

# Guidelines and Standards for Flood Risk Analysis and Mapping

## Appendix O: Format and Standards for Non-Regulatory Flood Risk Products

January 2012



**FEMA**

# Summary of Changes for Appendix O

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## Format and Standards for Non-Regulatory Flood Risk Products

The following Summary of Changes details the revisions of Appendix O, including and subsequent to its initial publication in January 2012. These changes represent new or updated guidance for Mapping Partners.

Table 1-1 Format and Standards for Non-Regulatory Flood Risk Products

Date	Affected Section(s)	Summary of Change
January 2012	All	Initial Publication

## Table of Contents

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Summary of Changes for Appendix O .....	ii
Table of Contents .....	iii
List of Tables .....	vi
List of Figures .....	vii
Table of Standards .....	viii
Acronyms and Abbreviations .....	xix
O.1. Overview .....	1
O.1.1. Document Purpose .....	1
O.1.2. Superseded Documents .....	2
O.2. Non-Regulatory Products and Datasets .....	3
O.3. Flood Risk Database .....	5
O.3.1. Overview .....	5
O.3.2. Accuracy and Standards .....	8
O.3.3. Database Design .....	9
O.3.3.1. FRD Structure for the FRR Elements .....	10
O.3.4. Database Standards .....	10
O.3.4.1. Spatial Extents .....	10
O.3.4.2. Data Tiling .....	17
O.3.4.3. Spatial Reference .....	17
O.3.4.4. Raster Standards .....	18
O.3.4.5. Topology .....	19
O.3.4.6. Table Structure .....	21
O.3.4.6.1. fGDB Field Properties .....	21
O.3.4.6.2. SHP Field Properties .....	22
O.3.4.7. Required and Optional Fields .....	22
O.3.4.8. Primary and Foreign Keys .....	23
O.3.4.9. Null Values .....	23
O.3.4.10. Feature Classes / Tables .....	24
Feature Class: S_AOMI_Pt .....	26
Feature Class: S_Carto_Ar .....	29
Feature Class: S_Carto_Ln .....	31
Feature Class: S_Carto_Pt .....	33
Feature Class: S_CenBlk_Ar .....	35
Feature Class: S_CSLF_Ar .....	38

Feature Class: S_FRD_Pol_Ar.....	44
Feature Class: S_FRD_Proj_Ar .....	49
Feature Class: S_FRM_Callout_Ln .....	52
Feature Class: S_HUC_Ar .....	54
Feature Class: S_UDF_Pt.....	56
Table: FRD_Model_Info .....	58
Table: FRD_Study_Info .....	61
Table: FRR_Custom.....	64
Table: FRR_Images.....	66
Table: FRR_Project.....	68
Table: L_AOMI_Summary .....	69
Table: L_Claims .....	72
Table: L_CSLF_Summary .....	75
Table: L_Exposure .....	79
Table: L_Local_GBS .....	83
Table: L_RA_AAL.....	85
Table: L_RA_Composite.....	88
Table: L_RA_Refined .....	91
Table: L_RA_Summary .....	94
Table: L_RA_UDF_Refined .....	99
Table: L_Source_Cit .....	101
O.3.4.11. Rasters .....	104
Raster: CST_Dpthxxxpct.....	105
Raster: Depth_xxxpct.....	106
Raster: Hillshade .....	107
Raster: Pct30yrChance .....	108
Raster: PctAnnChance.....	109
Raster: Vel_xxxpct [E].....	110
Raster: WSE_xxxpct [E] .....	110
Raster: WSE_Change [E].....	112
O.3.4.12. Relationship Classes .....	113
O.3.4.13. Domains.....	115
O.3.5. Versioning.....	117
O.3.6. Data Source Coordination.....	117
O.3.7. Metadata.....	118
O.4. Flood Risk Report .....	120

O.4.1. Overview.....	120
O.4.2. Report Standards.....	120
O.4.2.1. Report Cover .....	121
O.4.2.2. Table of Contents .....	121
O.4.2.3. General Content.....	122
O.4.2.4. Report Elements (Listed By Section) .....	123
O.4.2.5. Enhanced Report Features .....	131
O.4.2.6. Paper Report .....	131
O.5. Flood Risk Map.....	132
O.5.1. Overview.....	132
O.5.2. Map Standards .....	132
O.5.2.1. Page Size .....	132
O.5.2.2. Map Title .....	133
O.5.2.3. Legend (Map Symbology).....	133
O.5.2.4. Project Locator .....	133
O.5.2.5. Title Block.....	134
O.5.2.6. Scale, North Arrow.....	134
O.5.3. Page Content .....	134
O.5.3.1. Geographic Extent.....	134
O.5.3.2. Map Body .....	134
O.5.3.3. Required Features.....	135
O.5.3.3.1. Base Data Types .....	135
O.5.3.3.2. Flood Data Types.....	136
O.5.3.3.3. Flood Risk Types.....	137
O.5.3.4. Enhanced Features.....	137
O.5.3.4.1. Areas of Mitigation Interest.....	137
O.5.3.5. Callouts.....	138
O.5.3.5.1. Callout Placement.....	138
O.6. Deliverables / Submittals .....	140
O.6.1. Database Submittal .....	140

## Attachment A - Flood Risk Database (FRD) Data Model Poster

## List of Tables

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Table O-1. Flood Risk Database Tables .....	<b>Error! Bookmark not defined.</b>
Table O-2. Flood Risk Database Rasters .....	7
Table O-3. Topology Rules.....	20
Table O-4. FRD Relationship Classes .....	<b>Error! Bookmark not defined.</b>
Table O-5. FRD Domains .....	115
Table O-6. Source Citation Type Abbreviations .....	118
Table O-7. Standard Text in FRR Sections.....	122

## List of Figures

---

Figure O-1. Flood Risk Data and Products Model.....	<b>Error! Bookmark not defined.</b>
Figure O-3. HUC-8 Sub-basin Project Area .....	11
Figure O-4. Coastal Project Area .....	12
Figure O-5. PMR Project Area.....	13
Figure O-6. Multi-HUC Levee Project Area.....	14
Figure O-7. Community Spanning Multiple Sub-basins.....	15
Figure O-8. Raster Extents .....	16
Figure O-9. Raster Extents for Multiple Detailed Study Areas.....	16
Figure O-10. Example Relationship Class .....	113
Figure O-11. Example Domain .....	115

## Table of Standards

The Table of Standards is an overview of all mandatory elements within this Appendix. For details regarding these standards, refer to the body of this document where standards are shown in **bolded** text.

Table 1-2 Table of Standards

Section Number	Short description
O.3.1	All of the tables in the FRD standard are required to be populated and delivered unless noted with an [E] in the tables in this section or specifically noted as not required in a project's SOW, MAS, or IAA.
O.3.1	Updates to the FRD will be performed via a replacement of the entire project area, usually a HUC-8 sub-basin, as defined in the SOW, MAS, or IAA.
O.3.1	The Mapping Partner will copy and append the appropriate existing tables from the corresponding FIRM databases and other data sources into the FRD. If these data sources cross a project boundary, certain feature classes (e.g., S_FRD_Pol_Ar) will be clipped to the geographic extent of the flood risk project.
O.3.1	In naming the rasters in the FRD, the Mapping Partner will replace the xxx with the abbreviation for the flood event modeled that is represented by the particular raster.
O.3.2	In any instance where SFHA or political areas must be created, the data shall be created or adjusted according to the Appendix L requirements.
O.3.2	The structure of the digital files must follow the FRD schema. All duplicate elements (i.e., features with coincident vertices and the same attributes) within the FRD must be removed. The data must be horizontally controlled and referenced to the appropriate horizontal and vertical datums. The assigned Mapping Partner must perform a thorough Quality Control (QC) review before submitting data to FEMA.
O.3.3	The FRD must be delivered in file formats listed in Section O.6.
O.3.3	Additional domain table values must be approved by FEMA before they may be used in the flood risk products.
O.3.4.1	In the event that a flood risk project is scoped to cover multiple HUC-8 sub-basins, the Project Team, as an outcome of the Discovery process will determine if the project shall be delivered as: <ol style="list-style-type: none"> <li>a) a single suite of non-regulatory products for the entire project extents (i.e., a single FRD, FRR, and FRM) or</li> <li>b) multiple suites of products (i.e., an FRD, FRR, and FRM) that comprise the full project area. Normally, this would be a separate suite of projects for each HUC-8, but there could be circumstances where this is not practical.</li> </ol>

Section Number	Short description
O.3.4.1	Mapping Partners will create a single multi-part polygon feature (stored in the S_FRD_Proj_Ar feature class) that best represents the geographic extent of the flood risk project.
O.3.4.1	In areas where the S_FRD_Pol_Ar feature class is clipped at watershed boundaries, the attributes of the individual features shall be adjusted accordingly.
O.3.4.1	In raster datasets, for those cells whose centroid is outside the project area, the value of each cell is set to 'NO DATA'
O.3.4.1	For certain scenarios where the limits of study extend beyond the watershed boundary, the Mapping Partner will not clip the S_CSLF_Ar, nor mask the depth and analysis rasters using the S_FRD_Proj_Ar polygon, but will include the results of those analyses results in the delivered FRD.
O.3.4.2	The assigned Mapping Partner shall submit FRD datasets covering an entire sub-basin (or other spatial extent described in Section O.3.4.1.).
O.3.4.3	During the production part of the flood risk project, the Mapping Partner will select appropriate Spatial Reference Systems (SRSs), including projection, datum, and units, to maintain sufficient accuracy for engineering analysis.
O.3.4.3	The area of each change polygon will be calculated in square feet and used to populate the AREA_SF attribute. The original source and production projection information shall be captured and described in the metadata submitted with each FRD.
O.3.4.3	All vector data submitted in the FRD shall utilize the Geographic Coordinate System (GCS) with a defined horizontal datum as the North American Datum of 1983 as updated in 2007 (NAD83[NSRS-2007]). Any exceptions shall be coordinated with the FEMA Project Officer. All horizontal units shall be in decimal degrees and the spatial tolerances shall be defined in decimal degrees with the cluster tolerance and resolution as specified in Section O.3.4.5.
O.3.4.3	The assigned Mapping Partner shall reference all elevation data, including water surface elevation rasters, to the North American Vertical Datum of 1988 (NAVD88).
O.3.4.3	All vertical units shall be in U.S. Survey Feet. The use of other datums or vertical units (e.g., the use of meters in areas such as Puerto Rico where Base Flood Elevations [BFEs] are expressed in meters) will require approval of the FEMA Project Officer.
O.3.4.4	All raster datasets in the FRD shall use the Universal Transverse Mercator (UTM) zone in which the majority of the project area lies.
O.3.4.4	The horizontal datum for all rasters shall be NAD83. The use of other datums or vertical units (e.g., the use of meters in areas such as Puerto Rico where Base Flood Elevations [BFEs] are expressed in meters) will require approval of the FEMA Project Officer.

Section Number	Short description
O.3.4.4	All depth and analysis rasters shall be floating point with data rounded to the nearest tenth of a unit (i.e., 0.1 feet, 0.1 feet/second, or 0.1%) and shall have the same spatial reference, origin, resolution, and rotation.
O.3.4.4	The hillshade raster shall be an integer raster with the same spatial reference, cell size, rotation, and origin as the other rasters delivered with output values ranging from 0 to 255.
O.3.4.5	All spatial FRD feature classes in the file geodatabase (fGDB) exist within one feature dataset. The single FRD feature dataset must be named “FRD_Spatial_Layers”.
O.3.4.5	Non-spatial tables and rasters shall exist outside of the FRD_Spatial_Layers feature dataset, as standalone business tables and rasters at the ‘root’ level inside the fGDB.
O.3.4.5	All FRDs are delivered to FEMA with the cluster tolerance and resolution set to the values described in this section.
O.3.4.5	The Mapping Partner should use the tolerances described in this section to calculate the appropriate cluster tolerance and resolution in the local spatial reference system used during production.
O.3.4.5	Data delivered in the SHP format shall have the same tolerances and topology rules as specified for the geodatabase format.
O.3.4.5	The horizontal cluster tolerance value will match the cluster tolerance specified for the feature dataset above.
O.3.4.5	The Mapping Partner is responsible to validate the topology rules listed in this section on the resulting S_CSLF_Ar feature class.
O.3.4.5	The Census Block feature class shall be imported into the S_CenBlk_Ar feature class of the FRD and attributed.
O.3.4.6	Mapping Partners must follow the attribute table structure presented in Section O.3.4.10.
O.3.4.6.1	Blob and Raster object fields will not be exported to SHP format.
O.3.4.8	Each FRD table and feature class also has a primary key defined that may be made up of one or more fields.
O.3.4.9	In the event that the complete information cannot be obtained for a required field, the Mapping Partner shall substitute a value that indicates that the affected field was intentionally not populated.
O.3.4.9	For a field that is optional or required when applicable, the value must be set to the values shown in this section, not set to zero. The Mapping Partner shall use the value zero only when an attribute has the specific value of zero.
O.3.4.9	For those fields designated as enhanced in each of the table sections and on the data model poster, if the enhanced option is contractually required, but the data are unavailable, those fields are populated with “NP”, -8888, or 8/8/8888 respectively depending on data type. If the enhanced option is not contractually required, those fields shall be populated with “”, -9999, or 9/9/9999 respectively depending on data type.

