://nhd.usgs.gov/data.html</a> ; or EPA surf your watershed: <a href="http://cfpub.epa.gov/surf/locate/index.cfm">http://cfpub.epa.gov/surf/locate/index.cfm</a>
Anticipated use for attribute	Provides an attribute to determine what HUC 8 sub-basin the polyline resides in.
<b>STUDY_TYPE</b>	Study type of the SFHA represented by the reach based on the current effective FIS text.
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.
<b>LINE_TYPE</b>	Attribute provides description of flooding source line type as being Riverine, Lake, Pond, Playa, Ponding, or Other.

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Field	Description
Type of data expected	Entry from domain lookup table D_LINE_TYPE
Potential source to obtain	Current entry or user assessed entry based on line geometry source.
Anticipated use for attribute	Attribute will allow for the identification of non-riverine flooding sources which do not fit well with the linear riverine model for calculating NVUE mileage. This attribute is to be used to equate the level of effort associated with each of line type relative to the level of effort associated with Riverine studies.
<b>FBS_CMLNT</b>	Is the flood plain represented by this feature FBS Compliant? (NO/YES/UNKNOWN)
Type of data expected	This is a YES/NO field based upon domain lookup table D_ELEMENT.
Potential source to obtain	Regional Support Centers and / or TSDN
Anticipated use for attribute	Tracking FBS compliance across the National Inventory
<b>FBS_CHKDT</b>	Date when the current value within the FBS_CMLNT field was populated.
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	Calendar
Anticipated use for attribute	Tracks attribution of latest FBS compliance value.
<b>FBS_CTYP</b>	FBS compliance check type – bulk attributed at county level or attributed individually.
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_CMLNT field is populated, based upon check type
Anticipated use for attribute	Indicator of the type of FBS check performed for this reach
<b>DUPLICATE</b>	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)
Type of data expected	<p>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 1' by default. An exception to this is that two lines are to always be shown at Regional boundaries, even when the same study is used for both entities. Ideally, the line set to 'CATEGORY 1' will be the one with a better Validation Status and a more detailed study out of the two that represent two studies performed on the same reach. This way, while considering stream miles for a watershed based scoping, the better study could be hidden by a query, and the mapping needs will become more apparent.</p> <p>The hierarchy for determining the 'better' of the two studies is defined as follows and the bullets are organized in decreasing order, meaning the criteria in the first bullet supersedes ones below it for defining a better study. Legend: '&gt;' = 'better than'</p> <ul style="list-style-type: none"> <li>• Detailed study &gt; Approximates (<i>regardless of Validation Status or study type</i>)</li> <li>• 'Valid' study &gt; 'Unknown' study &gt; UNVERIFIED study (<i>assuming both studies in question are detailed or both are approximate</i>) <ul style="list-style-type: none"> <li>• Redelineated &gt; Digital Conversion &gt; Non-digital (<i>assuming level of detail and Validation Status is the same for the 2 studies in question</i>)</li> <li>• Study date or number of failed elements can be used to further differentiate between two of the same study types. (<i>Newer studies are better. Lesser elements failing is better. Secondary elements failing is better than critical ones</i>)</li> </ul> </li> </ul>
Potential source to obtain	While completing this field, one must check the same stream on the neighboring county to see if there is a second study for the same reach extent.
Anticipated use for attribute	<p>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.</p> <p>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.</p>

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Field	Description
<b>POC_ID</b>	Foreign key to join to 'Point_of_Contact' table. ID for Point of Contact
Type of data expected	This field, if populated, should have a matching record in the 'Point_of_Contact' table.
Potential source to obtain	Establishing the relationship of 'S_Studies_Ln' records and 'Point_of_Contact' records is user controlled.
Anticipated use for attribute	This field is used to establish a database relationship with records in the 'Point_of_Contact' table. The supporting idea is to relate record ownership information to specific CNMS records.
<b>DATE_RQST</b>	The date a study is determined to be unverified
Type of data expected	This field is of the type date. Data 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.
<b>DATE_EFFCT</b>	Date of effective analysis
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 <i>first</i> went effective is sufficient as well, especially when supporting data is sparse. Data should be entered in the MM/DD/YYYY format.
Potential source to obtain	The date of effective analysis for a detailed study is usually included in Section 1.2 in the FEMA Insurance Study (FIS) text.
Anticipated use for attribute	This date will be evaluated for age of analysis of the effective study.
<b>HYDRO_MDL</b>	Hydrologic model used for the effective study
Type of data expected	In this domain based field the user should choose the name of the hydrologic model used and version, as appropriate.
Potential source to obtain	There are two references in which one expects to find this information. One is in the reference section of the Flood Insurance Study (FIS) text and the second is the Technical Support Data Notebook (TSDN) for the study. A complete domain list of Hydrologic Models recognized by FEMA can be accessed on FEMA's Mapping Information Platform (MIP) on FEMA's website.
Anticipated use for attribute	Reference and evaluation
<b>HYDRA_MDL</b>	Hydraulic model used for the effective study
Type of data expected	In this domain based field the user should choose the name of the hydraulic model used and version, as appropriate.
Potential source to obtain	There are two references in which one expects to find this information. One is in the reference section of the Flood Insurance Study (FIS) text and the second is the Technical Support Data Notebook (TSDN) for the study. A complete domain list of Hydraulic Models recognized by FEMA can be accessed on FEMA's Mapping Information Platform (MIP) and FEMA's website.
Anticipated use for attribute	Reference and evaluation
<b>HODIGFMT</b>	Is the effective study's hydrologic model in digital format? (NO/YES/UNKNOWN)
Type of data expected	Yes or no is expected to indicate whether the data are digital or not.
Potential source to obtain	User evaluation of the data format
Anticipated use for attribute	Evaluation of the data relative to the expected effort associated with use of the data
<b>HADIGFMT</b>	Is the effective study's hydraulic model in digital format? (NO/YES/UNKNOWN)
Type of data expected	Yes or no is expected to indicate whether the data are digital or not.
Potential source to obtain	User evaluation of the data format
Anticipated use for attribute	Evaluation of the data relative to the expected effort associated with use of the data
<b>HO_RUNMOD</b>	Can the effective study's Hydrologic digital model be run? (NO/YES/UNKNOWN)
Type of data expected	Yes or no is expected to indicate whether the data can be run in a model.
Potential source to obtain	User evaluation of the data format
Anticipated use for attribute	Evaluation of the data relative to the expected effort associated with use of the data
<b>HA_RUNMOD</b>	Can the effective study's Hydraulic digital model be run? (NO/YES/UNKNOWN)
Type of data expected	Yes or no is expected to indicate whether the data can be run in a model.
Potential source to obtain	User evaluation of the data format

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Field	Description
Anticipated use for attribute	Evaluation of the data relative to the expected effort associated with use of the data
<b>C1_GAGE</b>	Critical Element 1, Change in gage record. Major change in gage record since effective analysis that includes major flood events? (NO/YES/UNKNOWN) NOTE: Users may indicate change in rainfall record or other climatologic data in this field if gage data is not available but other precipitation indicators are available.
Type of data expected	This YES/NO 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.
<b>C2_DISCH</b>	Critical Element 2, Change in Discharge. Updated and effective peak discharges differ significantly based on confidence limits criteria in FEMA's <i>Guidelines and Standards for Flood Risk Analysis and Mapping</i> ? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO 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 you how many years of record were used in the model. Gage data are measured, compiled and served via web access by the USGS. The gage ESRI shapefile will tell you if there are continuous and updated years of record available. Determine if 100-yr discharge obtained by running PeakFQ at effective date is still within 68% confidence interval of the Bullet 17B 100-yr estimate using updated gage data and PeakFQ. If not, Critical Element is set to 'YES'
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.
<b>C3_MODEL</b>	Critical Element 3, Model methodology. Model methodology no longer appropriate based on <i>Guidelines and Standards for Flood Risk Analysis and Mapping</i> (i.e. one-dimensional vs. two-dimensional modeling, Coastal Guidelines). (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not the model methodology used to produce the effective analysis still meet current guidelines and specifications.
Potential source to obtain	Research and general knowledge to be provided by engineering staff.
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.
<b>C4_FCSTR</b>	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)? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO 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.
<b>C5_CHANN</b>	Critical Element 5, Channel Reconfiguration. Current channel reconfiguration outside effective SFHA? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not any channel reconfiguration outside the effective special flood hazard area (SFHA) have been observed since the effective analysis was completed.
Potential source to obtain	NAIP or DOQQ imagery can be used to determine if the mapped SFHAs do not match the channel configurations on the aerial. If they do not match, record a YES. If you record a YES be sure you can go back and state with confidence that the SFHAs do not match information on the aerial. NOTE: when stating YES, 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.
<b>C6_HSTR</b>	Critical Element 6, Hydraulic Change 2. 5 or more new or removed hydraulic structures (bridge/culvert) that impact BFEs? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not 5 or more new or removed hydraulic structures (bridge/culvert) that impact base flood elevations (BFEs) have been observed

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Field	Description
	since the effective analysis was completed. Consider any combination of new and removed of 5 or more structures (i.e. 3 new and 3 removed). This should not be used to supersede the Letter of Map Revision process.
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.
<b>C7_SCOUR</b>	Critical Element 7, Channel Area Change. Significant channel fill or scour? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not significant channel fill or scour has been observed since the effective analysis was completed.
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record.
<b>S1_REGEQ</b>	Secondary Element 1, Regression Equation. Use of rural regression equations in urbanized areas? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not a regression equation intended for rural use was used in an urbanized area.
Potential source to obtain	An existing study will indicate the use of a regression equation and provide information on the area for which the model was run. This field could indicate the incorrect use of a regression equation intended for rural areas in urban areas or could capture that urban sprawl has overtaken a once rural area for which a rural regression equation model has been run.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S2_REPLO</b>	Secondary Element 2, Repetitive Loss. Repetitive losses outside the SFHA? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO 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 YES
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S3_IMPAR</b>	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.)? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there is a significant increase in impervious surface in the sub-basin since the effective study.
Potential source to obtain	Taking advantage of remote sensing land use classification data, or change detection analyses are potential sources for this field.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S4_HSTR</b>	Secondary Element 4, Hydraulic Structure. More than 1 and less than 5 new or removed hydraulic structures (bridge/culvert) impacting BFEs? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there have been 1 to 4 new and/or removed hydraulic structures that impact BFEs since the effective study. This should not be used to supersede the Letter of Map Revision process.
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S5_CHIMP</b>	Secondary Element 5, Channel Improvements. Channel improvements / Shoreline changes? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there have been any channel improvement or shoreline changing projects since the effective study. This should not be used to supersede the Letter of Map Revision process.
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation but one might check the local public works department for available supporting documentation.

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Field	Description
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S6_TOPO</b>	Secondary Element 6, Topography Data. Availability of better topography/bathymetry? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there are new topographic data meeting FEMA minimum standards available since the effective study.
Potential source to obtain	Look into all the resources available to determine if newer and/or more accurate topographic data are available for the reach and record a yes if you find updated topography (this will ultimately be based on whether or not new topographic data meet FEMA's minimum standards and are better than what was used for the effective study. The investigation of 'YES's' should be performed with an engineer or manager).
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S7_VEGLU</b>	Secondary Element 7, Vegetation or Land Use. Changes to vegetation or land use? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there are significant changes in land use or vegetation since the effective study. This does NOT include urban change.
Potential source to obtain	Look at the NAIP (streaming) and other sources available to you to determine if the area has experienced changes to vegetation or land use.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S8_DUNE</b>	Secondary Element 8, Coastal Dune. Failure to identify primary frontal dune in coastal areas? (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there was a failure to identify a primary frontal dune in coastal areas since 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 disaster or the FIS text.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S9_HWMS</b>	Secondary Element 9, High Water Mark Significant storms with High Water Marks. (NO/YES/UNKNOWN)
Type of data expected	This YES/NO field is to capture whether or not there is recent storm surge high water mark data now available following the effective study.
Potential source to obtain	The originator of the CNMS record should have professional knowledge of this situation. One might reference an after action report following a recent high water event.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>S10_REGEQ</b>	Secondary Element 10, Regression Equation. New regression equations available? (NO/YES/UNKNOWN)
Type of data expected	The originator of the CNMS record should have professional knowledge of this situation. This information may come to light following the release of a new study that includes a new regression model.
Potential source to obtain	Research and general knowledge to be provided by engineering staff.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED
<b>CE_TOTAL</b>	Total number of critical elements
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 > 0
<b>SE_TOTAL</b>	Total number of secondary elements
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 >= 4
<b>COMMENT</b>	Additional comments
Type of data expected	Additional analyst comments.

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Field	Description
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.
<b>BS_ZONE</b>	Zone type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.
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.
<b>BS_STDYTYP</b>	Study type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.
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.
<b>BS_HYDRO_M</b>	Hydrologic model used for creating the SFHA represented by the reach currently being studied based on scoping data or the preliminary FIS text.
Type of data expected	In this domain based field the user should choose the name of the hydrologic model used and version, as appropriate.
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.
Anticipated use for attribute	Stores the study type of a study currently in progress.
<b>BS_HYDRA_M</b>	Hydrologic model used for creating the SFHA represented by the reach currently being studied based on scoping data or the preliminary FIS text.
Type of data expected	In this domain based field the user should choose the name of the hydraulic model used and version, as appropriate.
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.
Anticipated use for attribute	Stores the study type of a study currently in progress.
<b>BS_FY_FUND</b>	When relevant - Attribute of the most recent non-effective FEMA fiscal year funding applied to the stream reach engineering at the time of study (ex. Watershed, county)
Type of data expected	Entry from domain lookup table B_FY_FUNDED
Potential source to obtain	Scoping data, Preliminary FIS, Study Manager.
Anticipated use for attribute	FY projections and trend identification
<b>PRELM_DATE</b>	Expected Preliminary issuance date for reaches representing areas being actively studied.
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	MIP, other pending guidance.
Anticipated use for attribute	Stores the expected Preliminary Date of a study currently in progress.
<b>LFD_DATE</b>	Expected Letter of Final Determination issuance date for reaches representing areas being actively studied.
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	MIP, other pending guidance.
Anticipated use for attribute	Stores the expected Letter of Final Determination Date of a study currently in progress.
<b>EC1_UDEF</b>	User Defined Critical Element 1
Type of data expected	This YES/NO field is to capture the results of additional Region Specific validation processes which have been deemed Critical.
Potential source to obtain	Dependent upon Element definition.
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record. In counties which have been identified as utilizing the Extra Elements, EC1_UDEF failure will result in an UNVERIFIED Validation Status assignment.
<b>EC2_UDEF</b>	User Defined Critical Element 2
Type of data expected	This YES/NO field is to capture the results of additional Region Specific validation processes which have been deemed Critical.
Potential source to obtain	Dependent upon Element definition.
Anticipated use for attribute	This Critical Element field is a trigger for indication of an identified deficiency, and subsequent assignment of UNVERIFIED Validation Status to the record. In counties which have been identified as utilizing the Extra Elements, EC2_UDEF failure will result

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Field	Description
	in an UNVERIFIED Validation Status assignment.
<b>ES1_UDEF</b>	User Defined Secondary Element 1
Type of data expected	This YES/NO field is to capture the results of additional Region Specific validation processes which have been deemed Secondary.
Potential source to obtain	Dependent upon Element definition.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES1_UDEF will contribute to the Secondary Element count.
<b>ES2_UDEF</b>	User Defined Secondary Element 2
Type of data expected	This YES/NO field is to capture the results of additional Region Specific validation processes which have been deemed Secondary.
Potential source to obtain	Dependent upon Element definition.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES2_UDEF will contribute to the Secondary Element count.
<b>ES3_UDEF</b>	User Defined Secondary Element 3
Type of data expected	This YES/NO field is to capture the results of additional Region Specific validation processes which have been deemed Secondary.
Potential source to obtain	Dependent upon Element definition.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES3_UDEF will contribute to the Secondary Element count.
<b>ES4_UDEF</b>	User Defined Secondary Element 4
Type of data expected	This YES/NO field is to capture the results of additional Region Specific validation processes which have been deemed Secondary.
Potential source to obtain	Dependent upon Element definition.
Anticipated use for attribute	Any combination of 4 or more Secondary Elements establishes a CNMS record as UNVERIFIED. In counties which have been identified as utilizing the Extra Elements, ES4_UDEF will contribute to the Secondary Element count.
<b>E_ELEMDATE</b>	The date on which the User Defined Element values were populated
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	User is to provide the date on which the E Elements were evaluated.
Anticipated use for attribute	The date on which the User Defined Elements were populated.

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### 3.2.1. S\_Studies\_Ln Discovery and Scoping Phase Updates

In instances where study mileage has been scoped and funded, but not yet tied to specific reaches, no updates to S\_Studies\_Ln are needed. In such a scenario, updates to the County\_Status table will however be required. Such documentation of funded miles in the County\_Status table should be limited to one quarter. Following this duration, the appropriate funded study reaches must be identified in S\_Studies\_Ln.

When project scope has been funded and specific reaches have been identified, the following fields within S\_Studies\_Ln will need to be updated as indicated. It is assumed that any fields not listed here should be updated by the user if more accurate data is available.