Section Number	Short description
O.3.4.9	For raster data, the value 'NODATA' shall be used to represent the absence of data or null values. Generally, all areas outside the project area (i.e., the polygon in S_FRD_Proj_Ar) shall be set to 'NODATA' in the depth and analysis rasters.
O.3.4.10	Text fields must follow the capitalization standards that apply to the display of that information in the FRR or on the FRM.
O.3.4.10	The Mapping Partner must convert the values from Hazus to whole dollar amounts in the FRD tables.
O.3.4.10	The AOMI feature class contains one record for each AoMI type at a location on the FRM.
O.3.4.10	When the AOMI feature class is exported to SHP format, the Mapping Partner will create four fields to contain the data in the NOTES field (i.e., NOTES1, NOTES2, NOTES3, and NOTES4).
O.3.4.10	The S_Carto_Ar polygon feature class is used to provide a cartographic background for the FRM.
O.3.4.10	The S_Carto_Ar feature class does not need to be clipped by the S_FRD_Proj_Ar polygon.
O.3.4.10	The S_Carto_Ar feature class is subdivided into subtypes (Hydrographic, Restudy Area, and User-Defined) to facilitate categorization and symbolization on the FRM.
O.3.4.10	The S_Carto_Ln polyline feature class is used to provide a cartographic background for the FRM.
O.3.4.10	The S_Carto_Ln feature class does not need to be clipped by the S_FRD_Proj_Ar polygon.
O.3.4.10	The S_Carto_Ln feature class is subdivided into subtypes (Hydrographic, Transportation, and User-Defined) to facilitate categorization and symbolization on the FRM.
O.3.4.10	The S_Carto_Pt point feature class is used to provide a cartographic background for the FRM.
O.3.4.10	The S_Carto_Pt feature class is subdivided into subtypes (Hydrographic, Transportation, and User-Defined) to facilitate categorization and symbolization on the FRM. The feature class does not need to be clipped by the S_FRD_Proj_Ar feature class.
O.3.4.10	The S_CenBlk_Ar polygon feature class provides the spatial foundation for storing the flood risk assessments.
O.3.4.10	The Mapping Partner should use the Census Block boundaries from the Hazus DVDs or FEMA's Map Service Center to create the S_CenBlk_Ar feature class.
O.3.4.10	The S_CenBlk_Ar feature class should not be clipped by the polygon in the S_FRD_Proj_Ar feature class.
O.3.4.10	The S_CenBlk_Ar feature class should contain one record for each Census Block in or partially in the project area.
O.3.4.10	The S_CSLF_Ar polygon feature class depicts the changes in spatial extents between the previous and newly revised FIRMs.

Section Number	Short description
O.3.4.10	If the floodplains that contribute to the S_CSLF_Ar feature class extend beyond the S_FRD_Proj_Ar project boundary, they should not be clipped by the project boundary, but included in the FRD for the areas being studied for regulatory products. If a CSLF polygon has multiple models of the same type (e.g., two hydrologic models), then the CSLF polygons should be subdivided accordingly. If the CSLF polygon spans FIRM panels that have different effective dates, then those polygons should be divided at the panel boundaries.
O.3.4.10	The project team should determine the definition of structures to be used in populating the structures field listed below (e.g., minimum footprint area, inhabitable versus uninhabitable, NFIP insured).
O.3.4.10	The S_FRD_Pol_Ar feature class is a combination of the S_Pol_Ar feature classes from all FIRM database in the project area. There should be one record (polygon) per community. This will necessitate the use of multi-part polygons for non-contiguous community boundaries. The polygon(s) should be clipped at the project boundary using the S_FRD_Proj_Ar feature class. Any remaining portion should be moved to S_Carto_Ar if required for display on the FRM (e.g., in the Project Locator Map).
O.3.4.10	The S_FRD_Pol_Ar feature class should only contain communities that have summary information presented in Section 3 of the FRR.
O.3.4.10	The S_FRD_Proj_Ar feature class represents the spatial ‘footprint’ of the project (or portion of the project if multiple suites of products are created for the project). The single polygon that ‘best’ represents the project area should be used. These features shall be multi-part polygons to support non-contiguous PMR project footprints.
O.3.4.10	The S_FRM_Callout_Ln feature class is used to display the callout/leader lines on the FRM. The lines must be digitized from a centroid of the callout box to the geographic feature being highlighted by the callout box.
O.3.4.10	The S_HUC_Ar feature class depicts the watersheds in and around the project area. The boundaries delivered in the S_HUC_Ar feature class should be those HUCs used for the most recent FEMA prioritization.
O.3.4.10	S_UDF_Pt is an enhanced feature class that locates UDFs for which site or location-specific risk assessments are performed. There is one record for each UDF assessed.
O.3.4.10	The FRD_Model_Info table describes the models that were used in the most recent update completed for a flood risk project and the prior analyses
O.3.4.10	The FRD_Model_Info table will have one record for each unique combination of models used to create the SFHAs that were used to develop the S_CSLF_Ar feature class.
O.3.4.10	If a CSLF polygon has multiple models of the same type (e.g., two hydrologic models), then the CSLF polygons should be subdivided accordingly. If the CSLF polygon spans FIRM panels that have different effective dates, then those polygons should be divided at the panel boundaries.

Section Number	Short description
O.3.4.10	The FRD_Study_Info table contains details about the FIRM projects in the flood risk project. There should be one record in the FRD_Study_Info table for each FIRM within the project extents whose data has been incorporated into the FRD.
O.3.4.10	The FRR_Custom table stores custom text written for the project and communities in Section 3 of the FRR, Flood Risk Analysis Results.
O.3.4.10	In the FRR_Custom table, there is one record for each community and one record for the project level summary for Section 3 of the FRR. There is one record for each community and one record for the project level summary for Section 3 of the FRR.
O.3.4.10	The FRR_Images table stores custom images in the FRR. This includes the FRM image at the beginning of Section 3 that is displayed once, as well as custom sidebar images in each of the community results.
O.3.4.10	The FRR_Project table stores report material specific to the entire project (i.e., project-level, custom text for Section 7 of the FRR). Any text is to be stored as an Office Open XML 2.0 compliant markup fragment containing only text and styles. There should be one record in this table.
O.3.4.10	The L_AOMI_Summary table stores summary counts by various classifications of AoMI points by community or partial community within the project area.
O.3.4.10	In the L_AOMI_Summary table, there is one record for each unique combination of community, mitigation interest type, and data source. There is also a set of summary records for the project area.
O.3.4.10	The L_Claims table stores historic claims and repetitive loss information for each community or partial community within the project area.
O.3.4.10	In the L_Claims table, if there are less than five (5) claims, five (5) repetitive loss claims, or five (5) severe repetitive loss claims in a community, then those fields shall be null (see discussion in Section O.3.4.9).
O.3.4.10	In the L_Claims table, there should be one record in the table for each community or partial community in the project area. There should also be an additional record for the totals for the entire project area.
O.3.4.10	The L_CSLF_Summary table stores summary statistics of the CSLF analysis by Community, including the changes in area, population, and number of buildings in the SFHA, non-SFHA, and Floodway.
O.3.4.10	The L_CSLF_Summary table contains up to three records for each community with a unique CID in the project area. The three records are for the SFHA, non-SFHA, and floodway areas for each community. The table also contains up to three records (SFHA, non-SFHA, and FLDWY) for the project total summaries. For those project total summary records, the CSLFSUMMID field should be populated with the FEMA Case Number.

Section Number	Short description
O.3.4.10	In creating the L_CSLF_Summary table, the Mapping Partner will aggregate the polygon attribute values (i.e., area, population, and building counts) in the S_CSLF_Ar feature class by community (e.g., city, town, village, or unincorporated portion of a county). If individual CSLF polygons extend outside the project boundary in S_FRD_Proj_Ar, only the portion within the project boundary should be aggregated. The aggregated values should represent the totals for that portion of the community in the project area.
O.3.4.10	The L_Exposure table stores data regarding flood risk exposure for each community or partial community within the project area.
O.3.4.10	In creating the L_Exposure table, the Mapping Partner shall use appropriate techniques (e.g., area-weighted summations) to aggregate the Census Block based risk assessment results by community, or partial community, and totaled for the project area.
O.3.4.10	In the L_Exposure table, there should be one record in the table for each community or partial community in the project area. If a community extends beyond the project footprint, the summary results in this table should represent only the portion within the project area. There should also be an additional record for the totals for the entire project area.
O.3.4.10	The L_Local_GBS table stores data collected from local sources to replace the General Building Stock data from Hazus used in the AAL analysis.
O.3.4.10	The L_Local_GBS table has one record for each Census Block with updated General Building Stock data. This data should be compiled for the entire Census Block, not restricted to the area inside the project boundary, nor just inside the floodplain.
O.3.4.10	The L_RA_AAL table stores the Hazus output data from the Level 1 AAL analysis conducted nationally for each county.
O.3.4.10	There is one record in the L_RA_AAL table for each combination of Census Block, hazard type, and return period for the assessment performed. In addition to the records for each return period, the table contains one record for the average annual loss per hazard type for each Census Block.
O.3.4.10	The L_RA_Composite table stores the results of the composite risk analysis, where the AAL data and the refined data are combined.
O.3.4.10	The L_RA_Composite table contains one record for each Census Block for each return period analyzed per hazard type. In addition, the table contains one record for the average annual loss per hazard type for each Census Block.
O.3.4.10	The L_RA_Refined table stores the results of the refined risk analysis.
O.3.4.10	The L_RA_Refined table contains one record for each Census Block for each return period analyzed per hazard type for the area being studied. In addition, the table contains one record for the average annual loss per hazard type for each Census Block.

Section Number	Short description
O.3.4.10	The L_RA_Summary table summarizes the results by community of the composite analysis performed by Census Block. The Mapping Partner shall use appropriate techniques (e.g., area-weighted summations) to aggregate the L_RA_Composite data, which stores the loss estimates by Census Block, to the L_RA_Summary table, which stores the loss estimates by community.
O.3.4.10	The L_RA_Summary table contains one record for each community or partial community within the project area for each hazard type for each return period analyzed, including the average annual loss. If a community extends beyond the project footprint, the summary results in this table should represent only the portion within the project area. The table also has one record for each hazard type for each return period for the project area.
O.3.4.10	The L_RA_UDF_Refined table stores the results of refined analyses for each User Defined Facility.
O.3.4.10	The L_RA_UDF_Refined table contains one record for each facility for each hazard type for each return period analyzed, including the average annual loss estimate.
O.3.4.10	The L_Source_Cit table is used to document the sources of the data used in the FRD.
O.3.4.10	The L_Source_Cit table has an entry for each different data source used in the flood risk project and is linked with all the feature classes to document the sources for the data.
O.3.4.11	All rasters are floating point rasters with a resolution of 0.1 units, except the hillshade raster, which is an integer raster.
O.3.4.11	All rasters delivered as part of the FRD shall be based on the UTM projection, NAD83 datum. The UTM zone is the zone in which the majority of the project area lies.
O.3.4.11	All rasters delivered as part of an FRD shall have the same cell size, extents, origin, and rotation.
O.3.4.11	The cst_dpthxxxpct raster dataset represents water depth in feet for a coastal type of analysis
O.3.4.11	The depth_xxxpct raster dataset represents water depth in feet for a non-coastal type of analysis.
O.3.4.11	The hillshade raster dataset is used as a backdrop for the FRM.
O.3.4.11	The pct30yrchance raster dataset represents the probability of flooding at least once within a 30-year period for all locations within the extent of the 0.2% annual chance floodplain.
O.3.4.11	The pctannchance raster dataset represents the percent annual chance of flooding for locations along the flooding source within the 0.2% chance floodplain.
O.3.4.11	Velocity rasters represent the flood water velocities (in feet/second) within the floodplain for a given annual chance flood event
O.3.4.11	The wse_xxxpct raster dataset represents the water surface elevation for a given flood event.

Section Number	Short description
O.3.4.11	The Water Surface Elevation (WSE) Change raster reflects the changes in water surface elevation for the 1 percent annual chance flood event, to the nearest tenth of a foot between successive FIRM studies.
O.3.4.13	Mapping Partners will utilize these domains or obtain approval from FEMA to add a domain value when preparing the FRD to provide consistency.
O.3.4.13	One of the requirements for the FRD delivery is to export the geodatabase elements to SHP format.
O.3.6	Mapping Partners shall identify and use existing digital data whenever possible, while still meeting the required standards and quality of work.
O.3.6	The Mapping Partner shall obtain the FIRM data available for the project area from the NFHL.
O.3.6	The Mapping Partner that produces the FRD must document the data sources, date of collection or digitizing, scale, projections, coordinate systems, horizontal datum, vertical datum, and units of all digital data used and submitted.
O.3.6	For each data source used (both vector and raster), the Mapping Partner shall add a record to the L_Source_Cit table described herein, and add a corresponding Source Citation entry to the FRD metadata file in the Lineage section under Data Quality. Source Citation Type Abbreviations, followed by sequential numbers, shall be used in creating the references.
O.3.6	The Mapping Partner that produces the FRD data shall number each source citation type abbreviation for a distinct data source.
O.3.6	The Mapping Partner that produces the FRD digital data shall populate the field with the Source Citation (i.e., prefix plus sequential number) from the lookup table that applies to the related spatial feature.
O.3.7	A metadata file shall accompany all digital data submittals, including the FRD. Only one FRD metadata file is required for each flood risk project. However, in this file, the assigned Mapping Partner must distinguish between the different origins of the various datasets included. The metadata file shall follow the latest FRD metadata profile.
O.3.7	The metadata file must include a description of the source material from which the data were derived and the methods of derivation, including all transformations involved in producing the final digital files. The description must include the dates of the source material and the dates of ancillary information used for updates.
O.3.7	The Mapping Partner shall describe any data created by merging information obtained from distinct sources in sufficient detail to identify the actual source for each element in the file.
O.3.7	The Overview Description Section of the Entity and Attribute Information should include a list of all FRD feature classes and tables included in the submittal. In this list, those tables without data should be identified.

Section Number	Short description
O.4.1	<p>Each FRR shall include the following sections:</p> <ul style="list-style-type: none"> <li><b>i.</b> Preface</li> <li><b>ii.</b> Table of Contents</li> <li><b>1.</b> Introduction</li> <li><b>2.</b> Risk Analysis</li> <li><b>3.</b> Flood Risk Analysis Results</li> <li><b>4.</b> Actions to Reduce Flood Risk</li> <li><b>5.</b> Acronyms and Definitions</li> <li><b>6.</b> Additional Resources</li> <li><b>7.</b> Data Used to Develop Flood Risk Products</li> </ul>
O.4.2	For delivery to the local communities, a Portable Document Format (PDF) must be digitally converted from the native word processing electronic file, not made by scanning a hardcopy printout of the document. The table of contents must be hyperlinked to applicable sections of the document. The PDF must contain bookmarks for each section heading in the table of contents.
O.4.2.4 Section 3.2	The project summary section shall include a summary table listing all the communities within the project area
O.4.2.4 Section 3.2	The project summary section shall have a CSLF summary table.
O.4.2.4 Section 3.2	The project summary section shall include a risk assessment summary table.
O.4.2.4 Section 3.3	A new section will need to be created for each jurisdiction within the project area.
O.4.2.4 Section 3.3	This section shall include a Community Overview table.
O.4.2.4 Section 3.3	Each community shall have a CSLF summary table.
O.4.2.4 Section 3.3	Each community shall have a risk assessment summary table containing the estimated loss information for each community in the flood risk project area.
O.4.2.4 Section 3.3	If AOMI data is ordered for the study, a summary table shall be created in this section for each community.
O.5.2.1	All FRM panels shall be printed full page, portrait orientation or landscape orientation, on ARCH E-size paper.
O.5.2.2	The title on the map shall be the name of the project area. This title should match the FRR and the data in the field PROJ_NM in the S_FRD_Proj_Ar feature class.
O.5.2.3	The map legend shall contain those items that are needed to assist the map user in interpreting map symbols, base data, flood data, flood risk, and AoMIs.

Section Number	Short description
O.5.2.4	The project locator inset should be shown on each FRM.
O.5.2.5	Every FRM should contain a title block that contains the name of the project area.
O.5.2.6	Each FRM should have a north arrow, a scale bar, and scale text.
O.5.3.2	The body of the FRM shall be comprised of base data, flood data, flood risk data, and areas of mitigation interest (if applicable).
O.6	A complete flood risk submittal to the Map Service Center is required and is composed of the items listed in this section.
O.6	All deliverable files must meet the standards set forth by the Map Service Center.
O.6.1	Mapping Partners will export the FRD vector datasets and tables to SHP and dbf formats, respectively.
O.6.1	Mapping partners must create and populate the domain description fields as described in Section O.3.4.13 with the actual descriptions (not the coded value)
O.6.1	The Mapping Partner will deliver all the tables and feature classes as specified in the fGDB-based FRD, even if they contain no records (e.g., enhanced tables). However, only SHP files and dbf tables are delivered that contain data.
O.6.1	The Mapping Partner must also export all depth and analysis rasters to GeoTIFF format.

## Acronyms and Abbreviations

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### A

AAL	Average Annualized Loss
aka	also known as
AoMIs	Areas of Mitigation Interest

### B

BFEs	Base Flood Elevation
Blob	Binary Large Object

### C

CID	Community Identification Number
CNMS	Coordinated Needs Management Strategy
CRS	Community Rating System
CSLF	Changes Since Last FIRM
CTP	Cooperating Technical Partners

### D

DCS	Data Capture Standards
DEM	Digital Elevation Model

### E

ELI	Estimated Loss Information
ETJ	Extraterritorial Jurisdictional
ESRI	Environmental Systems Research Institute

### F

FEMA	Federal Emergency Management Agency
fGDB	File Geodatabase
FIPS	Federal Information Processing Standards
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FRA	Flood Risk Assessment
FRD	Flood Risk Database
FRM	Flood Risk Map
FRR	Flood Risk Report
ftp	file transfer protocol

**G**

G&S	Guidelines and Standards
GBS	General Building Stock
GCS	Geographic Coordinate System
GIS	Geographic Information System

**H**

Hazus	FEMA - Software Package Hazus
H&H	Hydrology and Hydraulics
HMGF	Hazard Mitigation Grant Program
HUC	Hydrologic Unit Code

**I**

IA	Individual Assistance
IAA	Inter-Agency Agreement

**L**

LOMC	Letter of Map Change
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**M**

MAP	Mapping, Assessment, and Planning
MAS	Mapping Activity Statement
MIME	Multipurpose Internet Mail Extension
MIP	Mapping Information Platform
MSC	Map Service Center

**N**

NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NFHL	National Flood Hazard Layer
NHD	National Hydrology Dataset
NFIP	National Flood Insurance Program
NRCS	Natural Resources Conservation Service

**O**

OFA	Other Federal Agencies
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**P**

PA	Public Assistance
PDF	Portable Document Format
pGDB	Personal Geodatabase
PMRs	Physical Map Revisions

**R**

RDBMS	Relational Database Management System
RGB	Red, Green, Blue Colorimetric Values
Risk MAP	Risk Mapping, Assessment, and Planning

**S**

SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SHP	ESRI Shapefile
SOW	Statement of Work / Scope of Work
SRL	Severe Repetitive Loss
SRS	Spatial Reference System

**U**

USGS	U.S. Geological Survey
UDF	User Defined Facility
UTM	Universal Transverse Mercator

**W**

WBD	USGS / NRCS Watershed Boundary Dataset
WSE	Water Surface Elevation



## O.1. Overview

### O.1.1. Document Purpose

This Appendix to the Federal Emergency Management Agency (FEMA) *Guidelines and Standards for Flood Hazard Mapping Partners (G&S)* describes the standards for the flood risk products (map, report, and database) delivered to FEMA for a particular flood risk project. Flood risk datasets created as companion elements to the more traditional analysis of flood hazards are used to create the Flood Risk Database (FRD), Flood Risk Report (FRR), and Flood Risk Map (FRM), and will enable a wide variety of ad-hoc user-defined risk analyses. In contrast to the regulatory elements of the traditional Flood Insurance Study (FIS) - FIS Report, Flood Insurance Rate Map (FIRM) panels, and FIRM Database, the flood risk products are non-regulatory in nature and not subject to the due-process or related protocols associated with the FIS and FIRM. The non-regulatory products and datasets are intended to be complimentary to the regulatory products and do not necessarily represent “new or improved scientific or technical data.”

The regulatory flood hazard products described in other Appendices support the National Flood Insurance Program (NFIP). The flood risk datasets and products described in this Appendix are used to communicate flood risk to local stakeholders to enable actionable mitigation strategies aimed at a measurable reduction to loss of life, property damage, and associated economic impacts, not to establish regulatory flood zones. This Appendix is not intended to specify in-process methods and procedures, but to present the standards for output and deliverables.

Due to the dynamic nature of some aspects of digital Geographic Information System (GIS) data, certain requirements are specified in documents outside of the *G&S*. The following documents are referenced in this Appendix:

- *Guidelines and Standards for Flood Hazard Mapping Partners - Domain Tables Guide*
- *Risk MAP - Map Service Center (MSC) Deliverables Guide*
- *Risk MAP - Versioning Implementation Plan*
- *Geospatial Data Coordination Implementation Guide*
- *NFIP Metadata Profiles - Specifications*
- *NFIP Metadata Profiles Guidelines*

The most current version of these documents can be obtained from the FEMA. FEMA may provide additional guidance on the non-regulatory products as warranted.

This guidance applies to FEMA-funded flood hazard and flood risk studies conducted by FEMA's Mapping Partners, including contractors, Other Federal Agencies (OFA), and Cooperating Technical Partners (CTPs). The guidance summarized in this appendix applies to various contract documents (Scopes of Work [SOWs], Mapping Activity Statements - [MASs], Inter-Agency Agreements - [IAAs], etc.) for flood risk projects.

### O.1.2. Superseded Documents

This Appendix incorporates elements from and supersedes the following documents:

- *Operating Guidance for Version 1.0 of Flood Risk Data and Products in FY 2010* (September 28, 2010)
- *Procedure Memorandum No. 65 — Guidance for Additional Enhanced Dataset Definitions & Flood Risk Database Standards* (March 31, 2011)

## O.2. Non-Regulatory Products and Datasets

In support of the FEMA Risk Mapping, Assessment, and Planning (Risk MAP) program, flood risk will be assessed, visualized, and communicated using the flood risk datasets summarized below and detailed in Section O.3.4.10.

- Changes Since Last FIRM (CSLF): This dataset enables a visualization of planimetric changes to the floodplain and floodway extents and includes attribute data that provides insight as to potential reasons for the changes since the last FIRM was published.
- Flood Depth and Analysis Rasters: These datasets enable the analysis and visualization of a variety of flood risk data ranging from the depth of flooding associated with specific flood frequency events to an analysis of probabilities tied to relative risk. Additional enhanced datasets include: a) water velocity and b) flood depths at frequencies other than the five standard events used for regulatory products (i.e., 10%, 4%, 2%, 1%, and 0.2% annual chance events), c) coastal flooding depths, and d) water surface elevations for various frequencies. See Section O.3.1 for a definition of enhanced datasets.
- Flood Risk Assessment Results: This dataset quantifies flood risk in terms of potential damage based on economic loss and structure counts associated with calculated flood depths by Census Block and Community.
- Areas of Mitigation Interest (AoMIs): This dataset provides insight into a variety of flood risk mitigation issues, ranging from potential flood risk mitigation project opportunities to success stories of effective flood risk mitigation activities that have already taken place.

These flood risk datasets are used to create three flood risk products:

- Flood Risk Database: This spatially enabled, relational database stores flood risk datasets for a given project area (see Section O.3.4.1 for a definition of project area) and enables end users to perform a wide variety of ad-hoc flood risk analyses and visualizations. Information shown on the FRM and in the FRR is also contained in or derived from the FRD.
- Flood Risk Report: This report provides flood risk data at the project level and also summarizes the flood risk on a community-by-community basis for those portions of the flood risk project that affect each jurisdiction.
- Flood Risk Map: This map is an element of FRR that shows a visual overview of flood risk and related information for the project area such as potential flood losses associated with the 1% annual chance flood event.

These flood risk datasets and products are created as companion elements to the hydrologic and hydraulic study (or restudy) of flooding sources presented in an FIS Report(s) for a given watershed, coastal area, or site-specific project area. The creation of flood risk datasets as stand-alone products (i.e., without the creation of new/revised flood hazard data) are at the discretion of the FEMA Regions and is based on multiple factors, including relative flood risk and local stakeholder contributions.

Figure O-1 provides a graphic depiction of the relationship between the flood risk datasets and the flood risk products.