Field	Discovery and Scoping Phase Updates
REACH_ID	Update Reach_ID any time on affected features any time a Reach is split, or added to the Inventory.
STUDY_ID	Update Study_ID to reflect intended cardinality. Often with new studies, it will be appropriate to simply set STUDY_ID equal to the Reach_ID

Field	Discovery and Scoping Phase Updates
STATUS_TYPE	Shall be updated to 'BEING STUDIED' for all scoped Reaches
MILES	Recalculate for any Reaches where geometry has been modified.
STATUS_DATE	Set the STATUS_DATE to the current date, which should be the date the other fields were reassigned as well.
POC_ID	Set the POC_ID to reflect the most current editing entity.
DATE_RQST	Set the DATE_RQST to the current date, which should be the date that the STATUS_TYPE was set to 'BEINGSTUDIED'
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_HYDRA_M	Select the appropriate hydraulic model type being used for the ongoing study
BS_FY_FUND	Select the appropriate value for fiscal year funded for the ongoing study
PRELM_DATE	Update with accurate Preliminary issuance date estimate
LFD_DATE	Update with accurate LFD issuance date estimate

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### 3.2.2. S\_Studies\_Ln FIRM Production Phase Update

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Throughout the production phase, it is important that the PRELM\_DATE and LFD\_DATE fields be kept current. Should scope of work be altered in any way, S\_Studies\_Ln shall be updated to represent the updated scope, using the guidelines in 3.2.1. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION\_STATUS and STATUS\_TYPE values as follows.

Validation status - Status Type (Active Study Values)	Validation status - Status Type (De-Scoped Values)
ASSESSED - BEING STUDIED	ASSESSED - TO BE STUDIED
UNKNOWN - BEING STUDIED	UNKNOWN - TO BE ASSESSED
VALID - BEING STUDIED	VALID - NVUE COMPLIANT
UNVERIFIED - BEING STUDIED	UNVERIFIED - TO BE STUDIED

### 3.2.3. S\_Studies\_Ln Preliminary Issuance Phase Update

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

Field	Preliminary Issuance Phase Updates
FBS_CMPLNT	Update to indicate FBS compliance of Preliminary studies
FBS_CHKDT	Update with date new FBS_CMPLNT value populated
FBS_CTYPE	Update to reflect FBS compliance check type
PRELM_DATE	Update with actual Preliminary issuance date
LFD_DATE	Update with accurate LFD issuance date estimate

After Preliminary issuance, should it be discovered that scope of work had differed in any way from that represented in the polylines; S\_Studies\_Ln shall be updated to represent the correct scope. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION\_STATUS and STATUS\_TYPE values as defined in Section 3.2.2.

### 3.2.4. 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 primary study fields, and the immediate state fields will be cleared as follow.

Field	LFD Phase Updates
FLD_ZONE	This field should inherit its value from BS_ZONE
VALIDATION_STATUS	For Reaches representing New or Updated studies, this field shall be set to 'VALID', otherwise this field shall use UNKNOWN
STATUS_TYPE	For Reaches representing New or Updated studies, this field shall be set to 'NVUE COMPLIANT', otherwise this field shall be set to 'TO BE ASSESSED'
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.
FY_FUNDED	This field should inherit the value stored in BS_FY_FUNDED
STUDY_TYPE	This field should inherit the value stored in BS_SDTYTYP
POC_ID	Set the POC_ID to reflect the most current editing entity.
DATE_RQST	This field should be cleared.
DATE_EFFCT	This field should be updated to represent the date the H&H was completed for the Reach.
HYDRO_MDL	This field should inherit the value stored in BS_HYDRO_M
HYDRA_MDL	This field should inherit the value stored in BS_HYDRA_M
HODIGFMT	This field should be updated to indicate whether or not the Hydro model of the new study is in digital format
HADIGFMT	This field should be updated to indicate whether or not the Hydra model of the new study is in digital format

Field	LFD Phase Updates
HO_RUNMOD	This field should be updated to indicate whether or not the Hydro model, if in digital format, can be run
HA_RUNMOD	This field should be updated to indicate whether or not the Hydra model, if in digital format, can be run
C1 through C7	If the Reach represents a New or Updated study, this field should be cleared.
S1 through S10	If the Reach represents a New or Updated study, this field should be cleared.
CE_TOTAL	If the Reach represents a New or Updated study, this field should be cleared.
SE_TOTAL	If the Reach represents a New or Updated study, this field should be cleared.
BS_ZONE	After this value has been migrated to the appropriate field, this field should be cleared.
BS_STDYTYP	After this value has been migrated to the appropriate field, this field should be cleared.
BS_HYDRO_M	After this value has been migrated to the appropriate field, this field should be cleared.
BS_HYDRA_M	After this value has been migrated to the appropriate field, this field should be cleared.
BS_FY_FUND	After this value has been migrated to the appropriate field, this field should be cleared.
PRELM_DATE	This field should be cleared.
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.
ES1_UDEF through ES4_UDEF	If the Reach represents a New or Updated study, this field should be cleared.
E_ELEMDATE	If the Reach represents a New or Updated study, this field should be cleared.

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After LFD issuance, should it be discovered that scope of work had differed in any way from that represented in the line work, S\_Studies\_Ln shall be updated to represent the correct scope. Additionally, it is also imperative that de-scoped studies resume appropriate VALIDATION\_STATUS and STATUS\_TYPE values as defined in 3.2.2

### 3.3. ‘S\_Studies\_Ar’ Feature Class (Polygon)

The ‘S\_Studies\_Ar’ feature class existed in earlier versions of the CNMS data model within the CNMS Studies feature dataset. As of version 5.0 of the CNMS data model, the attributes of this polygon feature

class had been moved to the S\_Studies\_Ln feature class, and all resulting field redundancies removed, thus eliminating the requirement for maintaining ‘S\_Studies\_Ar’ within the CNMS database. All validation assessment and evaluation is now performed directly on the lines within S\_Studies\_Ln. FEMA Regions have the option of maintaining the original ‘S\_Studies\_Ar’ feature class within their local CNMS FGDB, however the national version of CNMS will no longer maintain ‘S\_Studies\_Ar’, and it is not a required component of submittals for National roll-up.

### 3.4. ‘S\_Requests’ Feature Classes (Point/Polygon)

The ‘S\_Requests\_Ar’ and ‘S\_Request\_Pt’ feature classes reside in the CNMS Requests feature dataset within the CNMS FGDB, and are designed to store details concerning update requests from stakeholders. Both feature classes possess the same table structure for data capture and storage, the only schematic difference between them being the name of the primary key fields. For S\_Requests\_Ar the primary key field is ‘SRA\_ID’, and for the S\_Requests\_Pt the primary key field is ‘SRP\_ID’.

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

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Table 3.4.1. S\_Requests\_Ar/Pt (Polygon/Point) (Table ID Code: 03/04)

Field	Description
<b>SRA_ID / SRP_ID</b>	Primary key for tables. Assigned by table creator.
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.
<b>REACH_ID</b>	Foreign key to join to the primary key REACH_ID of S_Studies_Ln in the CNMS data model
Type of data expected	A 12 digit key from the corresponding stream centerline in the S_Studies_Ln feature class 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.’ For polygons in ‘S_Requests_Ar,’ this field may be left blank when many stream centerlines from S_Studies_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 the S_Studies_Ln feature class
Anticipated use for attribute	Catalog and referencing; foreign key to primary key of S_Studies_Ln
<b>WTR_NM</b>	Name of flooding source
Type of data expected	Water feature name (ex. Mississippi River, Lake Superior, Pacific Ocean)

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Field	Description
Potential source to obtain	The name of the flooding source should come from the FIS, FIRM and FIRM DB, and should be given that order of importance. The FIS lists profiles in alphabetical order in the table of contents and usually discusses them in other FIS sections in that same order. Section 1.2 should list all of these streams and the dates they were studied. Section 2.1 should also list all the streams studied by detailed methods, and should also list all the streams studied by approximate methods. Note that the FIRM Database should not be the sole source of information that is used to evaluate stream reaches. Often times there are graphic 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.
<b>POC_ID</b>	Foreign key to join to 'Point_of_Contact' table. ID for 'Point of Contact'
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.
<b>RQST_CAT</b>	Distinction between Cartographic and Flood Data requests
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
<b>RQST_LVL</b>	Level of analysis requested
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
<b>MTHOD_TYPE</b>	Type of method used
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
<b>DATE_RQST</b>	Date request is made
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.
<b>DATE_RESOL</b>	Date request is resolved
Type of data expected	This field is of the type date. Date should be entered in MM/DD/YYYY format.
Potential source to obtain	Regional Support Center or relevant Study Managers. Date should represent the date of effective analysis for the study of the associated reach which addressed the Request
Anticipated use for attribute	Resource and tracking are the anticipated uses of dates.
<b>CARTO_RQST</b>	Type of cartographic change requested
Type of data expected	It is expected that a single CNMS Request record will be either cartographic or flood data related. If the 'RQST_CAT' is CARTOGRAPHIC in nature, this field will be populated with predefined acceptable values selected from the 'D_CARTO_RQST' domain list. Populating this field with cartographic information implies that the 'FDATA_RQST' field remains unpopulated.
Potential source to obtain	This information is expected to come from the originator of the CNMS Request record.
Anticipated use for attribute	Catalog and reference
<b>FDATA_RQST</b>	Type of flood data change requested

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Field	Description
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
<b>RESOL_STATUS</b>	Current request status pursuant to FEMA record review of the requested action or subsequent resolution.
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
<b>COMMENT</b>	Additional comments
<b>PRIORITY</b>	Priority of Request (HIGH, MED, LOW). Cartographic requests should not be prioritized as HIGH
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
<b>DATE_REVIEW</b>	Date FEMA has reviewed incoming request and authorized its inclusion in the database
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

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### 3.5. S\_Unmapped\_Ln (PolyLine)

The 'S\_UnMapped\_Ln' feature class within the CNMS Inventory feature dataset contains line work representing flooding sources that have not been included in the FEMA inventory of studied streams in the CNMS Study Records which have not been ASSESSED for new study prioritization. This line work is provided to assist CNMS users in performing scoping calculations, and to serve as an additional source from which to pull line work for population of new studies within S\_Studies\_Ln. Preferable line sources for such population are detailed above in the description of the S\_Studies\_Ln feature class.

**Table 3.5.1. S\_UnMapped\_Ln (Polyline) (Table ID Code: 07)**

Field	Description
<b>UML_ID</b>	Primary key for table. Assigned by table creator
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.
<b>CO_FIPS</b>	Federal Information Processing Standard code for the county

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Field	Description
Type of data expected	Five-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 EPA: <a href="http://www.epa.gov/enviro/html/codes/state.html">http://www.epa.gov/enviro/html/codes/state.html</a>
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.
<b>CID</b>	Community Identification Number
Type of data expected	A unique six-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
<b>HUC8_KEY</b>	8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds known 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.
Type of data expected	8-digit Hydrologic Unit Code
Potential source to obtain	Originator: United States Geological Survey (USGS): <a href="http://nhd.usgs.gov/data.html">http://nhd.usgs.gov/data.html</a> ; or EPA surf your watershed: <a href="http://cfpub.epa.gov/surf/locate/index.cfm">http://cfpub.epa.gov/surf/locate/index.cfm</a>
Anticipated use for attribute	Provides an attribute to determine what HUC 8 sub-basin the polyline resides in.
<b>MILES</b>	An attribute of the calculated miles of the data record entry
Type of data expected	A number corresponding to the length of the polyline in miles
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 provide information 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 database in stream miles for reporting (ex. NVUE, quarterly reports)

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### 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.

**Table 3.6.1. 'Specific\_Needs\_Info' (Table ID Code: 06)**

Field	Description
<b>CNMS_ID</b>	Primary key for table. Assigned by record creator or user. Imported from corresponding record in 'S_Studies_Ar', 'S_Requests_Ar' and 'S_Requests_Pt'
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	Imported from corresponding record in 'S_Studies_Ar', 'S_Requests_Ar' and 'S_Requests_Pt'

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Field	Description
Anticipated use for attribute	Unique identification of each individual CNMS record
<b>COST_SHARE</b>	Is there cost share? (NO/YES/UNKNOWN)
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.
<b>DISASTER</b>	Associated disaster number, either federally or state declared.
Type of data expected	An example of an associated disaster number excerpt from a FEMA disaster announcement: <i>Major Disaster Declaration number 1823 declared on Feb 17, 2009</i> . 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.
<b>MITIG_PLAN</b>	Is there a mitigation plan identifying the need? (NO/YES/UNKNOWN)
Type of data expected	A yes or no is expected to indicate whether or not reference to this CNMS record is included in a formal mitigation plan. If yes, please identify the specific mitigation plan document in the comment field. Additionally, document whether the plan is a State, local, or Tribal Mitigation plan and whether it is a standard or enhanced plan.
Potential source to obtain	Mitigation Plan documents
Anticipated use for attribute	It is anticipated that this attribute will be used as a reference in study background research.
<b>RSK_ASSESS</b>	Is there a risk assessment other than the 2010 Annualized Loss Estimate? (NO/YES/UNKNOWN)
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.
<b>RSK_CMMENT</b>	Details on the type of Risk Assessment other than the 2010 Annualized Loss Estimate if answer to RSK_ASSESS was 'YES'..
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.
<b>RSK_DATE</b>	Date that the Risk Assessment identified in RSK_CMMENT if answer to RSK_ASSESS was 'YES'.
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.
<b>RSK_MITIG</b>	Has the Risk Assessment identified in RSK_CMMENT been included as part of the current adopted hazard mitigation plan? (NO/YES/UNKNOWN).
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.
<b>HAZUS</b>	Is there an enhanced HAZUS (Level 2 or 3) run on the stream (NO/YES/UNKNOWN)

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Field	Description
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.
<b>HAZUS_LVL</b>	Level of HAZUS run (System default is 'Level 1' for Contiguous United States)
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.
<b>COMMENT</b>	Additional comments

### 3.7. County\_Status (Table)

The 'County\_Status' table provides status information pertaining to all counties contained within the file geodatabase. This table provides users with a snap shot of county modernization status, provides an indicator of whether H Elements should be considered for each county, and is essential for calculation of NVUE Initiated for counties within certain phases. Sections 3.7.1 – 3.7.4 outlines the updates needed for the County\_Status table at various Risk MAP phases.

**Table 3.7.1. County\_Status Table** (Table ID Code: Not Applicable)

Field	Description
<b>CO_FIPS</b>	Federal Information Processing Standard code for the county
Type of data expected	Five-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 EPA: <a href="http://www.epa.gov/enviro/html/codes/state.html">http://www.epa.gov/enviro/html/codes/state.html</a>
Anticipated use for attribute	Establishes a unique identifier for determining what state and/or county the data resides in.
<b>REGION</b>	The FEMA Region into which the County falls.
Type of data expected	A value from the list D_REGION
Potential source to obtain	This data can readily be found on the web.
Anticipated use for attribute	Reference field.
<b>STATE_NAME</b>	The state in which the county resides
Type of data expected	A value from the list D_STATE
Potential source to obtain	This data can be extrapolated from the CO_FIPS, and can readily be found on the web.
Anticipated use for attribute	Reference field. Useful for differentiating between records representing counties with the same name but in different states in instances where users may not be as familiar with 5 digit county FIPS codes.
<b>CO_NAME</b>	The name of the County represented by this record
Type of data expected	Text string.
Potential source to obtain	User input.

## CNMS Technical Reference

Field	Description
Anticipated use for attribute	Reference field. Users are sometimes more comfortable using common names for geographies rather than referring to them by CO_FIPS
<b>CO_STATUS</b>	County Modernization Status
Type of data expected	A value from the list D_COSTATUS
Potential source to obtain	Current effective county FIRM and FIRM Database data, study managers, RSC tracking data.
Anticipated use for attribute	Determining Inventory status at a glance.
<b>FY_FUNDED</b>	When relevant - Attribute of the most recent non-effective FEMA fiscal year funding applied to stream reach engineering represented in the NVUE_FUNDD field.
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	FY projections and trend identification, Calculation of NVUE Initiated.
<b>PRELM_DATE</b>	Expected Preliminary issuance date for reaches representing areas being actively studied.
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	MIP, other pending guidance.
Anticipated use for attribute	Stores the expected Preliminary Date of a study currently in progress.
<b>LFD_DATE</b>	Expected Letter of Final Determination issuance date for reaches representing areas being actively studied.
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	MIP, other pending guidance.
Anticipated use for attribute	Stores the expected Letter of Final Determination Date of a study currently in progress.
<b>NVUE_FUNDD</b>	Currently funded mileage which will contribute to NVUE, but which has not yet gone effective. Contributing miles include all New and Updated Study miles anticipated which are not currently VALID.
Type of data expected	Known or estimated mileage value.
Potential source to obtain	Scoping or Preliminary data, Study Managers, Regional Service Centers.
Anticipated use for attribute	Calculation of NVUE Initiated, particularly in counties for which a mileage has been scoped for study, but not yet determined for the reaches.
<b>REPIN_CNMS</b>	Indicates whether or not the most current study statuses are representing in CNMS S_Studies_Ln.
Type of data expected	A value from the list D_ELEMENT
Potential source to obtain	Scoping or Preliminary data, Study Managers, Regional Service Centers, and GIS Points of Contact for the Region of interest.
Anticipated use for attribute	Determines source of NVUE Initiated miles. See CNMS NVUE Calculation Appendix for further information.
<b>USE_E_ELEM</b>	Indicates whether or not E Elements values should be included in CE and SE totals for determining Validation Status.
Type of data expected	A value from the list D_ELEMENT
Potential source to obtain	Determined by Region.
Anticipated use for attribute	This field's value will directly influence calculation of CE and SE totals, which determine Validation Status.
<b>CERT_DATE</b>	Date which the county successfully passed through the CNMS QC Tool
Type of data expected	Calendar date (ex. 01/01/10)
Potential source to obtain	This field will be populated by the CNMS QC Tool
Anticipated use for attribute	This field will track the most recent data a given county has passed through the automated QC process.
<b>CERT_ID</b>	POC for entity passing the county through the CNMS QC Tool
Type of data expected	Existing Point_of_Contact table value
Potential source to obtain	This field will be populated by the CNMS QC Tool
Anticipated use for attribute	This field will track the POC_ID for the most recent entity to pass the county through the automated QC process.

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### 3.7.1. County\_Status Discovery and Scoping Phase Updates

In instances where study mileage has been scoped and funded, ongoing study characteristics should be correctly depicted in this table. It is especially important that these updates be made in instances where scope has not yet been tied to specific reaches.

Field	Description
FY_FUNDED	Update to indicate fiscal year mileage depicted in NVUE_FUNDED was funded
PRELM_DATE	Update with accurate Preliminary issuance date estimate
LFD_DATE	Update with accurate LFD issuance date estimate
NVUE_FUNDED	Indicate total NVUE miles purchased through ongoing studies. Only ongoing study miles which are New or Updated, which were not previously VALID should be listed here.
REPIN_CNMS	Indicate whether or not S_Studies_Ln has been updated to represent latest state, including NVUE purchases indicated in NVUE_FUNDD.

### 3.7.2. County\_Status FIRM Production Phase Update

Throughout the production phase, it is important that the PRELM\_DATE and LFD\_DATE fields be kept current. Should scope of work be altered in any way such that the estimated NVUE mileage purchase changes, the NVUE\_FUNDED field should be updated. As soon as the latest state, including NVUE purchase miles depicted in NVUE\_FUNDED, is represented in S\_Studies\_Ln, REPIN\_CNMS should be set to yes.

### 3.7.3. County\_Status Preliminary Issuance Phase Update

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

Field	Preliminary Issuance Phase Updates
PRELM_DATE	Update with actual Preliminary issuance date.
LFD_DATE	Update with accurate LFD issuance date estimate.

### 3.7.4. County\_Status LFD Issuance Phase Update

At LFD issuance, existing values should be updated, replaced with actual known values, or removed as indicated below.

## CNMS Technical Reference

Field	Description
CO_STATUS	Update to indicate the current status of the county as a result of the recent study.
PRELM_DATE	Update with accurate Preliminary issuance date estimate. This value can remain in the table.
LFD_DATE	Update with actual LFD issuance date. This value can remain in the table.
NVUE_FUNDED	This field should be cleared / set to NULL
REPIN_CNMS	Indicate whether or not S_Studies_Ln has been updated to represent latest state, including NVUE purchases indicated in NVUE_FUNDD.

### 3.8. Point\_of\_Contact (Table)

**Table 3.8.1. Point\_of\_Contact** (Table ID Code: 05)

Field	Description
<b>POC_ID</b>	Primary key for table. Assigned by record creator or user
Type of data expected	As the Primary key for this table this field must exist as a unique identifier for each individual record.
Potential source to obtain	A programmatic approach that prefixes 5 record counting digits with the 5 digit County FIPS code followed by the table ID 05 produces a number like 201190500001 (20119 is the county FIPS code, 05 is a table ID to separate from 'CNMS_IDs' used on the 4 FCs, and 00001 represents record counting digits) for the first POC record in Meade County, Kansas. Unique identifier obtained from National CNMS viewing solution.
Anticipated use for attribute	Unique identification of each individual CNMS POC record
<b>POC_NAME</b>	Given name of the point of contact knowledgeable of CNMS records
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.
<b>POC_TITLE</b>	Any title associated with the point of contract
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.
<b>POC_DESCRIPTION</b>	Information regarding the role and responsibilities of the point of contact
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.
<b>ORG_NAME</b>	The name of the owner, or managing government agency, of the subject item
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

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Field	Description
	agency) or corporate websites (if POC works for private sector).
Anticipated use for attribute	Information can be used for correspondence with the POC.
<b>ORG_TYPE</b>	A code that represents a kind of organization
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.).
<b>BUSINESS_PHONE</b>	The business telephone number of the contact person
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
<b>MOBILE_PHONE</b>	The cellular phone number of the contact person
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
<b>FAX_PHONE</b>	The fax number of the contact person
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
<b>ADDRESS_1</b>	The first line of the point of contact's address
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
<b>ADDRESS_2</b>	The second line of the point of contact's address
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
<b>CITY_NAME</b>	The city or town in which the contact person's address is located
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
<b>STATE</b>	The name of the State in which the contact person's address is located
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
<b>ZIP_CODE</b>	The Zip Code of the contact person's address
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

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Field	Description
<b>COUNTY</b>	The county name
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
<b>EMAIL_ADDRESS</b>	Electronic mail address
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
<b>COMMENT</b>	Additional comments

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## Appendix A. Validation Checklist

The central purpose of the Validation Checklist (Table A.2) is to 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 a CNMS Request Record, will warrant a review for inclusion in the map production planning process. For existing floodplain studies, this review will be triggered when one critical or four or more secondary change characteristics have been identified to mark the study as having an UNVERIFIED Validation Status. However, if a severe secondary change conditions exist, such as a high number of new or removed bridges and culverts, they can be elevated and considered critical. 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. Section 3.2 outlines how 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. Based on the Validation Checklist, if the validation evaluation identifies no critical elements and less than four secondary elements for a stream segment flood study are flagged as condition changes, the engineering analysis is considered VALID

In summary:

- A floodplain study is assigned a VALID Validation Status if zero critical and fewer than four secondary change conditions have been flagged.
- A floodplain study is assigned the UNVERIFIED Validation Status if it has at least one critical, or four or more secondary change conditions have been flagged.
- When a CNMS study record is checked out for evaluation, or when a CNMS evaluation is planned or in queue, the Validation Status is set to UNKNOWN.
- If a detailed evaluation based on the Validation Checklist does not lead to a definitive determination of the validity, the UNKNOWN Validation Status is applied to the study.
- If there is a need for re-visiting the validation process as a result of statutory requirements or availability of new data, the Validation Status for all affected studies will be toggled to UNKNOWN. This review process is also triggered 5 years after the initial determination of the Validation Status when the evaluation is considered outdated. Such studies are queued up for a CNMS evaluation based on current conditions.
- If a flooding source centerline in an unmapped area is considered for a new study, a Validation Status of ASSESSED is assigned to indicate that the stream has been assessed for a new study. The outcome of such consideration may be that resources are allocated in the current or future FY, or that the request for new study has been deferred.

Validity of approximate studies is to be assessed using the Validation Checklist to the greatest extent possible. It may not be appropriate to utilize the entire Validation Checklist for effective approximate studies unless the technical data, methodology, and basis for the study are known. Therefore, for approximate engineering studies, the Validation Checklist should be used to the extent possible and

practical without far exceeding expected costs. The FEMA Regional office can provide guidance to Mapping Partners to ensure this is met. Regional Offices should also leverage the 2012 National Urban Change Indicator dataset when evaluating Approximate Studies. For an approximate analysis to be categorized as a 'Valid' study, FEMA must have determined the approximate floodplains utilizing engineering methods and/or technical data.

The flow chart diagram included in Appendix E 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 1 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.

### **UNKNOWN Validation Status**

CNMS Study Records are initially given the Validation Status of UNKNOWN and status type of TO BE ASSESSED when the FEMA Regional Office has not yet evaluated the CNMS Study Record to provide input on either deferring or performing a CNMS evaluation. A BEING ASSESSED status type is assigned when Regional allocation to fund CNMS evaluation is established. The UNKNOWN Validation Status may also have a DEFERRED status type where the validity remains unknown after Phase III evaluation or the Region has determined the study to be low priority and CNMS evaluation is deferred. The option to defer an assessment for 1 year must be used to a minimum one year discussion with FEMA Headquarters during each FY production planning process.

### **UNVERIFIED Validation Status**

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

### **VALID Validation Status**

CNMS Study Records are categorized as VALID when a new or updated study is performed, or stream reach level validation was completed, and the study validation checklist contains no critical, and less than four secondary elements flagged during evaluation. These records will have the status type NVUE COMPLIANT and be monitored for re-evaluation every five years. All newly studied or restudied streams classified as VALID will be reclassified as UNKNOWN with a Status Type of TO BE ASSESSED after five years.

### **ASSESSED Validation Status**

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

The Validation Checklist (Table A.2) presents detailed definitions for the critical elements and secondary elements, and is intended to be used as a tool to assist in gathering information necessary to determine the Validation Status. Information gathered while using the Validation Checklist below to evaluate flooding sources and associated studies will translate into a CNMS Study Record entry in the S\_Studies\_Ln feature class. Feature Attribution policies are identified in Section 3.2. Other methods, not represented in the validation checklist, may be available and necessary to complete study validation and not all data and intelligence gathered for any validation exercise will find a place in the CNMS Studies Feature Dataset. To aid record keeping, a sample template of a Validation Process Documentation Checksheet with an example CNMS Study Record will be provided electronically with this document. Appendix B lays out minimum requirements for Validation Process Documentation that must be consulted over and above the use of the Validation Checklist. The abovementioned template is only one way to document methodologies used to make validation decisions. Other methods may be used to track decisions made, but must contain the fields suggested in the template at the least.

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

- Flood zones that have been affected by development since the date of the effective FIRM
- Inadequate flood hazard engineering data in areas with planned development/anticipated growth (i.e., areas that currently reflect approximate flood hazard analyses yet have been slated for upgraded analyses given flood hazard data validation efforts)
- Stream reaches requiring restudy because the methodologies used do not produce results that comply with quality standards

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## CNMS Technical Reference

**Table A.1.** Validation Status Type Descriptions

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

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**Table A.2. VALIDATION CHECKLIST**

Background Information
Name of Flooding Source:
Date of Effective Analysis: <ul style="list-style-type: none"> <li>• Determine from effective FIS the most recent date engineering for a flood hazard was updated. This is the date of the underlying engineering of the effective FIRM.</li> </ul>
Hydrologic Model Used: <ul style="list-style-type: none"> <li>• Determine from effective FIS or other source the model (or method) used in the effective engineering.</li> </ul>
Hydraulic Model Used and version (if applicable): <ul style="list-style-type: none"> <li>• Determine from effective FIS or other source model (or method) used in the effective engineering.</li> </ul>
Are the models in digital format? If so, can you run the model? <ul style="list-style-type: none"> <li>• Determine whether the models are in digital format, and if they can be run.</li> <li>• It is suggested that the location of the model be recorded with a description of the amount of effort it will take to prepare the model for a run.</li> </ul>
Changes in Physical, Climate, and Engineering Methodologies since Date of Effective Analysis
CRITICAL ELEMENTS
(C1) Major change in gage record since effective analysis that includes major flood events <ul style="list-style-type: none"> <li>• Determine if USGS gage is on stream.</li> <li>• If yes, record the gage Site No. and Site Name from the gages shapefile (add record in external table joined to CNMS database via REACH_ID as necessary).</li> <li>• Determine if a major flood event has occurred since the effective analysis. If yes, this Critical Element set to "YES" and you don't have to further evaluate gage records.</li> </ul>
(C2) Updated and effective peak discharges differ significantly based on confidence limits criteria in FEMA's G&S <ul style="list-style-type: none"> <li>• Determine if USGS gage is on stream.</li> <li>• If yes, record the gage Site No. and Site Name from the gages shapefile (add record in external table joined to CNMS database via REACH_ID as necessary).</li> <li>• Compare years of record from effective FIS to years of record now available.</li> <li>• If newer records are available for gage, record the gage Site No. and Site Name as above.</li> <li>• Determine if 100-yr discharge obtained by running PeakFQ at effective date is still within 68% confidence interval of the Bulletin 17B 100-yr estimate using updated gage data and PeakFQ. If not, Critical Element is set to "YES".</li> </ul>
(C3) Model methodology no longer appropriate based on Guidelines and Specifications (i.e one-dimensional vs. two-dimensional modeling; Coastal Guidelines) <ul style="list-style-type: none"> <li>• This element scrutinizes underlying model methods, rather than modeling software or versions of software.</li> <li>• If effective model methodology is found inappropriate based upon G&amp;S, Critical Element is set to "YES".</li> </ul>
(C4) Addition/removal of a major flood control structure <ul style="list-style-type: none"> <li>• Determine if dam or reservoir, has been added or removed since the effective analysis.</li> <li>• Determine if new/removed levee or seawall, has occurred since the effective analysis.</li> <li>• Determine if levee or seawall's current accreditation status is reflected in the effective analysis.</li> </ul>
(C5) Current channel reconfiguration outside effective SFHA <ul style="list-style-type: none"> <li>• Compare extents of effective SFHA with channel as shown on latest available aerial imagery.</li> <li>• If channel reconfiguration has occurred, Critical Element is set to "YES"               <ul style="list-style-type: none"> <li>◦ Some instances of channel outside of SFHA may be minor natural occurrences, and categorized as requests for mapping updates.</li> </ul> </li> </ul>
(C6) Five or more new or removed hydraulic structures (bridge/culvert) that impact BFEs <ul style="list-style-type: none"> <li>• Compare effective mapping and profile to latest available imagery and GIS data.</li> <li>• If five or more new or removed hydraulic structures exist along reach, Critical Element is set to "YES".</li> </ul>
(C7) Significant channel fill or scour <ul style="list-style-type: none"> <li>• If hydraulically significant fill or scour occurs along stream reach, Critical Element is set to "YES".</li> </ul>
SECONDARY ELEMENTS
(S1) Use of rural regression equations in urbanized areas <ul style="list-style-type: none"> <li>• Determine if rural regression equations were used in an urbanized basin, or if land use has changed from rural to urban since the effective analysis.</li> </ul>
(S2) Repetitive losses outside the SFHA <ul style="list-style-type: none"> <li>• If repetitive loss data is available/accessible, overlay Repetitive Loss spatial dataset with SFHA.</li> <li>• If there are any structures outside of the SFHA for that reach, then you have Repetitive Loss outside of SFHA.               <ul style="list-style-type: none"> <li>◦ Instances of repetitive losses caused by local drainage issues, rather than the subject flooding source should not be considered.</li> </ul> </li> </ul>
(S3) Increase in impervious area in the sub-basin of more than 50 percent (i.e., 10 percent to 15 percent, 20 percent to 30 percent, etc.) <ul style="list-style-type: none"> <li>• Determine increase of impervious area that has occurred since the effective analysis.</li> <li>• If impervious area has increased by 50% or more, Secondary Element is set to "YES".               <ul style="list-style-type: none"> <li>◦ Consider also meeting minimum impervious threshold to fail element. Consult State's regression equations.</li> </ul> </li> </ul>
(S4) One to four new or removed hydraulic structure (bridge/culvert) that impact BFEs <ul style="list-style-type: none"> <li>• Compare effective mapping and profile to latest available imagery and GIS data.               <ul style="list-style-type: none"> <li>• If one to four new or removed hydraulic structures exist along reach, Secondary Element is set to "YES".</li> </ul> </li> </ul>
(S5) Channel improvements / Shoreline changes <ul style="list-style-type: none"> <li>• Isolated to channel improvements only; shoreline assessed through coastal CNMS.</li> <li>• Determine whether channel improvements have occurred since the effective analysis. This can consist of straightening, rerouting, concrete lining, rip-rap.</li> </ul>
(S6) Availability of better topography/bathymetry <ul style="list-style-type: none"> <li>• Determine if topo with better resolution and/or being newer than topo used for study exists.</li> <li>• When assessing for redelineated streams, account for topo used during redelineation.</li> </ul>
(S7) Changes to vegetation or land use <ul style="list-style-type: none"> <li>• Determine whether significant vegetation or land use changes have occurred in the drainage area since the effective analysis.</li> <li>• Possible sources include USGS NLCD datasets and any datasets showing large scale landuse changes.</li> </ul>
(S8) Failure to identify primary frontal dune in coastal areas <ul style="list-style-type: none"> <li>• Shoreline assessed through coastal CNMS only.</li> </ul>
(S9) Significant storms with High Water Marks <ul style="list-style-type: none"> <li>• Determine if HWMs have been recorded on flooding source since the effective analysis.</li> </ul>
(S10) New regression equations <ul style="list-style-type: none"> <li>• If regression equations were used in the effective analysis and new equations now exist, set the Secondary Element to "YES".</li> </ul>

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## Appendix B. Validation Process Documentation

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. Summaries of the background information used to evaluate the criteria should be submitted as part of the CNMS data roll-up sent to the FEMA regional offices. These summaries will be referred to if FEMA ever has questions about the validity of methods used to evaluate criteria. Either in the format of the Validation Checklist, or in the format suggested in the sample template provided electronically with this user guide, the user should maintain current and accurate records that explicitly describe how the criteria were evaluated along with a list of the source and location of the data used in that evaluation. Source data should be documented outlining originator, location (URL, local drives), digital availability, and whether it can be shared or distributed. Data that has been processed such that it cannot be recreated in a reasonable amount of time from source data, or was manipulated once obtained from source, should be stored by its creator.

The need of the user to maintain records is important as the deliverable is subject to scrutiny. The first query under any scrutiny will be on the Validation Checklist entries used for the flooding source. This will be a summary level document that could be retrieved from Regional Offices and answer most, if not all, questions in regards 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.

To aid in record keeping in a searchable format and linked to the CNMS Database, a sample template of a 'Validation Process Documentation Checksheet' with an example CNMS Study Record is provided electronically with this document. The template is only one way to document methodologies used to make validation decisions. Other methods, including making customized Validation Checklists for each study reach evaluated, may be used to track decisions made. However, these alternate methods must track the information suggested in the template at the least.