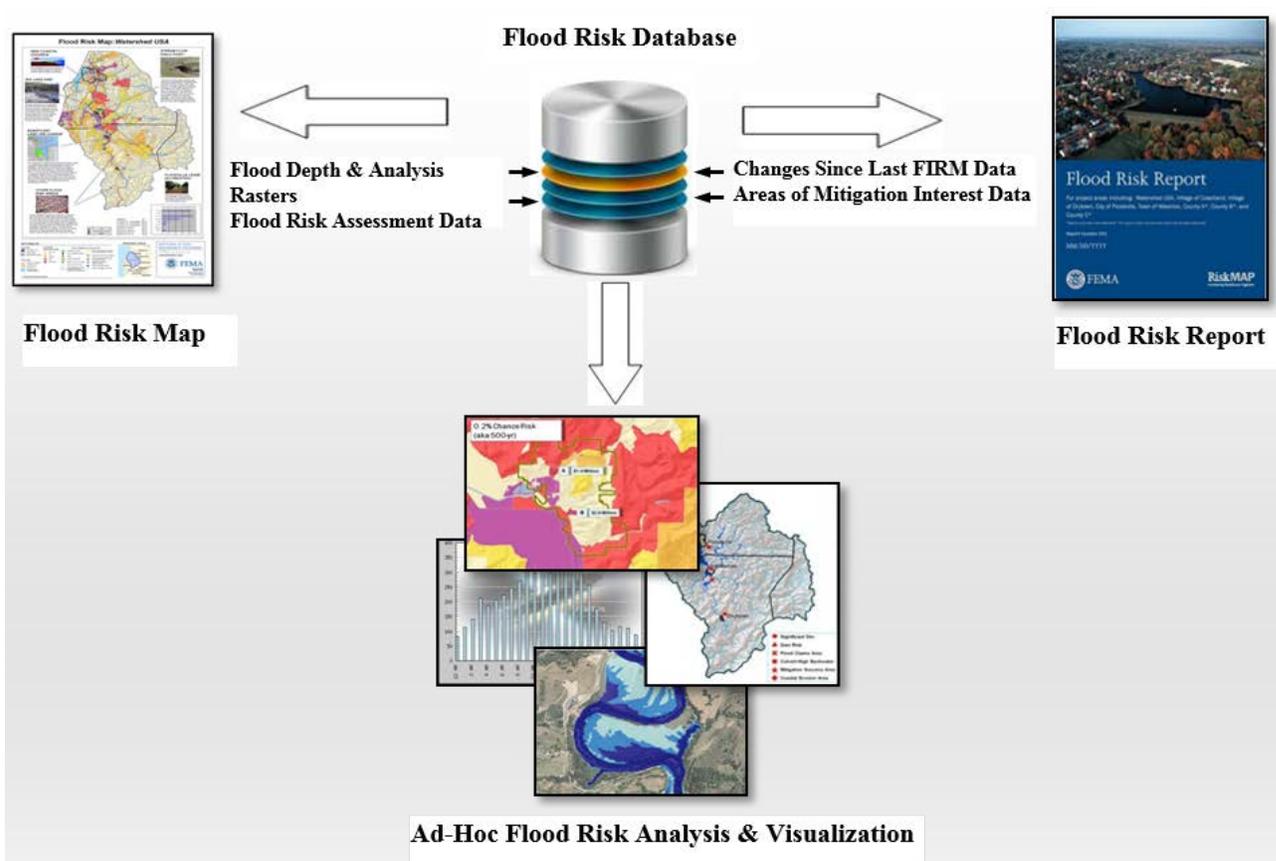


Figure O-1 Flood Risk Data and Products Model

## O.3. Risk Database

### O.3.1. Overview

The Flood Risk Database is the key product that will support all other flood risk products. It is a project level (e.g., 8-digit Hydrologic Unit Code [HUC-8] sub-basin or other geographic area) database of non-regulatory flood risk data. The FRD will store the digital data used to prepare the FRR and FRM, as well as other ancillary data generated during a flood risk project. The database will provide a standard, systematic method for FEMA to collect, store, and distribute comprehensive details of flood studies to the public and others in a digital format.

Preparing the data in digital format has significant advantages. Digital data allow for a more efficient storage, update, search and distribution of information. The most significant advantage is that the FRD is explicitly designed to work within a GIS environment. This means that the FRD can be used to support automated analyses and coupled with other readily-available GIS and tabular data in order to increase the understanding and mitigation of flood risk. In addition, the FRD can be used to support outreach efforts and be widely disseminated over the Internet through Web applications and interfaces.

The FRD was designed to collect and present the non-regulatory flood hazard information collected by FEMA and its Mapping Partners during a flood risk project. Users who are interested in knowing the probability of being flooded in a particular year, the statistical estimation of annual damages expected in a community, or the estimated 1% annual chance flood depth is for a location, will be able to use the FRD to determine this information.

The FRD will be delivered by Mapping Partners to FEMA and will be published and maintained in a standardized format that will support local, state, regional, and national distribution. Although the individual data layers differ from those found in the FIRM database, the FRD shares a similar overall structure. Flood risk data is stored in a database that will contain both spatial geometry (i.e., shapes) as well as descriptive attributes (i.e., probabilities, loss, flood depths, etc.). Similar to the FIRM database, the FRD will contain geospatial data layers, attribute domain tables, supporting files, and other information necessary to create other flood risk products.

**All of the tables in the FRD standard are required to be populated and delivered unless noted with an [E] in the tables below or specifically noted as not required in a project's SOW, MAS, or IAA.** The Mapping Partner that creates the FRD shall provide all of the applicable tables in the FRD standard and document them in the metadata. Those elements designated with an [E] are “enhanced” features and must be provided if required by the project's SOW, MAS, or IAA.

Enhanced database features include those tables, feature classes, and fields that may be furnished in the FRD, but are not mandatory. These features usually will have an extra cost to the community and/or FEMA as additional work must be performed to provide them. If enhanced features are desired, they should be specifically listed as required in the project's SOW, MAS, or IAA.

Generally, the FRD will cover the entire project area. **Updates to the FRD will be performed via a replacement of the entire project area, usually a HUC-8 sub-basin, as defined in the SOW, MAS, or IAA.**

**The Mapping Partner will copy and append the appropriate existing tables from the corresponding FIRM databases and other data sources into the FRD. If these data sources cross a project boundary, certain feature classes (e.g., S\_FRD\_Pol\_Ar) will be clipped to the geographic extent of the flood risk project.** Where appropriate, some attributes may need to be adjusted or recalculated to account for the changes in extents. Table O-1 provides a list of tables included in the FRD. Enhanced tables are denoted with an [E]. The listing is ordered with spatial tables (feature classes) first, followed by non-spatial (business) tables, and lookup tables last.

**Table O-3-1 Flood Risk Database Tables**

FRD Table Name	Table Type	Table Description
S_AOMI_Pt	Spatial	Areas of mitigation interest points that contribute to flood losses; or highlight flood issues and/or associated effects [E].
S_Carto_Ar	Spatial	Polygons used for cartographic representations only on the Flood Risk Map.
S_Carto_Ln	Spatial	Lines used for cartographic representations only on the Flood Risk Map.
S_Carto_Pt	Spatial	Points used for cartographic representations only on the Flood Risk Map.
S_CenBlk_Ar	Spatial	Census Block polygons.
S_CSLF_Ar	Spatial	Changes Since Last FIRM polygons depicting areas of change between new and previous flood hazards.
S_FRD_Pol_Ar	Spatial	Location and attributes for political jurisdictions shown on the FIRM(s) utilized in the flood risk project.
S_FRD_Proj_Ar	Spatial	Polygon representing the extents of the flood risk project area.
S_FRM_Callout_Ln	Spatial	Represents the leaders on the FRM for callouts.
S_HUC_Ar	Spatial	HUC boundaries in and adjacent to the flood risk project area.
S_UDF_Pt	Spatial	Locations of user-defined facilities used in site-specific risk analysis [E].
FRD_Model_Info	Non-Spatial	Information about engineering models used in prior and updated analysis.
FRD_Study_Info	Non-Spatial	General information about the FIRM database(s) utilized in the flood risk project.
FRR_Custom	Non-Spatial	Stores the custom text for the FRR.
FRR_Images	Non-Spatial	Stores the custom images for the FRR.
FRR_Project	Non-Spatial	Provides project level information for FRR generation / storage.
L_AOMI_Summary	Lookup	Area of Mitigation Interest Summary table used for the FRR [E].
L_Claims	Lookup	Claims data for each community or partial community and project area (1 record each).
L_CSLF_Summary	Lookup	Changes Since Last Firm Summary table by community or partial community and project area used for the FRR.

FRD Table Name	Table Type	Table Description
L_Exposure	Lookup	Exposure data for each community or partial community and project area (1 record each).
L_Local_GBS	Lookup	Local general building stock data by Census Block [E].
L_RA_AAL	Lookup	Stores Average Annualized Loss (AAL) risk assessment results by Census Block or partial Census Block, by frequency and by hazard type (riverine, coastal, levee).
L_RA_Composite	Lookup	Stores composite risk assessment results by Census Block or partial Census Block, by frequency.
L_RA_Refined	Lookup	Stores refined risk assessment results by Census Block or partial Census Block, by frequency and by hazard type (riverine, coastal, levee).
L_RA_Summary	Lookup	Risk assessment summary table by community or partial community and project area.
L_RA_UDF_Refined	Lookup	Refined risk assessment results for user-defined facilities [E].
L_Source_Cit	Lookup	Source citations for data sources used in the project; used to correlate with metadata.

In addition to feature classes and tables stored in the geodatabase, **several raster datasets will be delivered as part of each flood risk project.** Table O-2 provides a list of these rasters. Enhanced rasters are denoted with an [E] and are further described in Section O.3.4.11.

Table O-3-1. Flood Risk Database Rasters

FRD Raster Name	Data Description
cst_dpthxxxpct	Coastal depth for the xx percent annual chance flood event.
depth_0_2pct	Depth for the 0.2 percent annual chance flood event.
depth_01pct	Depth for the 1 percent annual chance flood event.
depth_02pct	Depth for the 2 percent annual chance flood event.
depth_04pct	Depth for the 4 percent annual chance flood event.
depth_10pct	Depth for the 10 percent annual chance flood event.
depth_01plus <sup>1</sup>	Depth for the 1% plus annual chance flood event [E].
depth_xxxpct	Depth for the xxx percent annual chance flood event [E].
pct30yrchance	Percent chance of flooding over a 30-year period.
pctannchance	Percent annual chance of flooding.
vel_xxxpct	Velocity for the xxx percent annual chance flood event [E].
wse_0_2pct	Water surface elevation for the 0.2 percent annual chance flood event [E].
wse_01pct	Water surface elevation for the 1 percent annual chance flood event [E].
wse_02pct	Water surface elevation for the 2 percent annual chance flood event [E].
wse_04pct	Water surface elevation for the 4 percent annual chance flood event [E].
wse_10pct	Water surface elevation for the 10 percent annual chance flood event [E].

<sup>1</sup> See Appendix N of the FEMA G&S for a more complete description of the 1% Plus annual chance flood event

FRD Raster Name	Data Description
wse_01plus <sup>1</sup>	Water surface elevation for the 1% plus annual chance flood event [E].
wse_change	Water surface elevation change since last FIRM [E].
wse_xxxpct	Water surface elevation for the xxx percent annual chance flood event [E].

The xxx's in the above table represent a percent chance flood event; examples include:

- 0\_2 – 0.2 percent annual chance flood event (also known as (aka) 500-year event)
- 0\_5 – 0.5 percent annual chance flood event (aka 200-year event)
- 01 – 1 percent annual chance flood event (aka 100-year event)

In naming the above rasters, **the Mapping Partner will replace the xxx with the abbreviation for the flood event modeled that is represented by the particular raster.** For example, a particular project scope may require the modeling of the 5 percent annual chance event in addition to the standard five events specified for FEMA. An additional depth raster, named depth\_05pct, would be provided.

### 0.3.2. Accuracy and Standards

In general, the core spatial data compiled for the FRD is derived from other FEMA datasets (e.g., the S\_CSLF\_Ar feature class is derived from the S\_Fld\_Haz\_Ar feature class from the National Flood Hazard Layer (NFHL) and new FIRM databases, the S\_FRD\_Pol\_Ar feature class is derived from FIRM S\_Pol\_Ar feature classes, etc.). These FEMA datasets should have been compiled to FEMA standards as described in Appendix L or other FEMA guidance. In the instances during which any data must be created (e.g., digitized from paper FIRM panels to create the prior Special Flood Hazard Area (SFHA) for CSLF) or adjusted (e.g., to correct for misalignment of SFHAs between county-wide FIRMs when merged for a HUC-8 sub-basin flood risk project), **the data shall be created or adjusted according to the Appendix L requirements** (e.g., edgematching, vertex spacing, coincident features, precise features, etc.).

**The structure of the digital files must follow the FRD schema.** This allows easy exchange of these data between FEMA, Mapping Partners, and other flood risk data users. **All duplicate elements (i.e., features with coincident vertices and the same attributes) within the FRD must be removed. The data must be horizontally controlled and referenced to the appropriate horizontal and vertical datums. The assigned Mapping Partner must perform a thorough Quality Control (QC) review before submitting data to FEMA.** FEMA will review the data provided by the Mapping Partner using automated and interactive techniques.