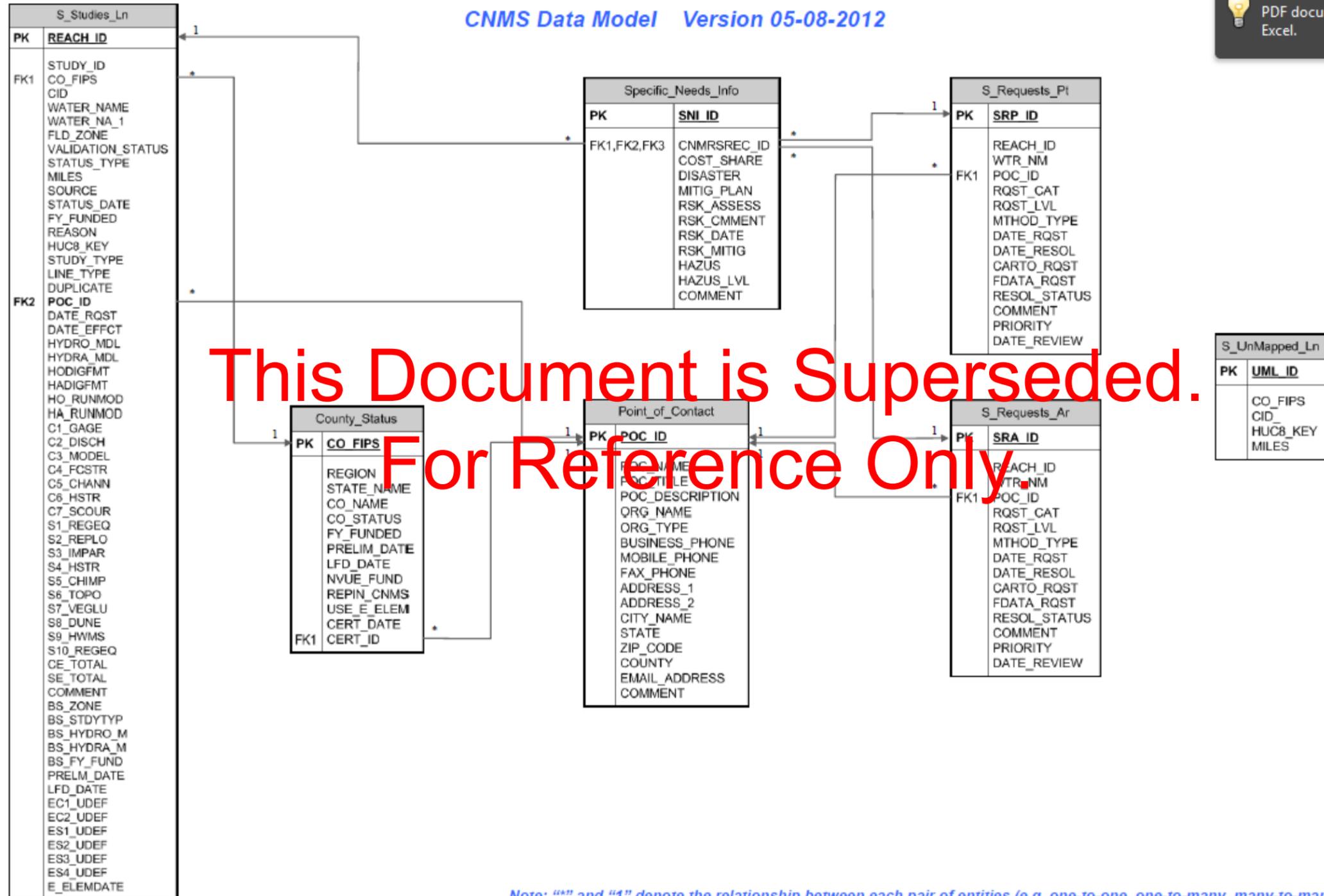
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*Electronic attachment to Appendix B:*

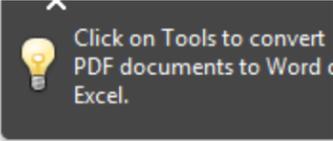
*CNMS\_Sample\_Validation\_Process\_Documentation\_Checksheet\_V1.0.xls*

Appendix C. CNMS Data Model

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

## Appendix D. CNMS Data Dictionary

### S\_Studies\_Ln Feature Class (polyline)

Field	Type	Length	Required	Domain Table	Description
REACH_ID	Text	12	Yes		Primary key for table, assigned by table creator
STUDY_ID	Text	12	No		
CO_FIPS	Text	12	Yes		Federal Information Processing Standard code (FIPS code)
CID	Text	12	Yes		FEMA Community ID
WATER_NAME	Text	50	No		Name of flooding source
WATER_NA_1	Text	50	No		Alternate name of flooding source
FLD_ZONE	Text	50	Yes	D_ZONE	SFHA type the polyline represents (ex. ZONE AE, ZONE A)
VALIDATION_STATUS	Text	50	Yes	D_VALID_CAT	This attribute establishes the latest evaluation condition of a flooding source centerline in relation to the criteria set forth in the <i>CNMS Technical Reference</i> , any procedure memorandums, or previous work.
STATUS_TYPE	Text	100	Yes	D_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 <i>CNMS Technical Reference</i> , any procedure memorandums, or previous work.
MILES	number (double)	8	Yes		An attribute of the calculated miles of the data record entry
SOURCE	Text	100	Yes	D_SOURCE	Source of polyline segment represented in the inventory
STATUS_DATE	Date	8	Yes		Date when CNMS stream reach validation is completed or a validation assessment of the stream reach has been made. UNVERIFIED records will have the date the CNMS evaluation triggered the UNVERIFIED status. If an unverified study becomes VALID, the date of the status change is recorded.
FY_FUNDED	Text	25	Yes for studies in progress for which a Preliminary FIRM has not been issued and if retrievable from MIP Case Number or RSC	D_FY_FUNDED	Attribute of the most recent FEMA fiscal year funding applied to the stream reach (ex. watershed, county)

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			Management.		
REASON	Text	255			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.
HUC8_KEY	number (double)	8	Yes		8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds known 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.
STUDY_TYPE	Text	40	Yes	D_STUDY_TYPE	Study type of the SFHA represented by the polygon based on the current effective, preliminary, or draft FIS text.
FBS_CMLPNT	Short Integer	Yes	Yes	D_ELEMENT	Indicator of FBS compliance for the flood plain represented by the line feature
FBS_CHKDT	Date	Yes	Yes		Date the FBS_CMLPNT field value was most recently populated
FBS_CTYP	Text	50	Yes	D_FBS_CTYPE	FBS Compliance Check Type
LINE_TYPE	Text	40	Yes	D_LINE_TYPE	Attribute provides description of flooding source line type as being RIVERINE, LAKE, POND, PLAYA, PONDING, or OTHER.
DUPLICATE	Text	20	Yes if stream reach has 2 lines representing 2 different studies for the same reach extent.	D_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)
POC_ID	Text	20	Yes if POC table is populated for associated record		Foreign key to join to Point_of_Contact table. ID for Point of Contact.
DATE_RQST	Date		Yes if Validation_Status is set to UNVERIFIED		Date request is made
DATE_EFFECT	Date		Yes		Date of effective analysis

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HYDRO_MDL	Text	100	Yes (if applicable)		Hydrologic model used
HYDRA_MDL	Text	100	Yes (if applicable)		Hydraulic model used
HODIGFMT	Short		Yes if HODIGFMT = 'YES'	D_ELEMENT	Is the Hydrologic model in digital format? (NO/YES/UNKNOWN)
HADIGFMT	Short		Yes if HADIGFMT = 'YES'	D_ELEMENT	Is the Hydraulic model in digital format? (NO/YES/UNKNOWN)
HO_RUNMOD	Short		Yes if HO_RUNMOD = 'YES'	D_ELEMENT	Can the Hydrologic digital model be run? (NO/YES/UNKNOWN)
HA_RUNMOD	Short		Yes if HA_RUNMOD = 'YES'	D_ELEMENT	Can the Hydraulic digital model be run? (NO/YES/UNKNOWN)
C1_GAGE	Short		Yes	D_ELEMENT	Critical Element 1, Change in gage record. Major change in gage record since effective analysis that includes major flood events? (NO/YES/UNKNOWN)
C2_DISCH	Short		Yes	D_ELEMENT	Critical Element 2, Change in Discharge. Updated and effective peak discharges differ significantly based on confidence limits criteria in FEMA's G&S? (NO/YES/UNKNOWN)
C3_MODEL	Short		Yes	D_ELEMENT	Critical Element 3, Model methodology. Model methodology no longer appropriate based on Guidelines and Specifications (i.e. one-dimensional vs. two-dimensional modeling; Coastal Guidelines)? (NO/YES/UNKNOWN)
C4_FCSTR	Short		Yes	D_ELEMENT	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)? (NO/YES/UNKNOWN)
C5_CHANN	Short		Yes	D_ELEMENT	Critical Element 5, Channel Reconfiguration. Current channel reconfiguration outside effective SFHA? (NO/YES/UNKNOWN)

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C6_HSTR	Short		Yes	D_ELEMENT	Critical Element 6, Hydraulic Change 2. 5 or more new or removed hydraulic structures (bridge/culvert) that impact BFEs? (NO/YES/UNKNOWN)
C7_SCOUR	Short		Yes	D_ELEMENT	Critical Element 7, Channel Area Change. Significant channel fill or scour? (NO/YES/UNKNOWN)
S1_REGEQ	Short		Yes	D_ELEMENT	Secondary Element 1, Regression Equation. Use of rural regression equations in urbanized areas? (NO/YES/UNKNOWN)
S2_REPLO	Short		Yes	D_ELEMENT	Secondary Element 2, Repetitive Loss. Repetitive losses outside the SFHA? (NO/YES/UNKNOWN)
S3_IMPAR	Short		Yes	D_ELEMENT	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.)? (NO/YES/UNKNOWN)
S4_HSTR	Short		Yes	D_ELEMENT	Secondary Element 4, Hydraulic Structure. More than 1 and less than 5 new or removed hydraulic structures (bridge/culvert) impacting BFEs? (NO/YES/UNKNOWN)
S5_CHIMP	Short		Yes	D_ELEMENT	Secondary Element 5, Channel Improvements. Channel improvements / Shoreline changes? (NO/YES/UNKNOWN)
S6_TOPO	Short		Yes	D_ELEMENT	Secondary Element 6, Topography Data. Availability of better topography/bathymetry? (NO/YES/UNKNOWN)
S7_VEGLU	Short		Yes	D_ELEMENT	Secondary Element 7, Vegetation or Land Use. Changes to vegetation or land use? (NO/YES/UNKNOWN)
S8_DUNE	Short		Yes	D_ELEMENT	Secondary Element 8, Coastal Dune. Failure to identify primary frontal dune in coastal areas? (NO/YES/UNKNOWN)
S9_HWMS	Short		Yes	D_ELEMENT	Secondary Element 9, High Water Mark. Significant storms with High Water Marks. (YES/NO/UNKNOWN)

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## CNMS Technical Reference

S10_REGEQ	Short		Yes	D_ELEMENT	Secondary Element 10, Regression Equation. New Regression Equations Available? (NO/YES/UNKNOWN)
CE_TOTAL	Short		Yes		Total number of critical elements
SE_TOTAL	Short		Yes		Total number of secondary elements
COMMENT	Text	255	No		Additional comments
BS_ZONE	Text	60	Yes, if reach represents the extents of an ongoing funded study	D_ZONE	Zone type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.
BS_STDYTYP	Text	255	Yes, if reach represents the extents of an ongoing funded study	D_STUDY_TYPE	Study type of the SFHA represented by the reach currently being studied based on scoping data, or the preliminary FIS text.
BS_HYDRO_M	Text	100	No	D_HYDRO	Hydrologic model used for creating the SFHA represented by the reach currently being studied based on scoping data or the preliminary FIS text.
BS_HYDRA_M	Text	100	No	D_HYDRA	Hydraulic model used for creating the SFHA represented by the reach currently being studied based on scoping data or the preliminary FIS text.
BS_FY_FUND	Text	4	Yes, if reach represents the extents of an ongoing funded study	D_FY_FUNDED	When relevant - Attribute of the most recent non-effective FEMA fiscal year funding applied to the stream reach engineering at the time of study (ex. Watershed, county)
PRELM_DATE	Date		Yes, if reach represents the extents of an ongoing funded study		Expected Preliminary issuance date for reaches representing areas being actively studied.
LFD_DATE	Date		Yes, if reach represents the extents of an ongoing funded study		Expected Letter of Final Determination issuance date for reaches representing areas being actively studied.
EC1_UDEF	Short		No	D_ELEMENT	User Defined Critical Element 1
EC2_UDEF	Short		No	D_ELEMENT	User Defined Critical Element 2
ES1_UDEF	Short		No	D_ELEMENT	User Defined Secondary Element 1
ES2_UDEF	Short		No	D_ELEMENT	User Defined Secondary Element 2
ES3_UDEF	Short		No	D_ELEMENT	User Defined Secondary Element 3
ES4_UDEF	Short		No	D_ELEMENT	User Defined Secondary Element 4

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E_ELEMDATE	Date		Yes, if the E Elements are non <NULL>		The date on which the User Defined Element values were populated
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### 'S\_Requests' Feature Classes (Point/Polygon)

Field	Type	Length	Required	Domain Table	Description
SRA_ID / SRP_ID	Text	12	Yes		Primary key for table, assigned by table creator
REACH_ID	Text	12	Yes, if there is a 1-1 or 1-many relationship between S_Studies_Ln and S_Requests feature (s)		Foreign key for table. Primary Key for S_Studies_Ln.
WTR_NM	Text	100	Yes		Name of flooding source
POC_ID	Text	20	Yes		Foreign key to join to Point_of_Contact table. ID for Point of Contact.
RQST_CAT		30	Yes	D_RQST_CAT	Distinction between Cartographic and Flood Data requests
RQST_LVL	Text	30	Yes	D_RQST_LVL	Level of analysis requested
MTHOD_TYPE	Text	20	Yes	D_MTHOD_TYPE	Type of method requested to make FIRM improvement
DATE_RQST	Date		Yes		Date request is made
DATE_RESOL	Date		Yes		Date request is resolved
CARTO_RQST	Text	50	Yes if RQST_CAT is CARTOGRAPHIC	D_CARTO_RQST	Type of cartographic change requested
FDATA_RQST	Text	50	Yes if RQST_CAT is FLOOD DATA	D_FDATA_RQST	Type of flood data change requested
RESOL_STATUS	Text	50	No	D_RESOL_STATUS	Current resolution status for the requested action
COMMENT	Text	255	No		Description of request
PRIORITY	Text	20	Yes	D_PRIORITY	Priority of request from originator of CNMS Request record.
DATE_REVIEW	Date		No		Date FEMA has reviewed incoming request and authorized its inclusion in the database

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### 'S\_UnMapped\_Ln' Feature Class (polyline)

Field	Type	Length	Required	Domain Table	Description
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## CNMS Technical Reference

UML_ID	Text	12	Yes		Primary key for table, assigned by table creator
CO_FIPS	Text	12	Yes		Federal Information Processing Standard code (FIPS code)
CID	Text	12	No		Community Identification Number
HUC8_KEY	number (double)	8	Yes		8-digit Hydrologic Unit Code (HUC) representing the smallest watersheds known 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.
MILES	number (double)	8	Yes		An attribute of the calculated miles of the data record entry

### Specific\_Needs\_Info Business Table

Field	Type	Length	Required	Domain Table	Description
SNI_ID	Text	12	Yes		Primary key for table, assigned by table creator
CNMSREC_ID	Text	12	Yes		Key field used to relate Specific_Needs_Info record to a record in another table
COST_SHARE	Short		No	D_ELEMENT	Is there a cost share? (NO/YES/UNKNOWN)
DISASTER	Text	50	No		Associated disaster number
MITIG_PLAN	Short		No	D_ELEMENT	Is there a mitigation plan identifying need? (NO/YES/UNKNOWN)
RSK_ASSESS	Short		No	D_ELEMENT	Is there a risk assessment other than the 2010 Annualized Loss Estimate? (NO/YES/UNKNOWN)
RSK_COMMENT	Text	255	Yes if RSK_ASSESS is 'Yes'		Details on the type of Risk Assessment other than the 2010 Annualized Loss Estimate if answer to RSK_ASSESS was 'YES'.
RSK_DATE	Date		Yes if RSK_ASSESS is 'Yes'		Date that the Risk Assessment identified in RSK_COMMENT if answer to RSK_ASSESS was 'YES'.
RSK_MITIG	Short		Yes if RSK_ASSESS is 'Yes'	D_ELEMENT	Has the Risk Assessment identified in RSK_COMMENT been included as part of the current adopted hazard mitigation plan? (NO/YES/UNKNOWN). This field is to be filled only Estimate if answer to RSK_ASSESS was 'YES'.
HAZUS	Short		No	D_ELEMENT	Is there a HAZUS run on the stream (YES/NO/UNKNOWN)
HAZUS_LVL	Text	20	No	D_HAZUS_Lvl	Level of HAZUS run
COMMENT	Text	255	No		Additional comment

## CNMS Technical Reference

**County\_Status Business Table**

Field	Type	Length	Required	Domain Table	Description
CO_FIPS	Text	12	Yes		Federal Information Processing Standard code for the county. This also serves as the primary key for this table.
REGION	Text	20	Yes	D_REGION	The FEMA Region into which the County falls.
STATE_NAME	Text	50	Yes	D_STATE	The state in which the county resides
CO_NAME	Text	50	Yes		The name of the County represented by this record
CO_STATUS	Text	50	Yes	D_COSTATUS	County Modernization Status
FY_FUNDED	Text	50	No	D_FY_FUNDED	When relevant - Attribute of the most recent non-effective FEMA fiscal year funding applied to stream reach engineering represented in the NVUE_FUNDD field.
PRELM_DATE	Date		Yes, if NVUE_FUNDED has been populated, and mileage currently being studied has not yet been represented in the line work		Expected Preliminary issuance date for reaches representing areas being actively studied.
LFD_DATE	Date		Yes, if NVUE_FUNDED has been populated, and mileage currently being studied has not yet been represented in the line work		Expected Letter of Final Determination issuance date for reaches representing areas being actively studied.
NVUE_FUNDED	number (double)		Yes, if mileage currently being studied has not yet been represented in the line work		Currently funded mileage which will contribute to NVUE, but which has not yet gone effective. Contributing miles include all New and Updated Study miles anticipated which are not currently VALID.
REPIN_CNMS	Short		Yes	D_ELEMENT	Indicates whether or not the most current study statuses are representing in CNMS S_Studies_Ln.
USE_E_ELEM	Short		Yes	D_ELEMENT	Indicates whether or not E Elements values should be included in CE and SE totals for determining Validation Status.
CERT_DATE	Date		No		Date which the county successfully passed through the CNMS QC Tool
CERT_ID	Text	20	No		POC for entity passing the county through the CNMS QC Tool

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## Point\_of\_Contact Business Table

Field	Type	Length	Required	Domain Table	Description
POC_ID	Text	20	Yes		Primary key for table. A unique, user defined identifier for each record or instance of an entity.
POC_NAME	Text	50	Yes		The name of the point of contact
POC_TITLE	Text	20	Yes		Any title associated with the point of contract
POC_DESCRIPTION	Text	60	Yes		Information regarding the role and responsibilities of the point of contact
ORG_NAME	Text	50	Yes		The name of the owner, or managing government agency, of the subject item
ORG_TYPE	Text	50	Yes	D_ORG_TYPE	A code that represents a kind of organization
BUSINESS_PHONE	Text	20	Yes		The business telephone number of the contact person
MOBILE_PHONE	Text	20	No		The cellular phone number of the contact person
FAX_PHONE	Text	20	No		The fax number of the contact person
ADDRESS_1	Text	75	Yes		The first line of the point of contact's address
ADDRESS_2	Text	75	No		The second line of the point of contact's address
CITY_NAME	Text	75	Yes		The city or town in which the contact person's address is located
STATE	Text	50	Yes	D_STATE	The name of the State in which the contact person's address is located
ZIP_CODE	Text	10	Yes		The Zip Code of the contact person's address
COUNTY	Text	100	Yes		The county name
EMAIL_ADDRESS	Text	50	Yes		Electronic mail address
COMMENT	Text	255	No		A description or other unique information concerning the subject item

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## 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.