### O.3.3. Database Design

Development of the FRD in a geospatial format facilitates use of the geographic component to perform spatial analyses that couple location with flood risk information. The FRD is designed to be useable in a standard Relational Database Management System (RDBMS). The Mapping Partner may use any suitable software during production of the FRD and associated products. However, **the FRD must be delivered in file formats listed in Section O.6.**

Users can import these formats into a wide variety of software packages. Interoperability is facilitated in that the delivered shapefile<sup>2</sup> (SHP format) and geoTiff formats. These are supported by most major GIS software vendors.

The complete FRD product is a GIS database made up of spatial data describing the location of features on the earth and tabular data that describe the attributes of these spatial features. The tables described in Section O.3.4.10 prefixed with “S\_” have a spatial component associated with them. The tables described in the following sections that begin with “L\_” are tabular (often referred to as a look-up or business tables); there is no direct spatial component included in these tables. The spatial tables (feature classes) also have a suffix describing the type of feature contained within the table. These include a) \_Ar (for polygonal areal features), b) \_Ln (for linear features), and c) \_Pt (for point features).

Domains (tables whose name begin with “D\_”) were established to assist FEMA’s Mapping Partners in the creation of the FRD. These case-sensitive domains provide Mapping Partners with valid attribute values for specific fields. A domain also helps minimize data entry differences by standardizing the value. For example, without domains, one user might enter “FLOODWAY” while another user might enter “FLDWY” while completing the LOCATION field in the L\_CSLF\_Summary table. While both of these entries reflect the same idea, the inconsistency between the two forms makes it difficult to group similar features together. Using a domain ensures that all users enter the same value (i.e., FLDWY) to describe the same feature. To capture local characteristics not included in the domain table, Mapping Partners may suggest the addition of domain table entries. However, **additional domain table values must be approved by FEMA before they may be used in the flood risk products.** The domains utilized by this Appendix are identified in the *Guidelines and Standards for Mapping Partners Domain Tables Guide*. The *Domain Tables Guide* provides a mechanism for uniform maintenance and dissemination of the domains for all Mapping Partners for databases submitted to FEMA using standards found in Appendices L, M, and O.

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<sup>2</sup> Whenever SHP files, shapefiles, or SHP format are referenced in this appendix, the intent is to include all the files comprising the ESRI Shapefile format, including at a minimum, those files with the extensions .shp, .dbf, .shx, and .prj. Additional files conforming to the ESRI Shapefile format may be provided, including those with the extensions .sbn, .sbx, .fbn, .fbx, .ain, .aih, .atx, .xml, and .cpg.

### O.3.3.1. FRD Structure for the FRR Elements

The FRD contains has three tables to store specific FRR elements:

- One table, FRR\_Custom, contains the custom text;
- A second table, FRR\_Images, stores binary data for report images; and
- A third table, FRR\_Project, is used to store project information specific to a single project.

The design of the FRR\_Custom table is based on the layout of the text in Section 3 of the FRR template. For each community, there are paragraphs of text and generally a table for presenting the results of the analyses. These paragraphs are: Overview, Changes Since Last Firm, Estimated Loss Information, and Areas of Mitigation. Each of these sections generally have some leading text and a table, followed by a paragraph(s) of text explaining the table. The text before and after the tables are stored in separate fields in the FRR\_Custom table.

## O.3.4. Database Standards

### O.3.4.1. Spatial Extents

Although flood risk projects will primarily be conducted at a HUC-8 sub-basin scale<sup>3</sup>, there are also instances when projects may be scoped differently – see Appendix I – Discovery for details. This section provides guidance on how to structure the FRD for a variety of project scopes. It is not intended to provide guidance on when it is acceptable to establish projects that are not watershed based.

The project area may cover portions of multiple HUC-8 sub-basins or only a portion of a single HUC-8. In each case, the project area will encompass all work elements as defined in the SOW, MAS, or IAA and for which a Case Number has been assigned by FEMA. **In the event that a flood risk project is scoped to cover multiple HUC-8 sub-basins, the Project Team, as an outcome of the Discovery process will determine if the project shall be delivered as:**

- a) a single suite of non-regulatory products for the entire project extents (i.e., a single FRD, FRR, and FRM) or**
- b) multiple suites of products (i.e., an FRD, FRR, and FRM) that comprise the full project area. Normally, there would be a separate suite of projects for each HUC-8, but there could be circumstances where this is not practical.**

<sup>3</sup> The United States Geological Survey (USGS) and Natural Resources Conservation Service (NRCS) defined and cataloged watersheds by unique HUCs. Because this data is regularly updated, the standard to be used for the definition of HUC-8, HUC-10, and HUC-12 cataloging units for RiskMAP projects is the *Watershed Boundary Dataset (WBD) used for the most recent FEMA prioritization*. The WBD is a companion dataset to the National Hydrography Dataset (NHD). The WBD used for each annual prioritization will be made available by FEMA.

A project area may be composed of multiple “Study Areas”. A sample HUC-8 project area encompassing multiple study areas is shown in Figure O-2. This is not intended to be a typical watershed project. It illustrates a possible complex project scope in order to illustrate how that situation would be handled in the FRD.

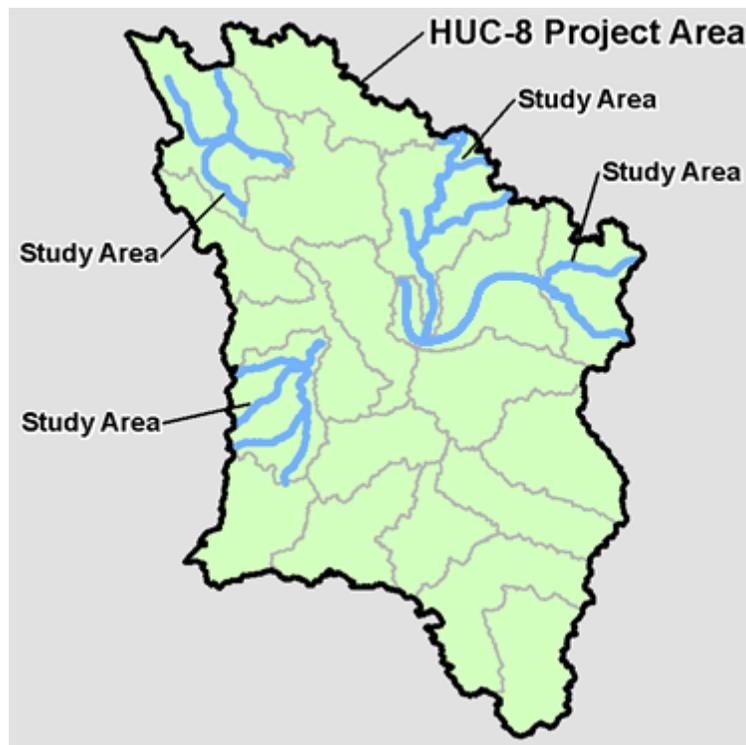


Figure O-a. HUC-8 Sub-basin Project Area

An example coastal project area encompassing multiple panels, multiple states, and multiple HUC-8 sub-basins is shown in Figure O-3.

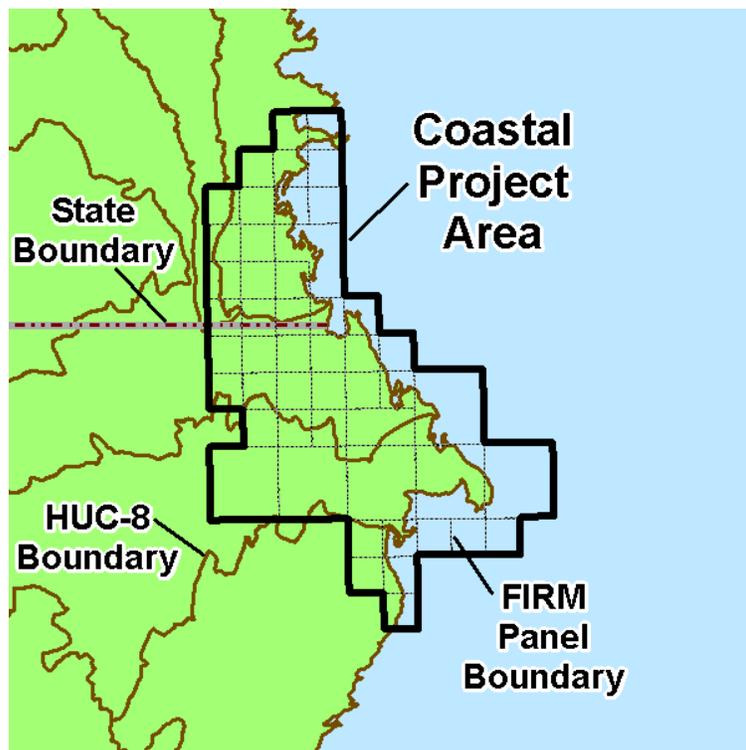


Figure O-b. Coastal Project Area

An example PMR project area encompassing multiple panels is shown in Figure O-4.

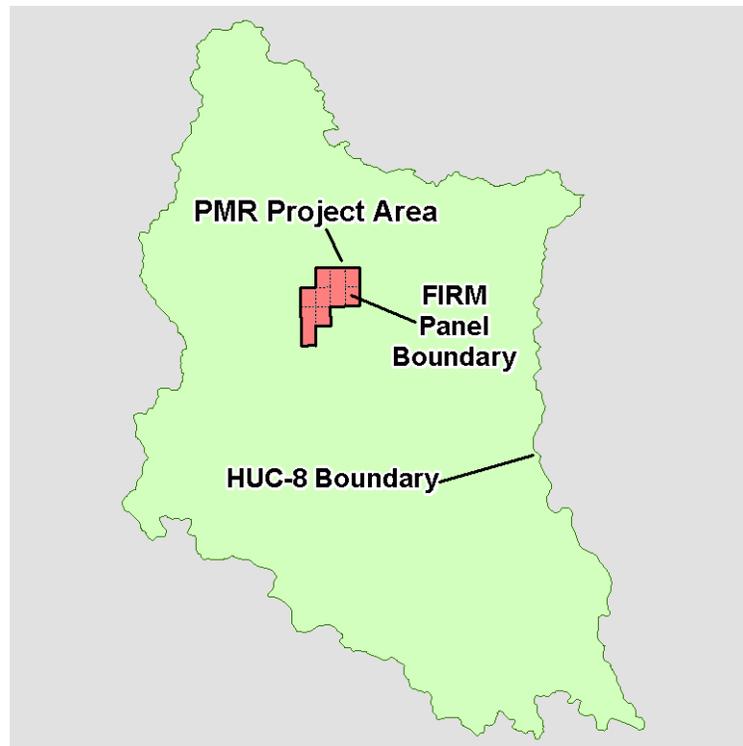


Figure O-c. PMR Project Area

For project areas which are not based upon the HUC-8 boundary, the FRD will be delivered for the HUC-8 where the project is identified, however, geospatial Risk MAP data will only be delivered within the project footprint. Delivering non-watershed based projects is the exception and not the rule. The Region should develop a plan to cover the remaining portions of the HUC-8 with a follow-up Risk MAP project.

In the coastal example in Figure O-3, the Project Team may decide that the products should be delivered as a suite of products for each HUC-8 sub-basin. However, in the case of a levee PMR-type project as shown in Figure O-5, the Project Team may decide that furnishing a single set of products is more logical. In either of these cases, the minimum deliverable extents shall be for each of the HUC-8 sub-basins.