D_CARTO_RQST
BASE MAP UPDATE

## CNMS Technical Reference

FLOOD HAZARD FEATURE SYMBOLIZATION AND NOTES
INDEX PANEL ERRORS
MAP BODY (PANEL) ERRORS
MAP COLLAR ISSUES

<b>D_COSTATUS</b>
MODERNIZED
PARTIALLY MODERNIZED
UNMODERNIZED

<b>D_DUPLICATE</b>
CATEGORY 1
CATEGORY 2
CATEGORY 3

Coded Value	D_ELEMENT
10	NO
11	YES
12	UNKNOWN

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<b>D_FBS_CTYP</b>
COUNTY - BULK ATTRIBUTION
INDIVIDUAL REACH ATTRIBUTION

<b>D_FDATA_RQST</b>
ANY LABELING OUTSIDE COUNTY BOUNDARY
BFE ERRORS
CBRS BOUNDARY ERRORS
CHANGES TO HYDRAULIC CONDITION
CHANGES TO HYDROLOGIC CONDITION
COASTAL GUTTER ERRORS
COMMUNITY MODEL OR DATA
CROSS SECTION ERRORS

## CNMS Technical Reference

FLOODPLAIN DELINEATION ERRORS
FLOODWAY DELINEATION ERRORS
HIGH WATER FROM RECENT FLOOD
IMPACTED STRUCTURES
LEVEE ISSUE
LIMIT OF STUDY ERRORS
OTHER
POPULATION CHANGE OR GROWTH IN FLOODPLAIN
SFHA LABELLING ERRORS

Coded Value	D_FY_FUNDED
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
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

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## CNMS Technical Reference

Coded Value	D_FY_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
LEVEL 1
LEVEL 2
LEVEL 3

D_HYDRA
ADVANCED ICPR
ADVANCED ICPR 2.20 (OCTOBER 2000)
ADVANCED ICPR 3.02 (NOVEMBER 2002)
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

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D_HYDRA
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)
FESWMS 2DH
FESWMS 2DH 1.1 (JUNE 1995)
FLDWAV
FLDWAV (NOVEMBER 1998)
FLDWY
FLDWY (MAY 1989)
FLO-2D
FLO-2D 2003.6
FLO-2D 2004.10
FLO-2D 2006.1
FLO-2D 2007.06
FLO-2D V.2000.11 (DECEMBER 2000)
GAGE ANALYSIS
GLWRM
HCSWMM
HCSWMM 4.31B (AUGUST 2000)
HEC-2
HEC-2 (1983)
HEC-2 4.6.2 (MAY 1991)
HEC-GEORAS
HEC-RAS
HEC-RAS 2.2 (SEPTEMBER 1998)
HEC-RAS 3.0.1
HEC-RAS 3.1.1
HEC-RAS 3.1.3

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D_HYDRA
HEC-RAS 4.0
HIGHWATER MARKS
HISTORICAL FLOOD DATA
HY8
HY8 4.1
HY8 6.0
ICPR
J-635
LAKE ROUTING ANALYSIS
LRD-1
MIKE 11
MIKE 11 HD (2002 D)
MIKE 11 HD (2004)
MIKE 11 HD (JUNE 1999)
MIKE FLOOD HD
MIKE FLOOD HD (2002 D)
MIKE FLOOD HD (2004)
MIKE FLOOD HD (2009)
NETWORK
NETWORK (JUNE 2002)
NORMAL DEPTH
OTHER
PONDPACK
PONDPACK V 8 (MAY 2002)
PSUPRO
QUICK
QUICK-2 1.0
QUICK-2 2.0
S2DMM
S2DMM (FEBRUARY 2005)
SFD
SHEET 2D 9 (JULY 2000)
SHEET 2D9

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## CNMS Technical Reference

D_HYDRA
SLOPE-AREA METHOD
STORMCAD
STORMCAD V 4 (JUNE 2002)
SWMM
SWMM 4.30 (MAY 1994)
SWMM 4.31 (JANUARY 1997)
SWMM 5 V 5.0.005 (MAY 2005)
TABS-RMA2
TABS-RMA2 V.4.3 (OCTOBER 1996)
TABS-RMA4
TABS-RMA4 V.4.5 (JULY 2000)
UNET
UNET 4.0 (APRIL 2001)
UNKNOWN
WSP-2
WSPGW
WSPGW 12.96 (OCTOBER 2000)
WSPRO
WSPRO (JUNE 1988)
XPSTORM
XPSTORM 10.0 (MAY 2006)
XP-SWMM
XP-SWMM 8.52

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D_HYDRO
2POND
AHYMO 97
AHYMO 97 (AUGUST 1997)
API
BULLETIN 15
BULLETIN 17
BULLETIN 17A
BULLETIN 17B

D_HYDRO
CUHPF/PC
CUHPF/PC (MAY 1996)
CUHPF/PC (MAY 2002)
DBRM
DBRM 3.0 (1993)
DEPTH FREQUENCY METHOD
DISCHARGE VERSUS DRAINAGE AREA RELATIONS
DR3M
DR3M (OCTOBER 1993)
FAN
GAGE ANALYSIS
HEC-1
HEC-1 4.0.1
HEC-1 4.1
HEC-FFA
HEC-FFA 3.1
HEC-FFA-REGRESSION EQUATIONS
HEC-HMS
HEC-HMS 1.1
HEC-HMS 2.0
HEC-HMS 2.0.3
HEC-HMS 2.1.1
HEC-HMS 2.1.2
HEC-HMS 2.1.3
HEC-IFH
HEC-IFH 1.03
HEC-IFH 1.04
HEC-IFH 2.0
HEC-IFH 2.01
HIGHWATER; SLOPE AREA METHOD
HSPF
HSPF 10.10
HSPF 10.11

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D_HYDRO
HSPF 11.0
HYMO
ICPR
LAKE ROUTING ANALYSIS
LOG-PEARSON TYPE III ANALYSIS
MIKE 11 RR
MIKE 11 RR (2002 D)
MIKE 11 RR (2004)
MIKE 11 RR (JUNE 1999)
MIKE 11 UHM
MIKE 11 UHM (2002 D)
MIKE 11 UHM (2004)
MIKE 11 UHM (JUNE 1999)
MODIFIED PULS ROUTING TECHNIQUES
OTHER
PEAKFQ
PEAKFQ 2.4 (APRIL 1998)
PEAKFQ 2.5
PEAKFQ 3.0
PEAKFQ 4.0
PEAKFQ-REGRESSION EQUATIONS
PONDPACK
PONDPACK V 8 (MAY 2002)
PRECIP
PRMS
PRMS 2.1 (JANUARY 1996)
RATIONAL METHOD
REGRESSION EQUATIONS
REGULATED FREQUENCY CURVES
S2DMM
SNYDER METHOD
SOIL CONSERVATION SERVICE NATIONAL ENGINEERING HANDBOOK
SQUARE ROOT OF THE DRAINAGE AREA METHOD

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## CNMS Technical Reference

D_HYDRO
STATISTICAL METHODS IN HYDROLOGY
SWMM
SWMM (RUNOFF) 4.30 (MAY 1994)
SWMM (RUNOFF) 4.31 (JANUARY 1997)
SWMM 5 V 5.0.005 (MAY 2005)
TR-20
TR-20 (FEBRUARY 1992)
TR-20 WIN 1.00.002 (JANUARY 2005)
TR-55
TR-55 (JUNE 1986)
TWO STATION STATISTICAL METHOD
UNET
UNKNOWN
VEN TE CHOW û B462
WIN TR-55 1.0.08 (JANUARY 2005)
WRC
XPSTORM
XPSTORM 10.0 (MAY 2006)
XP-SWMM
XP-SWMM 8.52

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D_LINE_TYPE
COASTAL
LAKE OR POND
OTHER
PLAYA
PONDING
RIVERINE

D_MTHOD_TYPE
NEW
REDELINEATION

## CNMS Technical Reference

UPDATED

D_ORG_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

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D_PRELIM_QTR
Q1FY10
Q2FY10
Q3FY10
Q4FY10
Q1FY11
Q2FY11
Q3FY11
Q4FY11
Q1FY12
Q2FY12
Q3FY12
Q4FY12
Q1FY13
Q2FY13
Q3FY13

D_PRELIM_QTR
Q4FY13
Q1FY14
Q2FY14
Q3FY14
Q4FY14
Q1FY15
Q2FY15
Q3FY15
Q4FY15
Q1FY16
Q2FY16
Q3FY16
Q4FY16
Q1FY17
Q2FY17
Q3FY17
Q4FY17
Q1FY18
Q2FY18
Q3FY18
Q4FY18
Q1FY19
Q2FY19
Q3FY19
Q4FY19
Q1FY20
Q2FY20
Q3FY20
Q4FY20
Q1FY21
Q2FY21
Q3FY21
Q4FY21

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D_PRELIM_QTR
Q1FY22
Q2FY22
Q3FY22
Q4FY22
Q1FY23
Q2FY23
Q3FY23
Q4FY23
Q1FY24
Q2FY24
Q3FY24
Q4FY24
Q1FY25
Q2FY25
Q3FY25
Q4FY25
Q1FY26
Q2FY26
Q3FY26
Q4FY26
Q1FY27
Q2FY27
Q3FY27
Q4FY27
Q1FY28
Q2FY28
Q3FY28
Q4FY28
Q1FY29
Q2FY29
Q3FY29
Q4FY29
Q1FY30

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## CNMS Technical Reference

### D\_PRELIM\_QTR

Q2FY30

Q3FY30

Q4FY30

### D\_PRIORITY

HIGH

LOW

MEDIUM

Coded Value	D_REGION
I	REGION I
II	REGION II
III	REGION III
IV	REGION IV
V	REGION V
VI	REGION VI
VII	REGION VII
VIII	REGION VIII
IX	REGION IX
X	REGION X

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### D\_RESOL\_STAT

DEFERRED

NO

UNKNOWN

YES

### D\_RQST\_CAT

CARTOGRAPHIC

FLOOD DATA

## CNMS Technical Reference

D_RQST_LVL
APPROXIMATE
DETAILED WITH FLOODWAY
DETAILED WITHOUT FLOODWAY
LIMITED DETAIL
N/A

Coded Value	D_SOURCE
DFIRM	COUNTY DFIRM DATABASE
DFIRM_PRELIM	COUNTY DFIRM DATABASE ACQUIRED DURING STUDY PERIOD
DIGITIZED	DIGITIZED
NFHL	NATIONAL FLOOD HAZARD LAYER
NHD-HIGH	NATIONAL HYDROGRAPHY DATASET HIGH RESOLUTION
NHD-LOW	NATIONAL HYDROGRAPHY DATASET LOW RESOLUTION
NHD-MED	NATIONAL HYDROGRAPHY DATASET MEDIUM RESOLUTION
RFHL	REGIONAL FLOOD HAZARD LAYER

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D_STATE
ALABAMA
ALASKA
ARIZONA
ARKANSAS
CALIFORNIA
COLORADO
CONNECTICUT
DELAWARE
DISTRICT OF COLUMBIA
FLORIDA
GEORGIA
HAWAII
IDAHO
ILLINOIS
INDIANA

D_STATE
IOWA
KANSAS
KENTUCKY
LOUISIANA
MAINE
MARYLAND
MASSACHUSETTS
MICHIGAN
MINNESOTA
MISSISSIPPI
MISSOURI
MONTANA
NEBRASKA
NEVADA
NEW HAMPSHIRE
NEW JERSEY
NEW MEXICO
NEW YORK
NORTH CAROLINA
NORTH DAKOTA
OHIO
OKLAHOMA
OREGON
PENNSYLVANIA
RHODE ISLAND
SOUTH CAROLINA
SOUTH DAKOTA
TENNESSEE
TEXAS
UTAH
VERMONT
VIRGINIA
WASHINGTON

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## CNMS Technical Reference

D_STATE
WEST VIRGINIA
WISCONSIN
WYOMING

D_STATUS_TYPE
BEING ASSESSED
BEING STUDIED
DEFERRED
NVUE COMPLIANT
TO BE ASSESSED
TO BE STUDIED

D_STUDY_TYPE
DIGITAL APPROXIMATE
DIGITAL CONVERSION APPROXIMATE
DIGITAL CONVERSION DETAILED
DIGITAL DETAILED
NEW APPROXIMATE
NEW DETAILED
NON-DIGITAL APPROXIMATE
NON-DIGITAL DETAILED
REDELINEATED
UNMAPPED
UPDATED APPROXIMATE
UPDATED DETAILED

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D_VALID_CAT
ASSESSED
UNKNOWN
UNVERIFIED

## CNMS Technical Reference

VALID

D_ZONE
0.2 PCT ANNUAL CHANCE FLOOD HAZARD
0.2 PCT ANNUAL CHANCE FLOOD HAZARD CONTAINED IN CHANNEL
1 PCT ANNUAL CHANCE FLOOD HAZARD CONTAINED IN CHANNEL
1 PCT FUTURE CONDITIONS
A
A99
AE
AH
AO
AR
AREA NOT INCLUDED
D
OPEN WATER
V
VE
X
X PROTECTED BY LEVEE

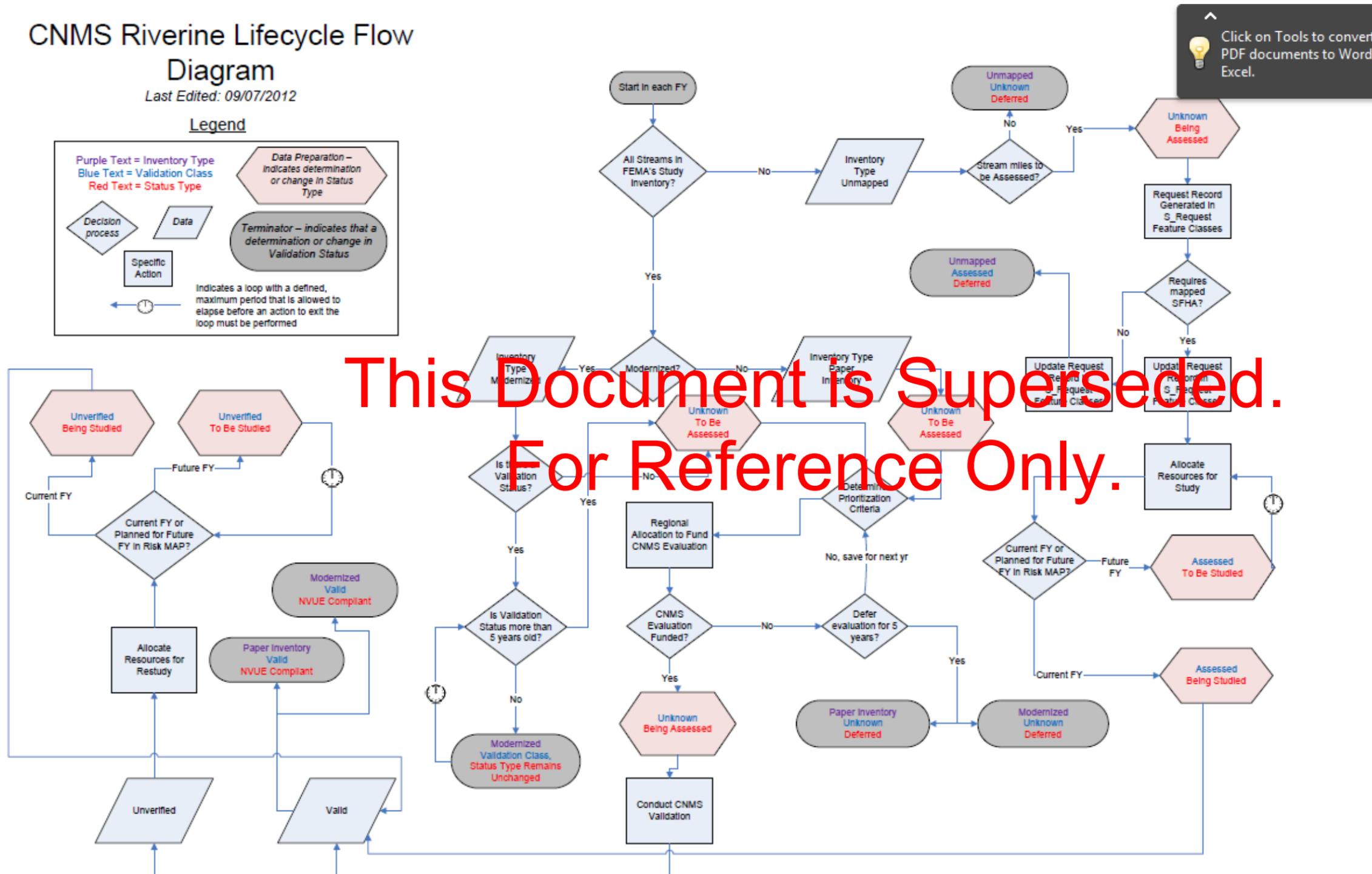
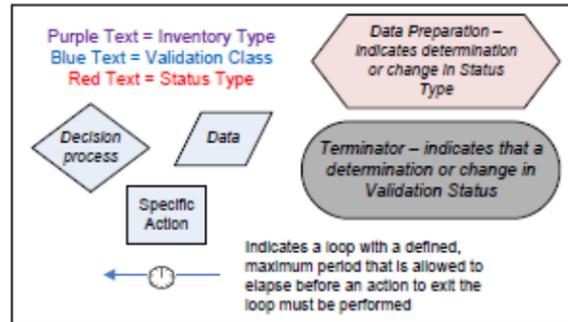
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### Appendix E. CNMS Lifecycle Flow Diagram