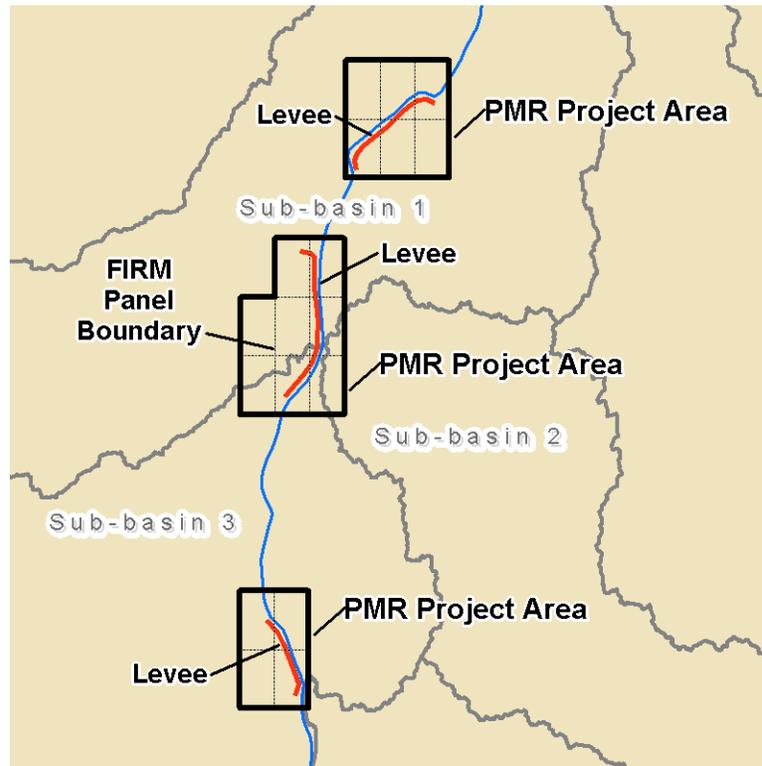


Figure O-d. Multi-HUC Levee Project Area

For watershed based projects, the project area should correspond to a HUC-8 sub-basin. For non-watershed based projects, the project area is defined by the regulatory flood map panels updated. **Mapping Partners will create a single multi-part polygon feature (stored in the S\_FRD\_Proj\_Ar feature class) that best represents the geographic extent of the flood risk project or portion of a project.** This polygon is represented with a black outline in each of the above figures (Figure O-2 through Figure O-5). This feature is used to clip the extent of spatial data submitted in the FRD, excluding S\_CSLF\_Ar, S\_CenBlk\_Ar, and the cartographic feature classes (S\_HUC\_Ar, S\_Carto\_Ar, and S\_Carto\_Ln.). **In areas where the S\_FRD\_Pol\_Ar feature class is clipped, the attributes of the individual features shall be adjusted accordingly.** For example, in Figure O-7, for a HUC-8 sub-basin project, if a community (City A) is split by a HUC-8 boundary between Sub-basins 1, 2, and 3, the community boundary (red dashed polygon) will be clipped at the sub-basin boundary (project area) and the appropriate attributes in the S\_FRD\_Pol\_Ar feature class reduced a pro-rata amount based on the area removed from the original community boundary.

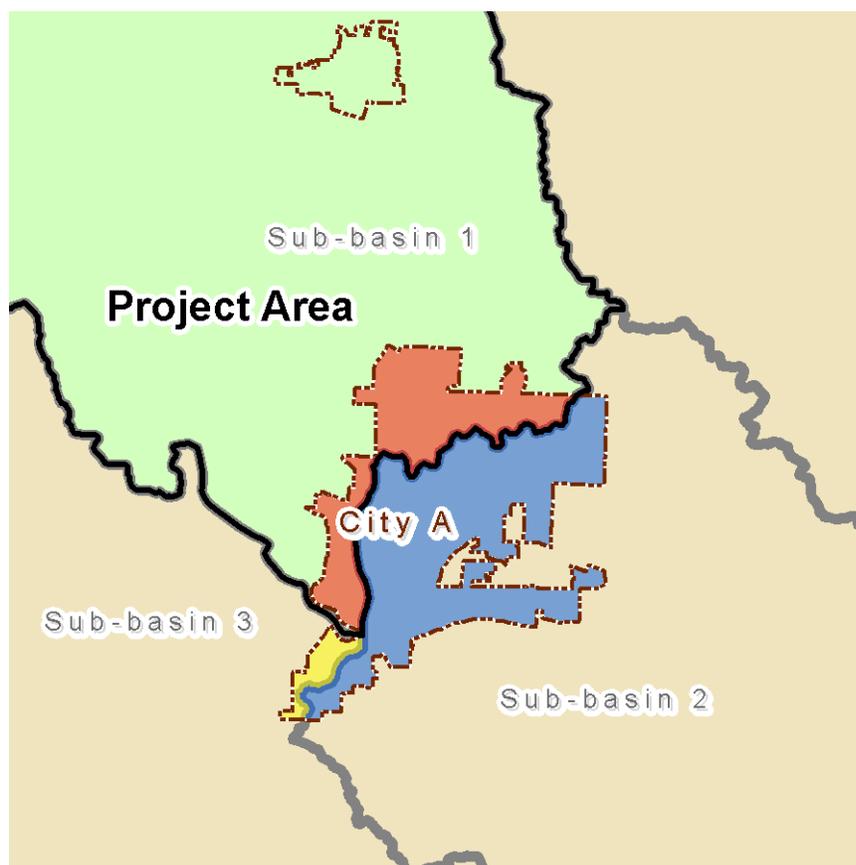


Figure O-e. Community Spanning Multiple Sub-basins

In the above figure, because City A is split between three sub-basins, the risk assessment data for each applicable portion of the community is present in the FRD, FRR, and FRM for each of the three sub-basins.

Raster datasets are rectangular in shape by design. **For those cells whose centroid is outside the project area, the value of each cell is set to 'NO DATA'** (see Figure O-7). For those cells whose centroid is inside the project area, the value of each cell is calculated based on the data being represented (e.g., depth, velocity, percent chance, etc.). The S\_FRD\_Proj\_Ar polygon feature is used as a 'mask' in creating all the depth and analysis rasters for the flood risk project. Similarly, for a project composed of multiple, non-contiguous study areas, the depth and analysis rasters shall cover the maximum footprint of the multiple study areas (see Figure O-8).

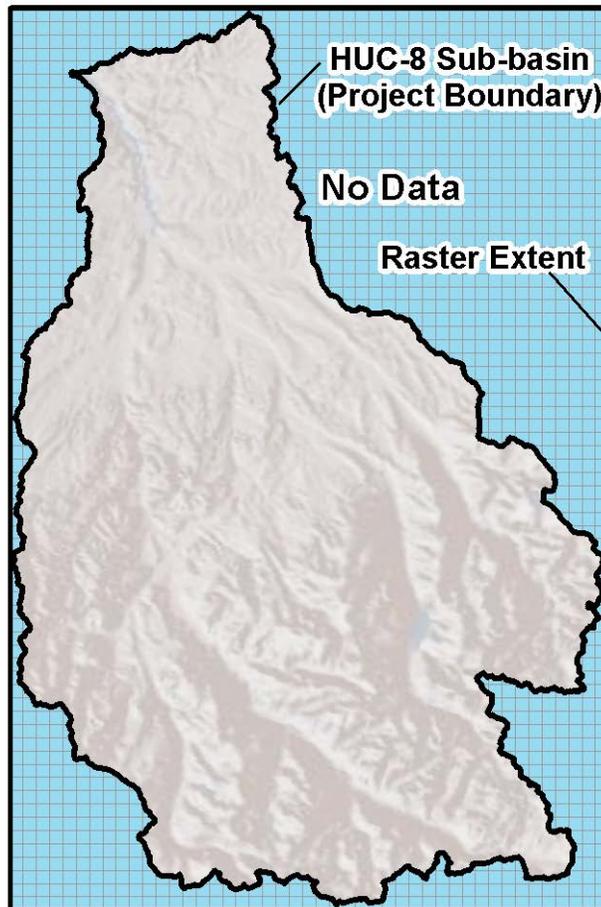


Figure O-f. Raster Extents

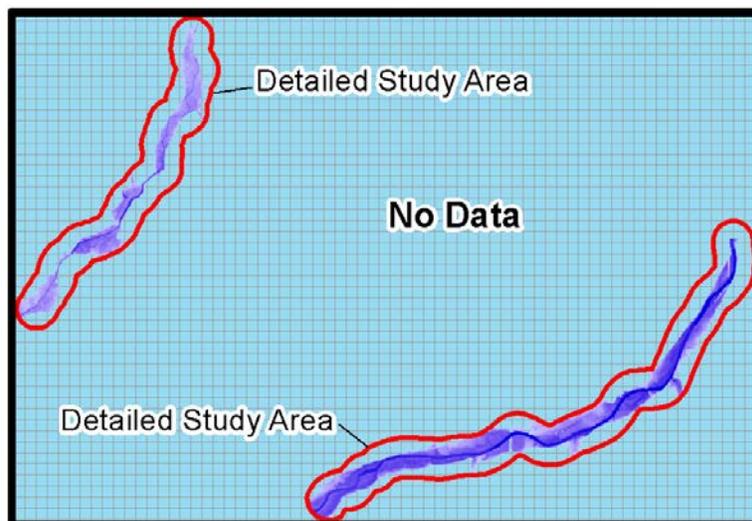


Figure O-g. Raster Extents for Multiple Detailed Study Areas

In certain circumstances (e.g., to address backwater issues at downstream confluences), the regulatory Hydrology and Hydraulic (H&H) analyses will extend beyond the project footprint (i.e., S\_FRD\_Proj\_Ar). The extents of the data delivered should match those for the updated regulatory products (e.g., up to the Limit of Study or next cross-section beyond the project footprint). **For those scenarios, the Mapping Partner will not clip the S\_CSLF\_Ar, nor mask the depth and analysis rasters using the S\_FRD\_Proj\_Ar polygon, but will include the results of those analyses in the delivered FRD.** However, in creating the L\_CSLF\_Summary table, the results will be area-weighted using the community boundaries within the project area.

#### O.3.4.2. Data Tiling

**The assigned Mapping Partner shall submit FRD datasets covering an entire sub-basin (or other spatial extent described in Section O.3.4.1.).** Although spatial data contained within the FRD may have come from previous countywide (or other format) flood mapping projects, feature classes and associated tables shall be delivered as single, complete layers and shall not have a county level, FIRM panel, or any other tiling scheme. The following example illustrates how data are to be combined from multiple sources:

*An FRD is being prepared for sub-basin 12345678. As part of this project, streams were studied from six different counties, each having an effective FIRM database. To create the CSLF dataset, flood hazards from each of the six countywide studies would be combined with the newly-studied areas to create one seamless dataset covering the entire sub-basin 12345678. Only one CSLF feature class would be delivered in the FRD.*

#### O.3.4.3. Spatial Reference

Mapping data submitted as part of the FRD must be referenced to a standard coordinate system, employ a standard projection, and specify both the horizontal and the vertical datums used. These positional references are established and documented prior to the data collection phase of the project. See Appendix A of these G&S for a detailed discussion of aerial mapping and surveying standards, which includes horizontal and vertical control for new mapping. Also see Appendix B of these G&S for a discussion of vertical datum selection and conversion.

Although the geographic extents of most FRDs are based on HUC-8 sub-basin boundaries, the extents of an FRD could be as large as a coastal study area or as small as a single riverine reach. Because the FRD may span several existing FIRMs and incorporate new studies, the underlying data for the FRD could come from many sources and therefore may be based on multiple projections and datums. **During the production part of the flood risk project, the Mapping Partner will select appropriate Spatial Reference Systems (SRSs), including projection, datum, and units, to maintain sufficient accuracy for engineering analysis.** These 'local' SRSs are used to populate the appropriate fields in the FRD (e.g., AREA\_SF in the S\_CSLF\_Ar feature class). For example, a State Plane Coordinate System may be used during production to develop the SFHA floodplains. These floodplains would then be unioned with the prior effective floodplains to

create the S\_CSLF\_Ar feature class. **The area of each change polygon will be calculated in square feet and used to populate the AREA\_SF attribute. The original source and production projection information shall be captured and described in the metadata submitted with each FRD.**

In support of FEMA's desire that all regulatory and non-regulatory data be housed in a national repository with a consistent spatial reference, **all vector data submitted in the FRD shall utilize the Geographic Coordinate System (GCS) with a defined horizontal datum as the North American Datum of 1983 - 2007 adjustment (NAD83[NSRS-2007]). Any exceptions shall be coordinated with the FEMA Project Officer. All horizontal units shall be in decimal degrees and the spatial tolerances shall be defined in decimal degrees with the cluster tolerance and resolution as specified in Section O.3.4.5.** Further details are:

- Spheroid:
  - Name: GRS\_1980
  - Semi major Axis: 6378137
  - Semi minor Axis: 6356752.3141403561
- Angular Unit
  - Name: Degree
  - Radians per unit: 0.017453292519943299
- Prime Meridian
  - Name: Greenwich
  - Longitude 00° 00' 00"

**The assigned Mapping Partner shall reference all elevation data, including water surface elevation rasters, to the North American Vertical Datum of 1988 (NAVD88).** See Appendix B of these G&S for additional details on vertical datum conversion requirements if necessary. **All vertical units shall be in U.S. Survey Feet. The use of other datums or vertical units (e.g., the use of meters in areas such as Puerto Rico where Base Flood Elevations [BFEs] are expressed in meters) will require approval of the FEMA Project Officer.**

#### O.3.4.4. Raster Standards

The depth and analysis rasters in the FRD have an inherent relationship to the underlying topographic data used during the development of the flood hazard delineations depicted on the FIRM. FEMA recognizes that a variety of terrain sources are utilized, each with a potentially different raster cell size. The raster cell size (resolution) of all raster datasets in the FRD should be based on the density of the ground elevation data used and the appropriate precision that can be supported by the data. Normally, all the raster datasets should use the same raster cell size. **All raster datasets shall use the Universal Transverse Mercator (UTM) zone in which the majority of the project area lies. The horizontal datum for all rasters shall be NAD83. The use**

**of other datums or vertical units (e.g., the use of meters in areas such as Puerto Rico where Base Flood Elevations [BFEs] are expressed in meters) will require approval of the FEMA Project Officer.**

**All depth and analysis rasters shall be floating point with data rounded to the nearest tenth of a unit (i.e., 0.1 feet, 0.1 feet/second, or 0.1%) and shall have the same spatial reference, origin, resolution, and rotation.** It should be noted that expressing these raster values to the nearest tenth of a unit does not imply the underlying analyses produced data to that level of accuracy.