#### CNMS Riverine Lifecycle Flow Diagram

Last Edited: 09/07/2012

##### Legend



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## Appendix F. NVUE Reporting Guidance

### F.1. Introduction

FEMA Procedure Memorandum (PM) 56 stipulates that CNMS is the sole reporting mechanism for the NVUE metric. Per PM56, standard reporting of NVUE should take place on a quarterly schedule that is aligned with the Joint Program Review (JPR) and Status of Studies reporting processes. The Region (with support from the RSC) will be responsible for compiling all CNMS data at the regional level to facilitate reporting of NVUE statistics. Each Regional CNMS database will be submitted for national roll-up on the last business day of each quarter and also dated and archived at the Region. Following the national-roll-up of the Regional CNMS FGDBs, the national NVUE table is generated within 10 business days after the end of each quarter, culminating in a report to the FEMA Headquarters Program Area C Lead. This report will summarize NVUE statistics for each State in the Region, along with the Region as a whole, including a breakdown by Validation Status and status type for Modernized, and Paper Inventories, as well as for unmapped areas. The NVUE metric will be reported as both “NVUE Attained” and “NVUE Initiated”. Any NVUE metric based planning will assume completion and finalization of all stream miles that are classified in CNMS as BEING STUDIED - barring any changes in scope, appeals or protests at a project level prior to LFD issuance, NVUE Attained + Initiated represents the final state of the NVUE metric once all ongoing studies are issued preliminary. The NVUE Initiated metric and associated attributes in the S\_Studies\_Ln feature class will support the ability to forecast the attainment rate of NVUE.

Prior to FY11, a single NVUE metric was being reported which was the ratio of all New, Validated, Updated Engineering Study miles divided by the sum total of all miles in FEMA’s Modernized FEMA inventory. A New or Updated study is considered NVUE complaint, and thus included in calculations of NVUE attained, after the issuance of the Preliminary FIRM. The National NVUE table generated each quarter, reports NVUE mileages and percentages at a state, regional and national level. It also provides the ability to distinguish between FEMA’s Modernized, Unmodernized and Unmapped stream reach inventory. Since the beginning of FY 11, 2 NVUE metrics are reported – NVUE Attained and NVUE Attained + Initiated. NVUE Attained is described above. NVUE Initiated miles are those New or Updated Study stream reaches which have been funded for new/updated engineering, but have not yet been issued as part of a Preliminary FIRM. While a mechanism exists in CNMS to capture these ‘Initiated’ miles, due to the retroactive updates needed for pre-FY11 studies, the CNMS FGDBs do not hold all NVUE Initiated miles. While the Regional CNMS FGDBs are being updated to store all ongoing studies, the best available source of all NVUE Initiated miles, along with their Preliminary issuance date, is available in the Risk MAP Project Planning and Purchasing Portal (P4). The Risk MAP Project Planning and Purchasing Portal is currently leveraged to calculate NVUE Initiated miles per FEMA Region and their anticipated attainment FY Quarter. This data is then included in the National NVUE table distributed to a wide audience to provide NVUE projections into the future.

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

## F.2. Understanding the Data Attributes Necessary for NVUE calculations

The fields discussed below are all necessary for NVUE Calculation and mileage classification into bins when reporting through the format prescribed in PM56 and the National NVUE Table. The primary ‘bins’ into which study mileages get sorted are represented by the different allowed Validation Status and Status Type combinations as listed below. Within these categories, studies can typically be based on Detailed or Approximate engineering methods. Further classification includes Modernized (digital) or UnModernized (paper) Inventories.

### Allowed VALIDATION\_STATUS – STATUS\_TYPE Combinations

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

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

### FIPS

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

### FLD\_ZONE

FLD\_ZONE is used to differentiate between Detailed and Approximate Studies. While the domain range allows for more values than are currently in use, it has been standard practice when rolling up NVUE thus far to remove any X, V, or VE records from consideration (as in, they do not get a detailed or approximate assignment and contribute 0 to NVUE), leaving just A, AE, AO, AH. At this point, where FLD\_ZONE = “A”, the study is considered approximate, and where FLD\_ZONE <> “A” the study is considered detailed. At this point in time the Inventory is entirely Riverine – how coastal miles should be handled has not yet been decided, hence the discount of the V and VE FLD\_ZONE value records. Studies with FLD\_ZONE = “X” are unmapped streams which do not get factored in to the numerator or denominator when calculating NVUE since they are not studied as 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.

### VALIDATION STATUS

See above for brief description on bins, and sub bins, as well as description of legal combinations of Validation Status and Status Type attributes for a CNMS Study Record to count towards the NVUE Calculation. Only ‘VALID – NVUE COMPLIANT’ miles, and those with a ‘BEING STUDIED’ Status Type which are past their projected Preliminary FIRM issuance dates are counted in the numerator when calculating NVUE. When calculating NVUE Attained + Initiated miles, “UNVERIFIED – BEING STUDIED” study miles that have not yet been issued Preliminary are also included in the numerator, unless the county’s corresponding County\_Status table REPIN\_CNMS field value is ‘No’. 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 within the 92% KPI1 footprint are counted for calculating the NVUE denominator (Note: all ASSESSED miles are omitted from the denominator, as they represent unmapped reaches).

### MILES

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

### STUDY\_TYPE

This field is used to determine whether a study is modernized or unmodernized (paper inventory). This field was a late addition to the schema and so may not be populated consistently for some regions. Due to the bulk methodology used to represent the unmodernized inventory in CNMS it is possible to use this field for separating the unmodernized inventory. Simply put, if the field value equals “Non-Digital Approximate”, or “Non-Digital Detailed”, then the study is unmodernized. If not, the study is considered Modernized (even when the field is <Null>). An exception is applied when records have a Status Type of BEING STUDIED, and are past their projected Preliminary FIRM issuance dates. In such cases, the BS\_STDY\_TYP field is instead used in the determination of Modernized and UnModernized.

### LINE\_TYPE

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

### **HUC8\_KEY (only needed when rolling up at a watershed level)**

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

### **DUPLICATE (only when rolling up at a watershed level)**

The DUPLICATE field has been populated based on a series of business rules put in place to prevent over counting of mileage in scenarios where studies form the boundary between multiple political entities. This approach has allowed mileage calculation to remain accurate while still retaining information related to the side of the study in each entity (if they differ). Simply put, when rolling up at a watershed level, the mileage for all records where DUPLICATE = 1 = YES is counted as zero. Handling the DUPLICATE field is complex, but necessary to ensure appropriate documentation and marking 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.

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### **STATUS\_TYPE**

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

## **F.3. NVUE CALCULATION**

For the NVUE Numerator, when reporting at a political boundary level, NVUE calculation is as simple as halving all modernized mileages where the LINE\_TYPE is of an appropriate value (see above), summing this result with the remaining modernized mileage in that entity and then dividing the total by the associated total mileage in the entity's 92% KPI1 footprint. Starting Fall 2011, the NVUE denominator was defined as the sum total of all mapped miles in FEMA's SFHA inventory that fall within the geospatial footprint defined by all counties and communities part of the KPI1 Map Mod metric, at the time it attained 92% (9/30/2011). Since the CNMS FGDBs are constantly evolving within and outside the 92% KPI1 footprint, the NVUE denominator is calculated each quarter using the latest CNMS FGDBs and the fixed KPI1 footprint extent defined as of 9/30/2011. As previously mentioned, any coastal or unmapped miles within the Inventory do not get counted towards the NVUE numerator or the denominator. FEMA is reviewing the process for Coastal Study inclusion in CNMS as most of the Nation's coastline is being currently revised. As of the date of issuance of this guidance, no coastal or coastally influenced studies are represented within the CNMS Inventory or the NVUE Metric.

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

### G.1. Identifying Mapping Needs/Requests Because of LOMC Processing

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

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

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### G.2. Updating the CNMS Inventory for Approved LOMRs

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

When documenting presence of a LOMR in the S\_Studies\_Ln feature class (especially important when a FLD\_ZONE changes based on the LOMR), recording the LOMR case number in the 'REASON' field is suggested. The LOMRs encountered can be classified into the following two categories:

#### Type 1

LOMRs representing newly studied or completely restudied (typically with updates to both hydrology and hydraulics) streams or portions of streams using new or updated engineering shall be "broken out" from the remainder of the stream. These areas will receive their own STUDY\_ID and REACH\_ID, These are then treated

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as a separate study and are subject to the guidelines outlined in the Validation Checklist (Appendix A) and Section 3.2.

### **Type 2**

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

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## **Appendix H. CNMS Quality Management Plan (QMP)**

### **H.1. Introduction**

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

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

- Helps ensure timely and successful reporting of NVUE after each quarterly roll-up of the Regional CNMS FGDBs
- Can be used as a standalone tool within the existing infrastructure of various CNMS Stakeholders.
- Uses a self-certification model to document compliance and to note any exceptions requested
- Supports multiple platforms including ArcGIS 9.3 and 10
- Has an easy to use UI that presents issues found by the QC tool to the user for incorporation and documentation
- Has a phased implementation that accommodates the incorporation of the multiple phases of schema changes to the Regional CNMS FGDBs

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

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

### **H.2. Workflow and User Interface**

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

#### **User Groups**

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

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

- has a knowledge of CNMS Policies and Procedures and is well versed with the *CNMS Technical Reference* Version 5.3
- is a CNMS liaison representing a FEMA Regional Office, RSC, PTS, or CTP responsible of making updates to the CNMS FGDB per project scopes and operating procedures

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### Data Inputs

Due to multiple stakeholder involvement, self-certification and exceptions need to be documented at source. The CNMS FGDB QC Tool supports data submissions spanning various geography types. It accepts single or multiple counties' data, watershed-level data, and an entire Region CNMS FGDB. The CNMS FGDB used with the QC Tool should be in the schema that is reflected in the current *CNMS Technical Reference* Version 5.3. The list of checks seen in Section H.3. has been grouped into validation categories, that relate to the 3 phases of schema changes over 2011-2012 and associated quality needs.

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

### User Interface and Platform

The CNMS FGDB QC Tool can be installed on desktops by users with administrative rights to the workstation, and operated independent of a license. The CNMS FGDB QC Tool supports functioning in both ESRI ArcGIS 9.3 and 10 environments. Only some components of the CNMS FGDB QC Tool are platform dependent.

The UI itself is integrated with ArcGIS to work within an ArcMap session and can read out of an ESRI FGDB in software versions 9.3 and 10. Upon launching the UI, the user will be prompted to select from options to 'Validate a Single or Multiple Counties/Watersheds' and 'Validate Entire Region', and will then be asked for an FGDB file location. The tool will then auto-populate a list of the counties included in the FGDB, or will continue without a message, respectively, depending on the option first selected.

The tool will perform a series of checks as defined in the table seen in Section H.3., and will prompt the user for input in several ways. First, the user will be shown results of any certain checks which are not considered critical. Fixes to these issues may be made by looking into features associated with these secondary issues. The user will be required to provide brief documentation for any exceptions for secondary issues that will not be addressed prior to self-certifying and advancing the CNMS FGDB to the next roll-up. Second, values deemed to violate schema, and/or quality rules, and/or suspected to cause issues in the quarterly roll-up of the Regional CNMS FGDBs will be flagged and documented in a table with records associated with CNMS FGDB feature primary keys. This table of records may be used to associate with the appropriate CNMS feature class to identify and correct issues. The table of records with results of the QC check will contain fields that classify the type of issue found during the automated check, along with possible suggestions for eliminating the issue for each record. After addressing the errors listed in the QC check output table, the CNMS FGDB should be resubmitted for a run through the UI described above iteratively, until a validation check passes without any critical issues remaining unaddressed. Any secondary issues that have an associated request for exception with a reason noted within the table of records for the QC issues found, will be allowed in the FGDB that will be advanced for the next stage in the roll-up. At this point, the CNMS FGDB submission is considered to be self certified and contact details of the user is collected for the self-certification and for entry in the Points\_of\_Contact table of the CNMS FGDB.

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When the next roll-up happens at the State- or Regional- level, if the table of records resulting from running the QC tool is carried forward, notes of exceptions will be retained so that subsequent teams rolling the database up, do not have to re-document the request for exception.

### H.3. Quality Control Criteria

This Section outlines the types of checks that will be performed including a categorization of the checks in order to account for the phased consideration and approval of schema changes since the release of Version 4.2 of the *CNMS Database User's Guide* and FGDB Schema. In addition to several logical consistency requirements, the quality checks queries have been defined based on the *CNMS Technical Reference* Version 5.3 in possession with the 3-PTS CNMS Development Team and FEMA Headquarters.

The grouping of validation checks into categories is to address the various evolutions of the schema. It is likely that such distinction of validation checks disappear in subsequent versions of the QC Tool, when all contributing and dependent systems have verified successful migration to the schema described in the *CNMS Technical Reference* Version 5.3. The validation categories will merely allow users to easily recognize recent changes and allow for optionally including or omitting those checks in bulk. For the time being, a single set of standards have been hard coded on the back-end. Given the needs to consistent FDGB schemas for the quarterly roll-up, it is unlikely that different users are able to select different sets of standards to base the checks on.

#### Validation Categories

- S0 – This category represents checks against schematic values, such as domain adherence, through the last round of quarterly roll-ups in CY 11 (12/31/11). The schema version of relevance here was finalized with Version 4.2 of the *CNMS Database User's Guide*.
- Q0 – This category represents quality issues in the Inventory based on logic checks and combinations of field values, as they relate to the S0 schema expectations.
- S1 – This category represents checks against schematic values, such as domain adherence,. This includes but is not limited to the joining of S\_Studies\_Ar values to the appropriate related S\_Studies\_Ln features, the incorporation of new DOMAIN values (all domains are now entirely in CAPITAL LETTERS, and the values for D\_DUPLICATE and D\_ELEMENT have been changed), and the 1:1 swap of UNVERIFIED for INVALID.
- Q1 – This category represents quality issues in the Inventory based on logic checks and combinations of field values, as they relate to the S1 schema expectations.
- S2 – This category represents checks against schematic values, updated to include the consensus solution for attribute retention regarding the Prelim vs. LFD NVUE credit discussion.
- Q2 – This category represents quality issues in the Inventory based on logic checks and combinations of field values, as they relate to the S2 schema expectations.

#### Additional Checks to be Implemented in the Future (S3/Q3)

The Beta Version of the CNMS FGDV QC Tool was distributed in September 2012 and utilized successfully in the FY12 – Q4 Quarterly Roll-up. Future versions of the tool will have the capability to compare stream mileage data in the CNMS County Status table (described in section 3.7), with mileage calculations based on the most recent CNMS FGDB submission for roll-up. Mileage fluctuations above a certain threshold (to be determined prior to the update of the QC Tool) and outside of those established thresholds will be flagged. The user would

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then be required to provide a comment on the cause for the fluctuation, though these checks will not disallow the submittal or self-certification. Likewise, mileage and validation status changes expected based on the County FIRM Study status may be checked against the Inventory, again requiring user comment should unexpected values be encountered. These checks will serve the purpose of documenting the cause of mileage and mileage type shifts that may occur within the National Inventory. Should stakeholders inquire as to the reason behind such shifts we will be able to reproduce calculations alongside specific cause.

### CNMS S\_Studies\_Ln Checks Table

Parameter / Attribute	Allow Nulls	Entity	Validity	Validation Categories	Note
REACH_ID	No	S_Studies_Ln	Must be 12 characters in length	S0	
			The first five characters must match with the associated FIPS field value.	S0	
			The two characters following the FIPS must be '01'.	S0	
			Each Reach_ID must be unique.	S0	
FIPS	No	S_Studies_Ln	Five Character Length Enforcement	S0	
CID	Yes	S_Studies_Ln	None	S0	
WATER_NAME	Yes	S_Studies_Ln	None	S0	
WATER_NAME_ALIAS	Yes	S_Studies_Ln	None	S0	
FLD_ZONE	No	S_Studies_Ln	D_ZONE Domain Value	S0	
	No	S_Studies_Ln	Zone A + Detailed STUDY_TYPE is Not Permissible.	Q0	
			UnMapped Streams Should have ASSESSED Validation Status.	Q0	
			UnMapped Streams Should Have SOURCE Field Value of NHD or Digitized.	Q0	
			Zone AE/AH/AO Streams Cannot Have ASSESSED Validation Status.	Q0	
VALIDATION_STATUS	No	S_Studies_Ln	D_VALID_CAT Domain	S0	
			Validation Status – Status Type Combination Must Pass Check Against List of Acceptable Combinations	Q0 / Q1	Acceptable Combinations Defined in Latest User's Guide
			INVALID Replaced 1:1 with UNVERIFIED	Q1	
STATUS_TYPE	No	S_Studies_Ln	D_Status_Type Domain	S0	

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			BEING STUDIED requires a FY and PRELIM_QTR entries	Q0	
MILES	No	S_Studies_Ln	Should be greater than zero and not null.	Q0	
SOURCE	No	S_Studies_Ln	D_SOURCE domain	S0	
VALIDATION_DATE	No	S_Studies_Ln	Field Must be Filled Out	S0	
STATUS_DATE	No	S_Studies_Ln	Needs to have a valid date	S1	Replaces Validation Date in Updated Schema
PRELIM_QTR	Yes	S_Studies_Ln	D_PRELIM_QTR domain	S0	
			Should Contain a Date Value When STATUS_TYPE = "BEING STUDIED"	Q0	
FY_FUNDED	Yes	S_Studies_Ln	D_FY_FUNDED domain	S0	
			Should Contain a Date Value When STATUS_TYPE = "BEING STUDIED"	Q0	
REASON	Yes	S_Studies_Ln	Special Characters Check	S0	Will Check for Presence of Special Characters Which May Cause Future Interoperability Issues, But Will Not Cause Validation Failure.
HUC8_KEY	No	S_Studies_Ln	Must be 8 Characters in Length	S0/Q0	
			Must Be an Existing HUC	Q0	
STUDY_TYPE	No	S_Studies_Ln	D_STUDY_TYPE domain	S0	
			STUDY_TYPE must be set to 'NON-DIGITAL DETAILED' or 'NON-DIGITAL APPROXIMATE' for All Studies in Counties Identified as UnModernized within the County Status Tracker	Q2	
LINE_TYPE	No	S_Studies_Ln	D_LINE_TYPE Domain	S0	
DUPLICATE	No	S_Studies_Ln	D_ELEMENT Domain	S0	
			D_DUPLICATE Domain	S1	
POC_ID	Yes	S_Studies_Ln	None	S0	
	No	S_Studies_Ln	Should Contain an Existing POC_ID from POC_ID Table	S1	

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DATE_RQST	Yes	S_Studies_Ln	Should be In Expected Data Format (Date)		
			If Study is “UNVERIFIED – TO BE STUDIED”, This Field Should be Populated	Q0	
			For VALID studies, if there is a DATE_RQST, Then DATE_RESOL Must Also be Populated. The DATE_RESOL Value Should Represent a Later Date in Time DATE_RQST.	Q0	
DATE_EFFECT	Yes	S_Studies_Ln	Should be In Expected Data Format (Date)	S0	
HYDRO_MDL	No	S_Studies_Ln	D_HYDRO Domain	S0	
HYDRA_MDL	No	S_Studies_Ln	D_HYDRA Domain	S0	
HODIGFMT	No	S_Studies_Ln	D_ELEMENT Domain	S0	Check Against S0 Type D_ELEMENT Domain
				S1	Check Against S1 Type D_ELEMENT Domain
HADIGFMT	No	S_Studies_Ln	D_ELEMENT Domain	S0	Check Against S0 Type D_ELEMENT Domain
				S1	Check Against S1 Type D_ELEMENT Domain
HO_RUNMOD	No	S_Studies_Ln	D_ELEMENT Domain	S0	Check Against S0 Type D_ELEMENT Domain
				S1	Check Against S1 Type D_ELEMENT Domain
HA_RUNMOD	No	S_Studies_Ln	D_ELEMENT Domain	S0	Check Against S0 Type D_ELEMENT Domain
				S1	Check Against S1 Type D_ELEMENT Domain
C1 to C7, S1 to S10	No	S_Studies_Ln	D_ELEMENT Domain	S0	Check Against S0 Type D_ELEMENT Domain
				S1	Check Against S1 Type D_ELEMENT Domain
CE_TOTAL	No	S_Studies_Ln	The Value Should Accurately Reflect the Number of Failed Critical Elements	Q0	
SE_TOTAL	No	S_Studies_Ln	The Value Should Accurately Reflect the Number of Failed Secondary Elements	Q0	

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COMMENT	No	S_Studies_Ln	Special Characters Check	S0	Will Check for Presence of Special Characters Which May Cause Future Interoperability Issues, But Will Not Cause Validation Failure.
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**CNMS S\_Requests\_Ar and S\_Requests\_Pt Checks Table**

Parameter / Attribute	Allow Nulls	Entity	Validity	Validation Categories	Note
SRA_ID	No	S_Requests_Ar	Must be 12 characters in length	S0	
			The two characters following the FIPS must be '01'.	S0	
			Each Reach_ID must be unique.	S0	
SRP_ID	No	S_Requests_Pt	Must be 12 characters in length	S0	<p style="color: red; font-size: 1.2em; font-weight: bold;">This Document is Superseded. For Reference Only.</p>
			The two characters following the FIPS must be '01'.	S0	
			Each Reach_ID must be unique.	S0	
REACH_ID	Yes	S_Requests	Must be 12 characters in length	S0	Recognizing that REACH_ID's May Disappear from the Inventory Through Normal Maintenance Practices, This Check Will Not Cause Validation Failure, but Will Show Up in the Data Validation Output
			If this Field is Populated, the Associated REACH_ID Should be Present in S_Studies_Ln	S0	
WATER_NAME	Yes	S_Requests	None	S0	
POC_ID	Yes	S_Requests	None	S0	
	No	S_Requests	Should Contain an Existing POC_ID from POC_ID Table	S1	
RQST_CAT	No	S_Requests	D_RQST_CAT Domain	S0	
RQST_LVL	Yes	S_Requests	D_RQST_LVL Domain	S0	

## CNMS Technical Reference

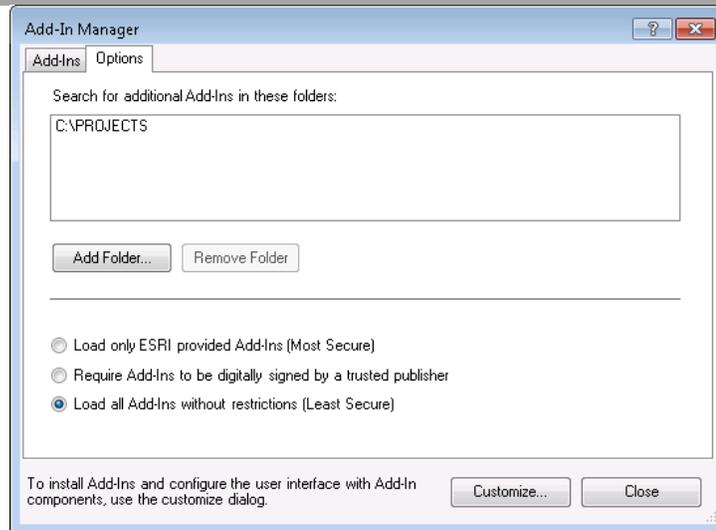
MTHOD_TYPE	Yes	S_Requests	D_MTHOD_TYPE Domain	S0	
DATE_RQST	No	S_Requests	Should be In Expected Data Format (Date)	S0	
DATE_RESOL	Yes	S_Requests	Should be In Expected Data Format (Date)	S0	
			Value Must Represent Later Date in Time Than DATE_RQST	S0	
CARTO_RQST	Yes	S_Requests	D_CARTO_RQST Domain	S0	
FDATA_RQST	Yes	S_Requests	D_FDATA_RQST Domain	S0	
RESOL_STATUS	Yes	S_Requests	D_RESOL_STAT Domain	S0	
COMMENT	Yes	S_Requests	Special Characters Check	S0	Will Check for Presence of Special Characters Which May Cause Future Interoperability Issues, But Will Not Cause Validation Failure.
PRIORITY	Yes	S_Requests	D_PRIORITY Domain	S1	
DATE_REVIEW	Yes	S_Requests	Should be In Expected Data Format (Date)	S1	
			Value Must Represent Later Date in Time Than DATE_RQST	S1	

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For Reference Only

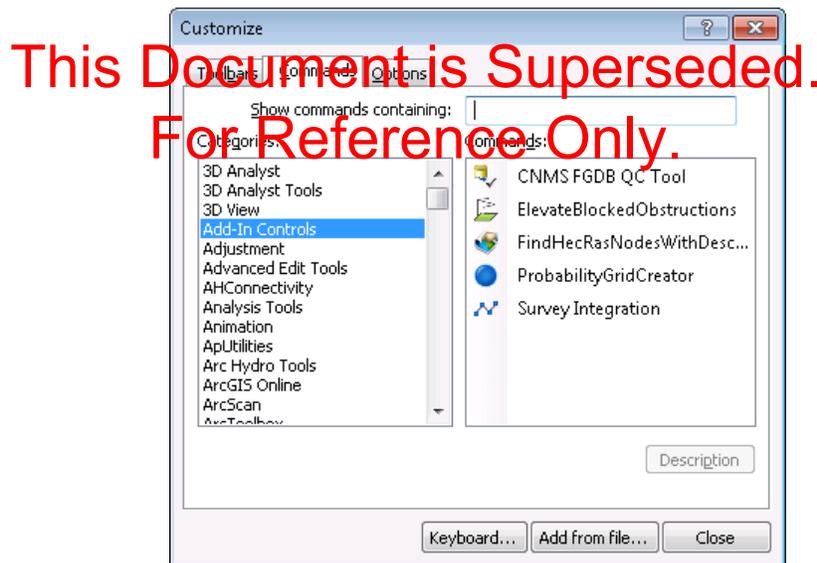
### H.4. User's Guide: CNMS FGDB QC Tool - Beta Version

#### How to Install and Access the Tool:

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



- Click Customize on the Add-In Manager dialog. In the Customize dialog, click on the Commands tab. Select the “Add-in controls” under the categories. You can also reach the Customize dialog by clicking on ‘Customize-Customize Mode’ on the main ArcMap menu. The commands pane lists all the add-ins available.



- Drag and drop “CNMS FGDB QC Tool” into the ArcMap toolbar area. Alternatively, you can also create a new custom toolbar and drop the item into the new toolbar.

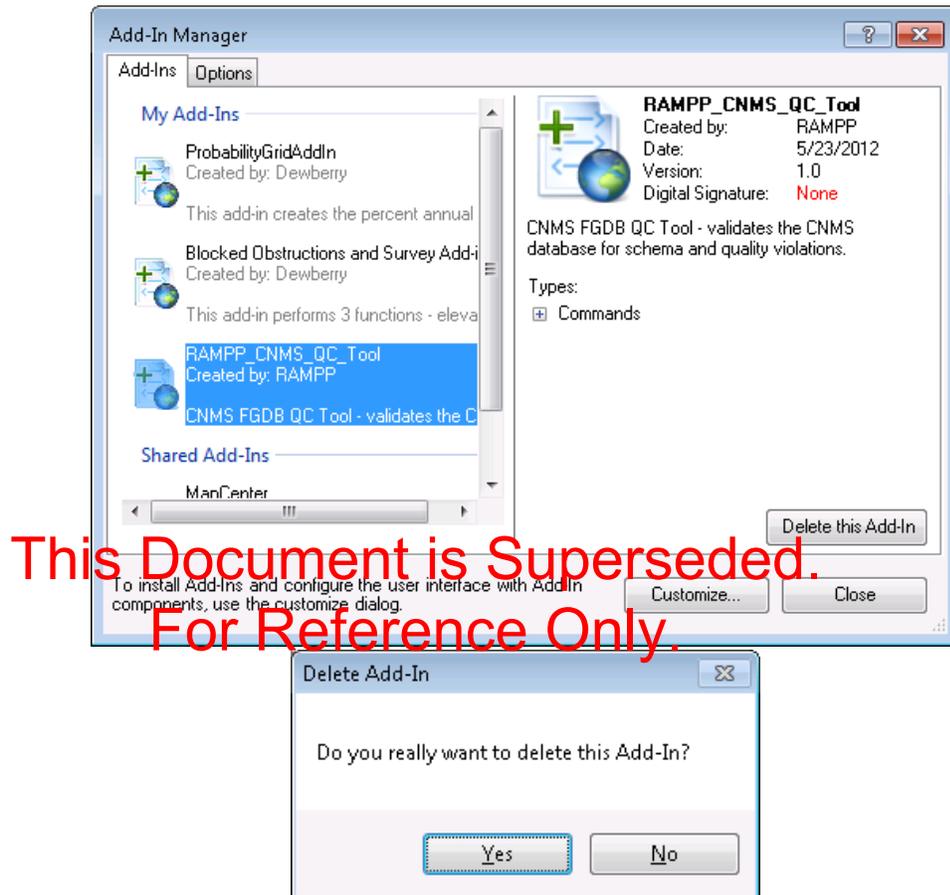
Note: The user does not need to be an administrator to install and use this tool.

### **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 completely uninstall the add-in and re-install by using the steps outlined below.

1. In ArcMap, go to Customize-Addin Manager.
2. Click on the 'RAMPP\_CNMS\_QC\_Tool' add-in.
3. Click on the 'Delete this add-in' button. Confirm by clicking 'Yes' on the ensuing confirmation dialog.

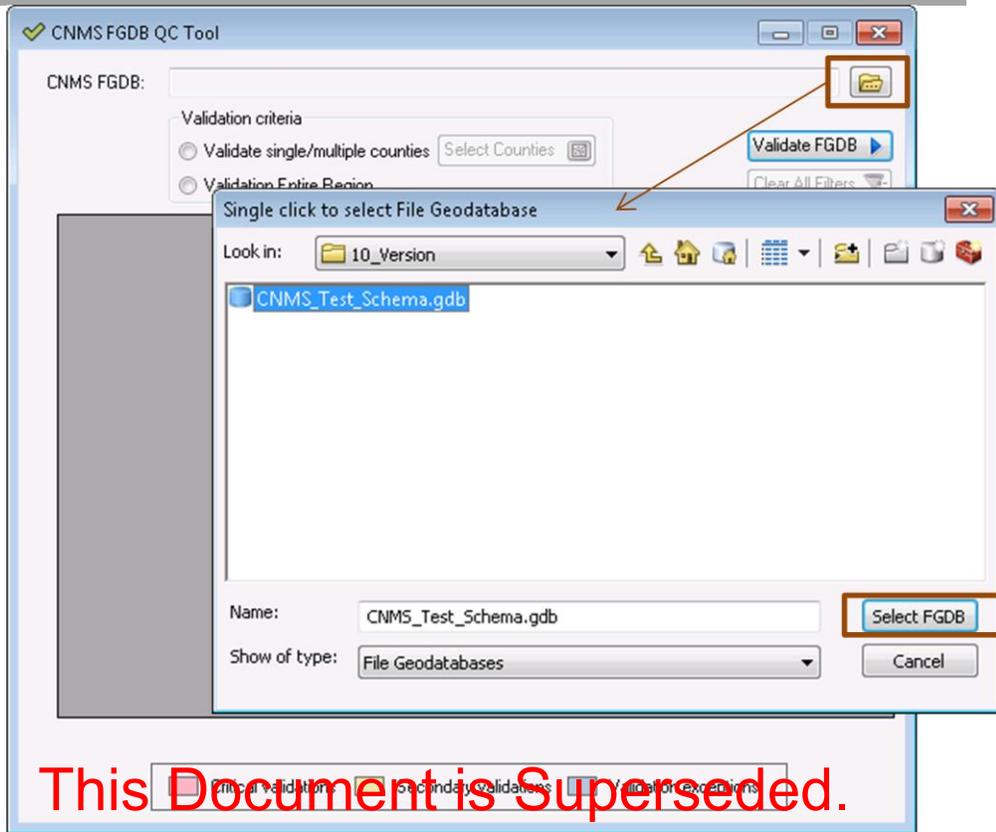


4. Follow the procedure outlined in the “How to Install and Access the Tool” section of this document to re-install the add-in.

### **Intended FGDB QC Workflow:**

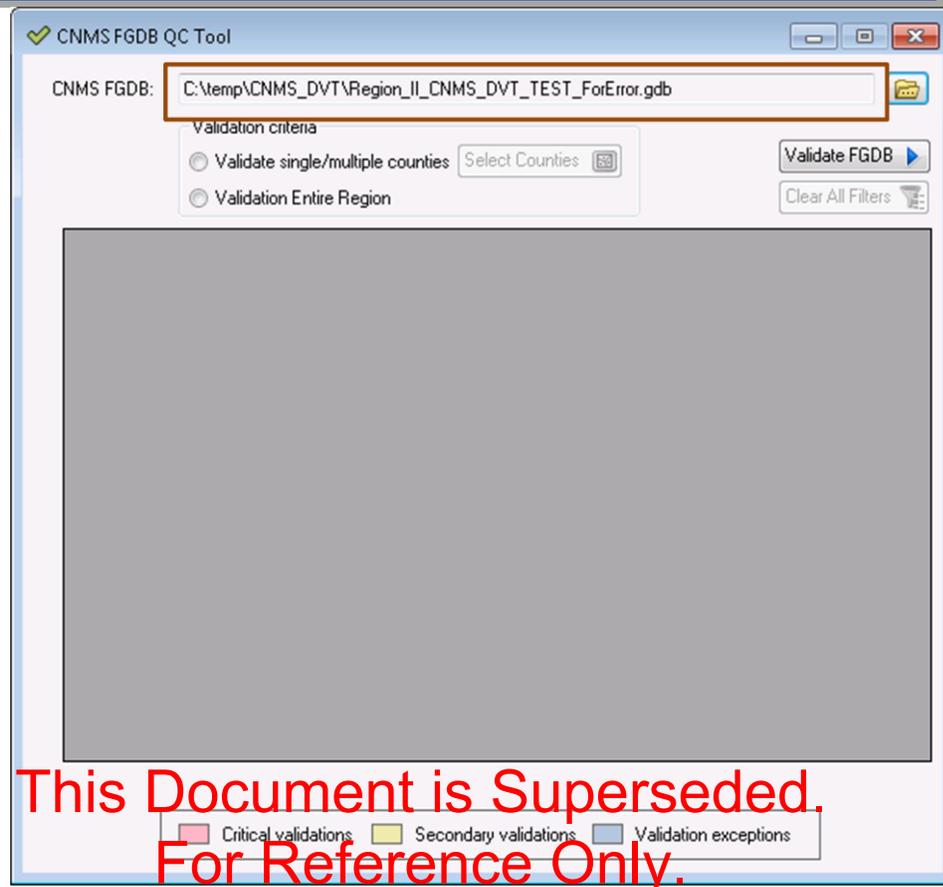
1. Start the CNMS FGDB QC Tool by clicking on the icon previously added to either an existing or custom toolbar
2. Select a ESRI FGDB (conforming to CNMS schema V 5.1 dated 5/8/2012) using the Select FGDB dialog.