**The hillshade raster shall be an integer raster with the same spatial reference, cell size, rotation, and origin as the other rasters delivered with output values ranging from 0 to 255.**

#### **O.3.4.5. Topology**

**All spatial FRD feature classes in the file geodatabase (fGDB) exist within one feature dataset.** The feature dataset is required for the creation of topology. **The single FRD feature dataset must be named “FRD\_Spatial\_Layers”** in order to aid in the automated loading of spatial layers into FEMA’s automated checking tool and the National Flood Risk dataset.

**Non-spatial tables and rasters shall exist outside of the FRD\_Spatial\_Layers feature dataset, as standalone business tables and rasters at the ‘root’ level inside the fGDB.** See Attachment A.

Using guidance from Appendix L, Mapping Partners are required to set the cluster tolerance and resolution of the FIRM database to 0.25 feet (0.0762 meters) and 0.025 feet (0.00762 meters), respectively. Realizing that some of the data in the FRD are derived from FIRM data and knowing that FRDs are delivered in geographic coordinates, the guidance cannot be consistently applied across the U.S. and result in the same value in geographic coordinates (i.e., decimal degrees). In other words, converting the measurement of 0.25 feet to geographic coordinates in Florida is different than performing the conversion in Montana. Therefore, to provide national consistency, the above tolerances have been converted to decimal degrees at the approximate center of the contiguous 48 states (Meade’s Ranch, Kansas). Those tolerances (i.e., 0.25 feet and 0.025 feet) are 0.000000784415 and 0.0000000784415 decimal degrees, respectively. **All FRDs are delivered to FEMA with the cluster tolerance and resolution set to these values.**

FEMA anticipates that the Mapping Partner will perform data compilation and analysis in a projected coordinate system (e.g., State Plane Coordinate System) for production work on the flood risk project. To minimize distortions in projecting the data in the production version of the FRD for delivery to FEMA, in setting up their production geodatabases, **the Mapping Partner should use the above tolerances to calculate the appropriate cluster tolerance and resolution in the local spatial reference system used during production.** These values will likely differ slightly from the 0.25 feet and 0.025 feet prescribed in Appendix L.

**References to feature classes, feature datasets, topology rules, and feature class cluster tolerances are expressed in terms of the ESRI geodatabase format. However, the same requirements apply to the data delivered in SHP format.** . See Table O-3 for a description of topology rules and participating layers.

Minimum feature size is dictated by the horizontal cluster tolerance in the feature's respective topology layer. By default, **the horizontal cluster tolerance value will match the cluster tolerance specified for the feature dataset above.** Validating the 'Must Be Larger Than Cluster Tolerance' rule will verify that no lines or polygon features smaller than above cluster tolerance exist in the FRD.

Table O-3-2. Topology Rules

Topology Class	Spatial Layer	Topology Rule	Parameter
CSLF_Topology	S_CSLF_Ar	Must Be Larger Than Cluster Tolerance*	
CSLF_Topology	S_CSLF_Ar	Must Not Overlap	
CSLF_Topology	S_CSLF_Ar	Must Not Have Gaps	
CenBlk_Topology	S_CenBlk_Ar	Must Be Larger Than Cluster Tolerance*	
Pol_Ar_Topology	S_FRD_Pol_Ar	Must Be Larger Than Cluster Tolerance*	
Pol_Ar_Topology	S_FRD_Pol_Ar	Must Not Overlap	
Pol_Ar_Topology	S_FRD_Pol_Ar	Must Not Have Gaps	
Pol_Ar_Topology	S_FRD_Pol_Ar	Must be covered by feature class of	S_FRD_Proj_Ar
Proj_Ar_Topology	S_FRD_Proj_Ar	Must Be Larger Than Cluster Tolerance*	
Proj_Ar_Topology	S_FRD_Proj_Ar	Must Not Overlap	
Proj_Ar_Topology	S_FRD_Proj_Ar	Must Not Have Gaps	

\*Inherent for all polygon and polyline feature classes in each topology.

During the creation of the S\_CSLF\_Ar feature class, the Mapping Partner will be using the S\_Fld\_Haz\_Ar S\_Pol\_Ar, and potentially other feature classes from FIRM databases. Assuming that topology has been validated for these feature classes, when the union geoprocessing operation is performed, the topology rules should be preserved. **The Mapping Partner is responsible to validate the above topology rules on the resulting S\_CSLF\_Ar feature class.**

The S\_CenBlk\_Ar feature class is developed from U.S. Census Block boundaries from the Hazus DVDs or from the Map Service Center. The Census Block boundaries have been altered for various reasons and used in the national AAL analysis. When Hazus updates the boundaries and data based on each decennial Census, those data will be available for incorporation in later FRDs. By using this data source, spatial consistency is maintained in the refined and composite analysis and between all FRDs nationwide. This Census Block feature class is distributed in the personal Geodatabase (pGDB) format. **The feature class shall be imported into the S\_CenBlk\_Ar feature class of the FRD and attributed.**

The S\_FRD\_Pol\_Ar feature class in the above table has a topology rule of “must be covered by feature class of” S\_FRD\_Proj\_Ar. Validating topology with this rule ensures that those features are entirely contained within the project boundary. This topology rule does not apply to the S\_CenBlk\_Ar layer because the risk assessment analyses are to be performed on whole Census Blocks, which may extend beyond the project footprint. This topology rule also does not apply to the S\_HUC\_Ar, S\_Carto\_Ar, S\_Carto\_Ln, and S\_Carto\_Pt feature classes. These feature classes may contain features outside the project boundary to show on the project locator inset on the FRM.

#### O.3.4.6. Table Structure

**Mapping Partners must follow the attribute table structure presented in Section O.3.4.10.** The attribute data must be stored directly in the ESRI fGDB and ESRI SHP feature classes, along with the associated spatial data. With the exception of the look-up tables (i.e., those prefixed with L\_ or suffixed with \_Info), the attribute data must not be in an independent data file or separate relational database table.

Table attribute structure defines the required fields and field properties. For a GIS feature class or business table, field properties specify the type, field width, and how the data is stored. Generally these properties are identified as the field name, field type, field length, field precision, and field scale. The field name is the unique term used to identify the table column (e.g., CEN\_BLK\_ID). The field type indicates the type of data that is stored in the table column. Common field types include text, date, float (i.e., a small fractional number), double (i.e., a large fractional number), short integer (i.e., a small integer number), and long integer (i.e., a large integer number). The following two sections describe these field properties as they pertain to the fGDB and SHP formats being delivered.

##### *O.3.4.6.1. fGDB Field Properties*

For the text field type in a fGDB, the user should specify the field length for each field based on Section O.3.4.10. The field length indicates the number of characters that may be stored in the table column (e.g., a text field that has a length of 100 may store no more than 100 alphanumeric characters). Since only the data type and length (for text fields) must be declared for the fGDB, the tables in this appendix identifying the field properties will not include a specification for precision and scale.

For date and numeric field types in a fGDB, the length is the number of bytes required to store the data and is controlled internally by the software based on the data type and cannot be changed by the user. The precision and scale in a fGDB are not utilized and will show only as a 0 value.

The file geodatabase schema provides support for Binary Large Object (Blob) and Raster data types. However, the SHP specification does not support those data types. Therefore, **those fields will not be exported to SHP format.** Those Blob and Raster objects can be extracted directly from the source FRR or FRM, as well as the fGDB version of the FRD.

### ***O.3.4.6.2. SHP Field Properties***

For the text field type in the SHP format, the user should specify the field length for each field based on Section O.3.4.10. The field length indicates the number of characters that may be stored in the table column (e.g., a text field that has a length of 100 may store no more than 100 alphanumeric characters). Since only the data type and length (for text fields) must be declared for SHP format, the tables in this appendix identifying the field properties will not include a specification for precision and scale.

For numeric field types in a SHP format, the field length is ignored. The precision defines the number of digits that can be stored in the field. The scale defines the number of digits to the right of the decimal place. For those data types that store fractional values (e.g., double and float), the user may define the precision and scale. For example, the number 3456.78 has a precision of 6 and a scale of 2. If the user opts to accept the default values of 0 for the precision and scale, any number of decimal places may be stored. For those data types that store integer values (e.g., short integer and long integer), the user may only define the precision since the field value may not be fractional. For compatibility with the fGDB format of the FRD, the precision and scale are not specified in the following table and feature class data dictionaries.

For the date field type in a SHP format, the length, precision, and scale are inherent and cannot be specified by the user. Date fields in the SHP format are stored in the native date format.

### **O.3.4.7. Required and Optional Fields**

In the table documentation in Section O.3.4.10 and on the data model poster in Attachment A, each field name is followed by a letter code as follows:

- R – Required for all records.
- A – Required if applicable to that particular spatial feature.
- E – Required if that enhancement is part of SOW, MAS, or IAA.
- O – Optional; the Mapping Partner determines if the data for this field are available.

Most FRD tables also have the following, required fields:

- a) HUC8\_CODE identifying the WBD sub-basin for that feature,
- b) CASE\_NO identifying the FEMA project with which each feature is associated, and
- c) VERSION\_ID that stores the version of the FRD standard that was used to compile the data. Determination of the version identifier to assign is explained in the *Risk MAP - Versioning Implementation Plan*.

#### O.3.4.8. Primary and Foreign Keys

Each FRD table and feature class has an OBJECTID field defined. This is a sequential number maintained internally in the geodatabase by ESRI ArcGIS software. This OBJECTID field provides a mechanism for the software to uniquely access each record in the table. This field is required by the geodatabase schema.

**Each FRD table and feature class also has a primary key defined that may be made up of one or more fields.** This primary key is used to provide unique access to a record in the table. If the primary key is a single field, the field is usually suffixed with 'ID'. Where possible, these fields are designed to use identifications (IDs) that are known unique values. For example, in the S\_CenBlk\_Ar feature class, the primary key is the CEN\_BLK\_ID field, which is the character string that is created by concatenating the State and County Federal Information Processing Standards (FIPS) codes, followed by the Census tract, block group, and block numbers. Allowance has been made for future Censuses that may add an alphabetic suffix to the Census Block id.

In some cases, no 'natural' key field exists. For example, the S\_AOMI\_Pt feature class does not currently have any unique identifier assigned to it. In these cases, the Mapping Partner will sequentially assign a unique number to each feature in the feature class. In the S\_AOMI\_Pt example, the AOMI\_ID field is populated with "1", "2", "3", etc., for each successive feature. The Mapping Partner may choose another numbering method provided it is logical, documented, and consistently implemented, and results in a unique ID value for each record in the table.

In some cases, the OBJECTID field is the primary way to uniquely identify each record. However, the use of two or more non-system fields may also be used to uniquely identify a record. For example, in the L\_CSLF\_Summary table, there are fields for the CSLFSUMMID, which is either the CID for the individual community records or the CASE\_NO for the project total records. For each community, there are three records based on the LOCATION field, one each for SFHA, non-SFHA, and Floodway. So a combination of the CSLFSUMMID field and the LOCATION field will uniquely identify each record.

#### O.3.4.9. Null Values

Although the fGDB format supports "true" null values for data types, the SHP format does not. To provide consistency between the fGDB and SHP formats of the FRD standards, the following conventions for inserting null values into the tables is followed for both fGDB and SHP formats.

**In the event that the complete information cannot be obtained for a required field, the Mapping Partner shall substitute a value that indicates that the affected field was intentionally not populated.** Any use of non-populated values must be documented and explained in the metadata. The value to use for non-populated data for each field type is as follows:

- Text: "NP"

- Numeric: -8888
- Date: 8/8/8888

**For a field that is optional or required when applicable, the value must be set to the values shown below, not set to zero. The Mapping Partner shall use the value zero only when an attribute has the specific value of zero.**

- Text: Null (or "", the empty string)
- Numeric: -9999
- Date: 9/9/9999

**For those fields designated as enhanced in each of the table sections and on the data model poster, if the enhanced option is contractually required, but the data are unavailable, those fields are populated with "NP", -8888, or 8/8/8888 respectively depending on data type. If the enhanced option is not contractually required, those fields shall be populated with "", -9999, or 9/9/9999 respectively depending on data type.**

**For raster data, the value 'NODATA' shall be used to represent the absence of data or null values. Generally, all areas outside the project area (i.e., the polygon in S\_FRD\_Proj\_Ar) shall be set to 'NODATA' in the depth and analysis rasters. See Sections O.3.4.1 and O.3.4.11 for additional information.**

#### **O.3.4.10. Feature Classes / Tables**

Each of the feature classes and tables present in an FRD are described in the following sections. Each section is further divided into the following parts:

Overview – a short paragraph describing the table or feature class and its purpose

Attribute Definitions – a description of each attribute

Field Properties – the database schema for the table or feature class

Relationships – a description of the relationships with other tables in the FRD, if applicable

Mapping Partners must use the Field Properties for each feature class and table in this section to create the database and use the Attribute definitions to populate those fields.