# CNMS Technical Reference



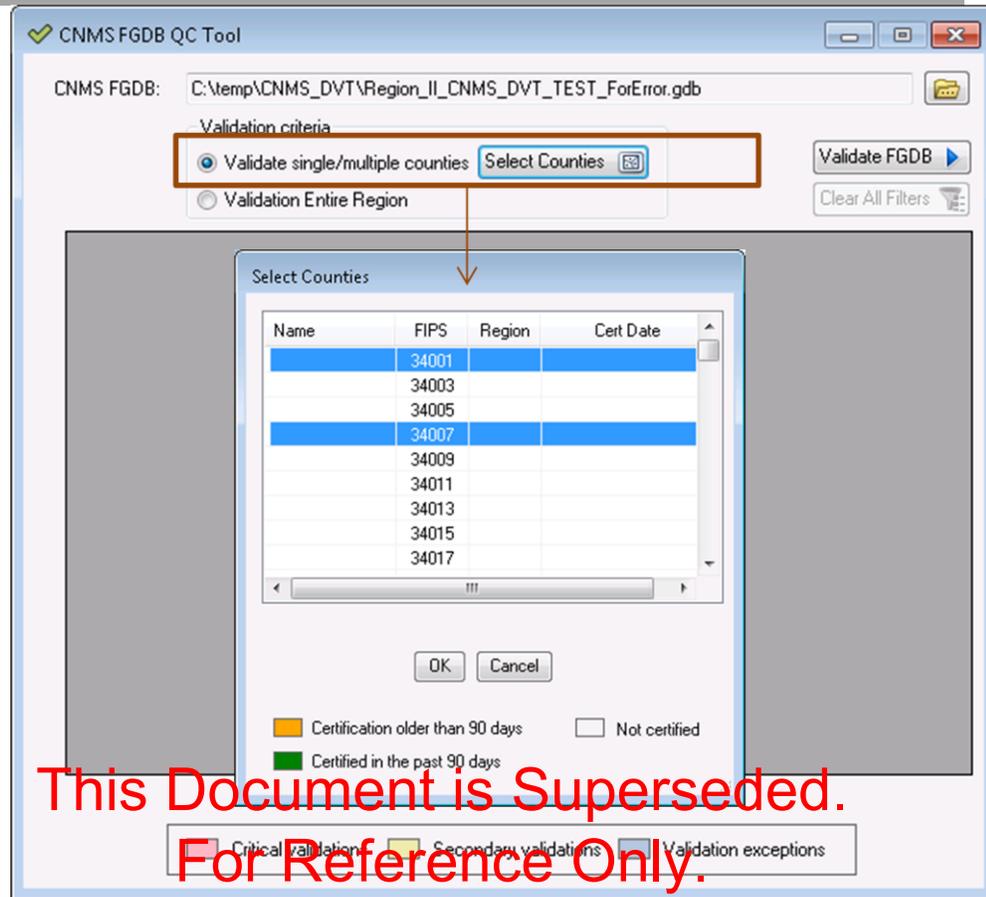
The selected FGDB is listed on the user interface as shown below:

## CNMS Technical Reference



3. 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.

## CNMS Technical Reference



4. Click on the “Validate FGDB” 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.
5. The context-menu available on the grid allows the following actions:
  - a. Zoom to the selected record on the map. The selection occurs based on the Reach\_ID field for S\_Studies\_Ln, SRA\_ID field for S\_Requests\_Ar and SRP\_ID field for S\_Requests\_Pt. If there are no unique ID fields, the OID field is used. (Right click – Zoom to Selection)
  - b. Add a validation exception (Right click – Mark as exception)
  - c. Edit an existing validation exception (Right click – Edit exception)
  - d. Delete an existing validation exception (Right click – Delete exception)

# CNMS Technical Reference

CNMS FGDB QC Tool

CNMS FGDB: C:\temp\CNMS\_DVT\Region\_II\_CNMS\_DVT\_TEST\_ForError.gdb

Validation criteria

Validate single/multiple counties 
 Validation Entire Region

Priority	UniqueID	ValidationErrorText	ValidationFieldName
Critical	340210100014	Invalid combination value for VALIDATION_STATUS ...	VALIDATION_STATL
Critical	340210100014	Required field has null value	SOURCE
Critical	340210100028	Required field has null value	SOURCE
Critical	340210100029	Required field has null value	SOURCE
Critical	340210100077	Required field has null value	SOURCE
Critical	360970100423	Value is not part of the domain	VALIDATION_STATL
Secondary	360970100423	Field value cannot be null: PRELIM_QTR	STATUS_TYPE
Critical	360970100424	Value is not part of the domain	VALIDATION_STATL
Secondary	360970100424	Field value cannot be null: PRELIM_QTR	STATUS_TYPE
Critical	360970100425	Value is not part of the domain	VALIDATION_STATL
Secondary	360970100425	Field value cannot be null: PRELIM_QTR	STATUS_TYPE
Critical	360970100426	Value is not part of the domain	VALIDATION_STATL
Secondary	360970100426	Field value cannot be null: PRELIM_QTR	STATUS_TYPE
Critical	360970100427	Value is not part of the domain	VALIDATION_STATL

Critical validation
  Secondary validation
  Validation exceptions

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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.

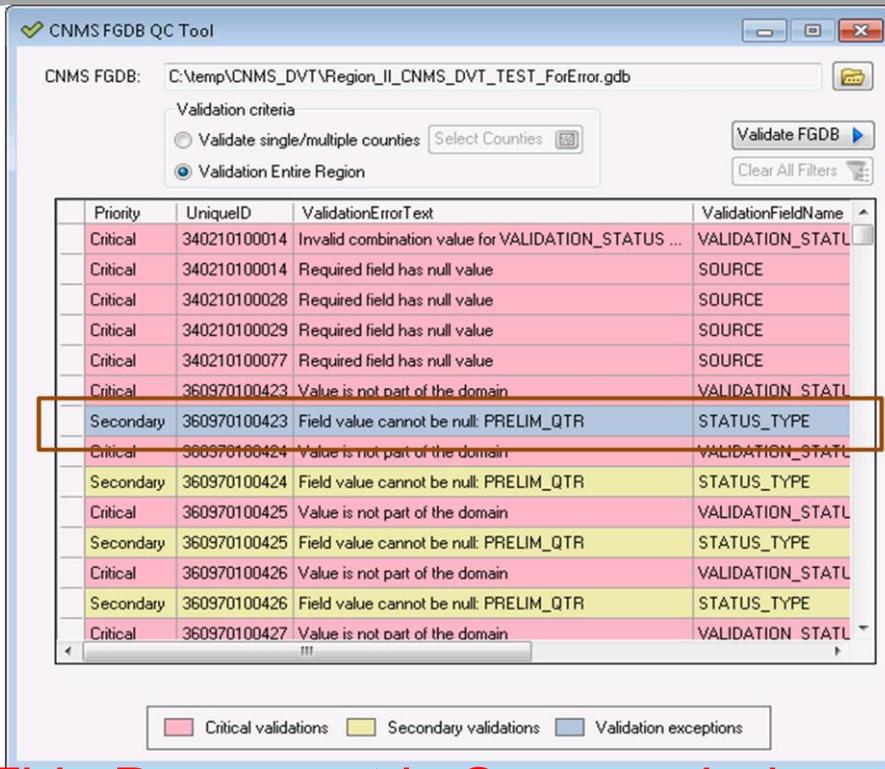
# CNMS Technical Reference

The screenshot displays the 'CNMS FGDB QC Tool' window. At the top, the 'CNMS FGDB' path is set to 'C:\Temp\CNMS\_DVT\Region\_II\_CNMS\_DVT\_TEST\_ForError.gdb'. The 'Validation criteria' section has 'Validation Entire Region' selected. Below this is a table of validation errors:

Priority	UniqueID	ValidationErrorText	ValidationFieldName
Critical	340210100014	Invalid combination value for VALIDATION_STATUS ...	VALIDATION_STATU
Critical	340210100014	Required field has null value	SOURCE
Critical	340210100028	Required field has null value	SOURCE
Critical	340210100029	Required field has null value	SOURCE
Critical	340210100077	Required field has null value	SOURCE
Critical	360970100423	Value is not part of the domain	VALIDATION_STATL
Secondary	360970100423	Field value cannot be null: PRELIM_QTR	
Critical	360970100424	Value i	
Secondary	360970100424	Field v	
Critical	360970100425	Value is not part of the domain	
Secondary	360970100425	Field value cannot be null: PRELIM_QTR	
Critical	360970100426	Value is not part of the domain	
Secondary	360970100426	Field value cannot be null: PRELIM_QTR	
Critical	360970100427	Value is not part of the domain	

An 'Add Exception(s)' dialog box is open over the table. It has a 'Comments Type' dropdown set to 'Exception' and a text area containing 'This is a sample exception comment'. A legend at the bottom of the tool shows 'Critical validations' in pink, 'Secondary validations' in yellow, and 'V' in blue. A red watermark is overlaid on the bottom of the image.

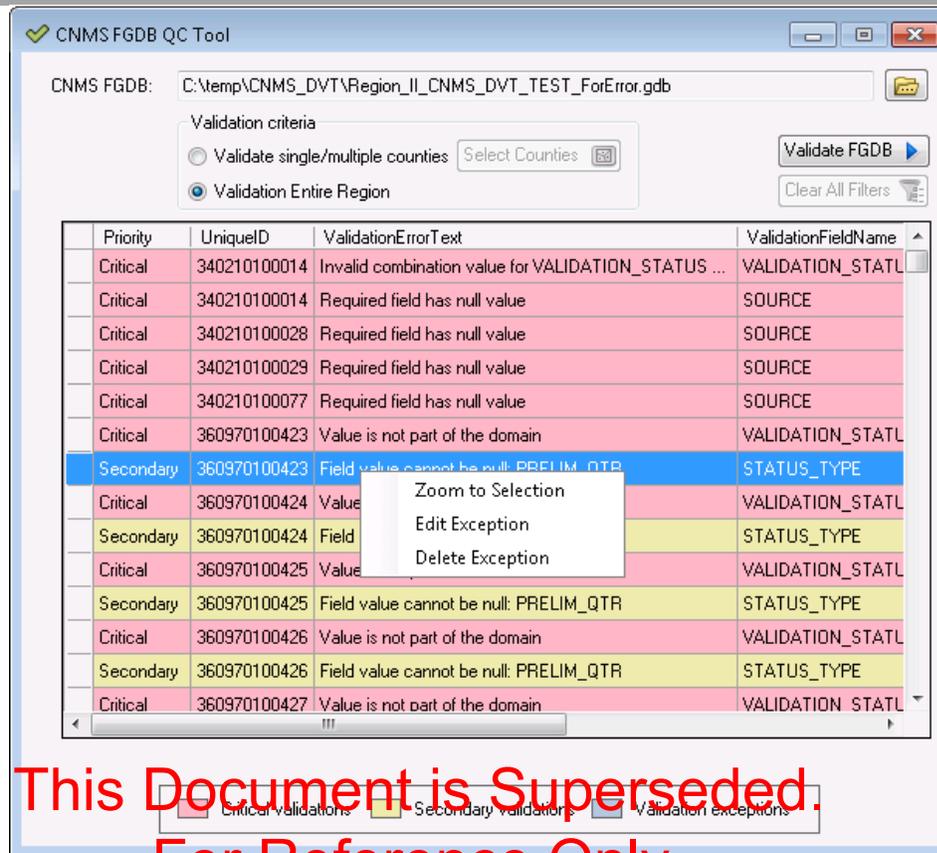
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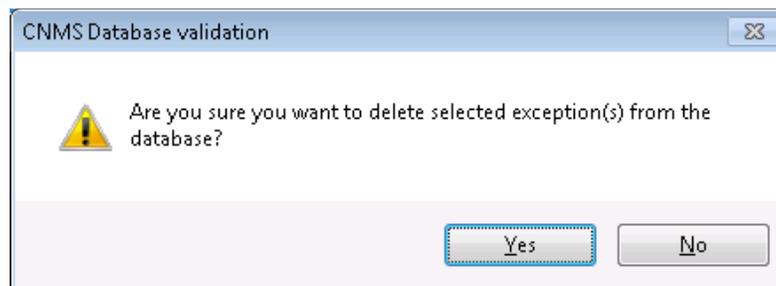
7. **Editing and deleting exceptions:** Clicking on an existing exception provides additional options to edit and/or delete exceptions. For Reference Only.

# CNMS Technical Reference



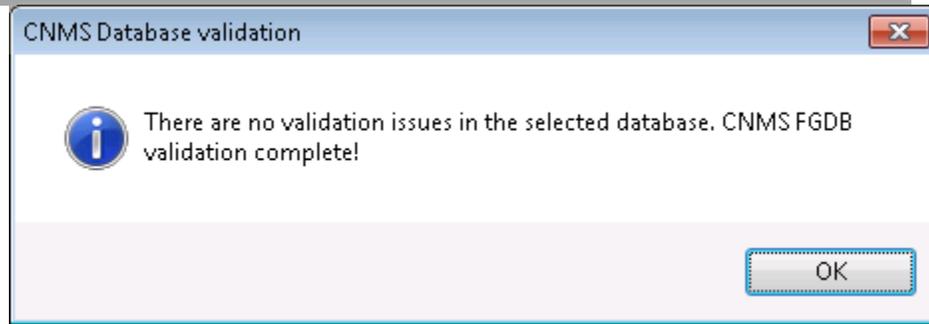
This Document is Superseded.  
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Selecting 'Edit Exception' brings up the input dialog allowing comments to be altered. This feature can also be used as to overwrite existing comments. Deleting an exception brings up a confirmation dialog (as shown below).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



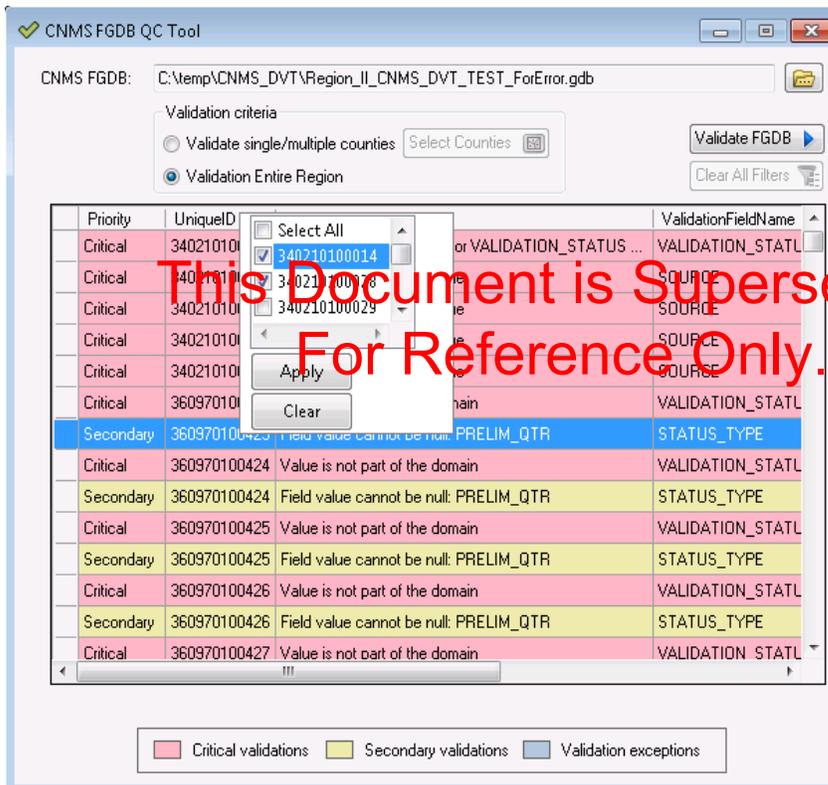
8. Click on the "Validate FGDB" button after every round of changes until all issues have been addressed. A success message will appear at the end of the validation process. Validation is complete only when:
  - a. All Critical validation items have been addressed.
  - b. All Secondary validation items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

# CNMS Technical Reference



## Additional CNMS FGDB QC Tool Features:

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



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

# CNMS Technical Reference

The screenshot shows the 'CNMS FGDB QC Tool' window. At the top, the 'CNMS FGDB' path is set to 'C:\temp\CNMS\_DVT\Region\_II\_CNMS\_DVT\_TEST\_ForError.gdb'. Under 'Validation criteria', 'Validate single/multiple counties' is selected with a 'Select Counties' button, and 'Validation Entire Region' is also selected. There are 'Validate FGDB' and 'Clear All Filters' buttons. Below this is a table with the following data:

Priority	UniqueID	ValidationErrorText	ValidationFieldName
Critical	340210100014	Required field has null value	SOURCE
Critical	340210100028	Required field has null value	SOURCE

At the bottom, there is a legend: a pink box for 'Critical validations', a yellow box for 'Secondary validations', and a light blue box for 'Validation exceptions'. A large red watermark is overlaid on the bottom half of the screenshot.

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