**Text fields must follow the capitalization standards that apply to the display of that information in the FRR or on the FRM.**

In the field properties sections in the following table definitions, the key type column uses several abbreviations designating which fields are keys and what type they represent. These abbreviations are defined below:

- PK – Primary Key – This field is the internal primary key field used and maintained by ArcGIS software for all tables and feature classes registered in a geodatabase.
- UPK – User-defined Primary Key – This field(s) is the primary key to be used in accessing records in the table or feature class. See discussion in Section O.3.4.8.
- FK – Foreign Key – This field is related to a UPK in another table.

Note that the FRD maintains all dollar values, including asset replacement values, losses, etc., as whole dollars. The data from Hazus are exported in \$1,000s. **The Mapping Partner must convert the values from Hazus to whole dollar amounts in the FRD tables.**

**Feature Class: S\_AOMI\_Pt**

This enhanced feature class is intended to be used as a communication tool to direct users to areas and issues that warrant further investigation or research for possible mitigation, as well as to highlight prior mitigation successes.

**This feature class contains one record for each AoMI type at a location on the FRM.**

Additionally, the features are used to create a summary by community and classification in the L\_AOMI\_Summary table. There is no direct link between the S\_AOMI\_Pt feature class and the L\_AOMI\_Summary table.

Some AoMI features may be better represented by a line or a polygon. If so, there will still be a point in the S\_AOMI\_Pt feature class, but a line or polygon may be created in S\_Carto\_Ln or S\_Carto\_Ar respectively to represent the AoMI on the FRM. For example, an unaccredited levee may be better illustrated on the FRM as a linear feature. A feature could be placed in S\_Carto\_Ln so the levee could be shown on the FRM.

This feature class is linked to the L\_Source\_Cit table to document the sources for the data.

**Table 3-3 Attribute Definitions - S\_AOMI\_Pt**

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
AOMI_ID	Area of Mitigation Interest Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
CID	Community Identification Number. This is the six-digit CID assigned by FEMA in which this AoMI lies. See the definition in S_FRD_Pol_Ar for more detail. If the AoMI point does not lie in an area covered by a FEMA community identifier, this field shall be populated with a null value (See Section O.3.4.9).
POL_NAME1	Political Area Name 1. This is the primary name of the community in which the AoMI lies. This field is included in this table instead of retrieval by joining to S_FRD_Pol_Ar table to make querying for the FRR easier. See the definition in S_FRD_Pol_Ar for more detail. If the AoMI does not lie in an area covered by a FEMA community identifier, this field shall be populated with a null value (See Section O.3.4.9).
AOMI_CLASS	Area of Mitigation Interest Class. This is the general class to which the AoMI belongs (e.g., Riverine, Coastal, Past Floods, see D_AOMI_Class).

Attribute	Definition
AOMI_TYP	Type of Mitigation Interest. This is the general type to which the AoMI belongs (e.g., Dam, Levee, Erosion, etc., see D_AoMI_Typ).
AOMI_CAT	Area of Mitigation Interest Source Category. This is the general category from which the AoMI Information originated (see D_AoMI_SourceCat).
AOMI_SRCE	Source of the AoMI information (e.g., SHMO, NFIP, Local Agency). Care should be taken in standardization of the names of these sources within a project. The L_AoMI_Summary table can be semi-automatically generated if a consistent naming convention is used.
AOMI_INFO	AoMI Information. This field provides the specific reason(s) this location is considered an AoMI. See Appendix N of the FEMA G&S for suggested text for each different AoMI type.
NOTES	Comments explaining the relevance of this AoMI point. The size of this field provides the user space to supply more detail in a free form format regarding the relevance of this AoMI.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the AoMI point lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in the S_FRD_Proj_Ar feature class for a more detailed description.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.

**Table 3-4 Field Properties - S\_AoMI\_Pt**

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
AOMI_ID	UPK	R	Text	25		N/A
CID	FK	A	Text	6		S_FRD_Pol_Ar
POL_NAME1		A	Text	50		N/A
AOMI_CLASS		R	Text	4		D_AoMI_Class
AOMI_TYP		R	Text	4		D_AoMI_Typ
AOMI_CAT		R	Text	4		D_AoMI_SourceCat
AOMI_SRCE		R	Text	50		N/A
AOMI_INFO		A	Text	254		N/A
NOTES		A	Text	1000		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit

Note: Because of the length of the Notes field and the dBASE limitation of 254 character field width, **when this feature class is exported to SHP format, the Mapping Partner will create four fields to contain the data in the NOTES field (i.e., NOTES1, NOTES2, NOTES3, and NOTES4).**

Table 3-5 Relationship Classes - S\_AOMI\_Pt

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
AOMI_SourceCit	S_AOMI_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_Carto\_Ar*

**This polygon feature class is used to provide a cartographic background for the FRM.** The features contained in the feature class are primarily large hydrographic areas that are best represented as polygons and polygons representing the restudy areas, significant cultural features (e.g., parks, military bases, national forests, etc.). Other potential features include portions of communities clipped by the S\_FRD\_Proj\_Ar polygon, but yet are required to show in the project locator inset on the FRM. The feature class was designed to be flexible enough to allow the user to expand the feature class through the use of user defined features if they would enhance the communication capability of the FRM. **The S\_Carto\_Ar feature class does not need to be clipped by the S\_FRD\_Proj\_Ar polygon.**

**The feature class is subdivided into subtypes (Hydrographic, Restudy Area, and User-Defined) to facilitate categorization and symbolization on the FRM.**

The Mapping Partner may use several different sources for creating this feature class. Potential sources include the USGS National Hydrographic Dataset (NHD), the S\_Water\_Ar layer from effective FIRMs, or the NFHL.

This feature class is linked to the L\_Source\_Cit table to document the sources for the data.

### *Attribute Definitions – S\_Carto\_Ar*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CART_AR_ID	Cartographic Area Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
F_TYPE	Feature Subtype for symbolization. See D_Carto_Typ for possible values.
F_CODE	Feature Code for symbolization. See D_Carto_Hydro_Code for possible values when F_TYPE = 100 Hydrographic.
NAME	Feature Name use for labeling on the FRM. This should be the name for the body of water or other feature name.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the feature lies. If the feature crosses a HUC-8 boundary, the field shall be populated with the HUC-8 value in which the majority of the feature lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.

Attribute	Definition
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail..
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

### *Field Properties – S\_Carto\_Ar*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CART_AR_ID	UPK	R	Text	25		N/A
F_TYPE		R	Short Integer	Default		D_Carto_Typ
F_CODE		A	Long Integer	Default		D_Carto_Hydro_Code
NAME		A	Text	80		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

### *Relationship Classes – S\_Carto\_Ar*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CartoAr_SourceCit	S_Carto_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_Carto\_Ln*

**This polyline feature class is used to provide a cartographic background for the FRM.** The features contained in the feature class are primarily streams and transportation features (i.e., roadways). The feature class was designed to be flexible enough to allow the user to expand the feature class through the use of user defined features if they would enhance the communication capability of the FRM. **The S\_Carto\_Ln feature class does not need to be clipped by the S\_FRD\_Proj\_Ar polygon.**

**The feature class is subdivided into subtypes (Hydrographic, Transportation, and User-Defined) to facilitate categorization and symbolization on the FRM.**

The Mapping Partner may use several different sources for creating this feature class. Potential sources include the U.S. Census Bureau TIGER files, USGS NHD, or the S\_Water\_Ln or S\_Transport\_Ln layer from effective FIRMs.

This feature class is linked to the L\_Source\_Cit table to document the sources for the data.

### *Attribute Definitions – S\_Carto\_Ln*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CART_LN_ID	Cartographic Line Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
F_TYPE	Feature Subtype for symbolization. See D_Carto_Typ for possible values.
F_CODE	Feature Code for symbolization. See D_Carto_Hydro_Code for possible values when F_TYPE = 100 Hydrographic and D_Carto_Trans_Code for F_TYPE=200 Transportation; Should be null for other F_TYPES.
NAME	Feature Name use for labeling on the FRM. This should be the name for the stream, roadway, or other feature.
HWY_NUM	Highway Number or Route Number to place on shield.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the feature lies. If a feature crosses a HUC-8 boundary, the field shall be populated with the HUC-8 value in which the majority of the feature lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.

Attribute	Definition
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.

### *Field Properties – S\_Carto\_Ln*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CART_LN_ID	PK	R	Text	25		N/A
F_TYPE		R	Short Integer	Default		D_Carto_Typ
F_CODE		A	Long Integer	Default		D_Carto_Hydro_Code D_Carto_Trans_Code
NAME		A	Text	80		N/A
HWY_NUM		A	Short Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A

### *Relationship Classes – S\_Carto\_Ln*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CartoLn_SourceCit	S_Carto_Ln	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_Carto\_Pt*

**This point feature class is used to provide a cartographic background for the FRM.** The feature class was designed to be flexible enough to allow the user to expand the feature class through the use of user defined features if they would enhance the communication capability of the FRM.

**The feature class is subdivided into subtypes (Hydrographic, Transportation, and User-Defined) to facilitate categorization and symbolization on the FRM. The feature class does not need to be clipped by the S\_FRD\_Proj\_Ar feature class.**

The Mapping Partner may use several different sources for creating this feature class. Potential sources include the U.S. Census Bureau TIGER files or USGS NHD.

This feature class is linked to the L\_Source\_Cit table to document the sources for the data.

### *Attribute Definitions – S\_Carto\_Pt*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CART_PT_ID	Cartographic Point Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
F_TYPE	Feature Subtype for symbolization. See D_Carto_Typ for possible values.
F_CODE	Feature Code for symbolization. See D_Carto_Hydro_Code for possible values when F_TYPE = 100 Hydrographic and D_Carto_Trans_Code for F_TYPE = 200 Transportation; Should be null for other F_TYPES.
NAME	Feature Name use for labeling on the FRM. This should be the name for the stream, roadway, or other feature.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the feature lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.

## *Field Properties – S\_Carto\_Pt*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CART_PT_ID	PK	R	Text	25		N/A
F_TYPE		R	Short Integer	Default		D_Carto_Typ
F_CODE		A	Long Integer	Default		D_Carto_Hydro_Code D_Carto_Trans_Code
NAME		A	Text	80		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit

## *Relationship Classes – S\_Carto\_Pt*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CartoPt_SourceCit	S_Carto_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_CenBlk\_Ar*

**The S\_CenBlk\_Ar feature is a polygon feature class. This class is the spatial foundation for the flood risk assessments.** All of the inventory and damage estimates for flood risk assessments are stored and performed at the Census Block level, except for the User Defined Facilities (UDFs). This feature class contains the spatial location of the Census Blocks for the project. This feature class also stores the Asset Replacement Value, as well as the estimated structure and population counts for each block. The risk assessment results are stored in other tables (e.g., L\_RA\_AAL). Using the appropriate relationship class, this feature class may be used to display the assessment results on the FRM by Census Block. To provide consistency with other flood risk projects, **the Mapping Partner should use the Census Block boundaries from the Hazus DVDs or FEMA’s Map Service Center.**

Because Hazus performs its analysis at the Census Block level, **the feature class should not be clipped by the polygon in the S\_FRD\_Proj\_Ar feature class.**

**The feature class should contain one record for each Census Block in or partially in the project area.**

This feature class is linked to the inventory (L\_Local\_GBS) and results tables (i.e., L\_RA\_AAL, L\_RA\_Refined, and L\_Composite). These relationships facilitate the user being able to create a join between S\_CenBlk\_Ar and these related tables so that thematic maps can be created and symbolized on many of the attributes in these related tables. This feature class is also linked to the L\_Source\_Cit table to document the sources for the data.

### *Attribute Definitions – S\_CenBlk\_Ar*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CEN_BLK_ID	This field should be populated with the Census Block identifier. This identifier is based on the following format with an optional single alphabetic character suffix to accommodate the 2010 decennial Census:  <div style="text-align: center;"> <p style="margin: 0;"> <span style="margin-right: 20px;">06</span> <span style="margin-right: 20px;">07</span> <span style="margin-right: 20px;">1003</span> <span style="margin-right: 20px;">6021</span> <span>003</span> </p> <p style="margin: 0; font-size: small;"> <span style="margin-right: 20px;"> </span> </p> <p style="margin: 0; font-size: x-small;"> <span style="margin-right: 20px;">State</span> <span style="margin-right: 20px;">County</span> <span style="margin-right: 20px;">Census tract</span> <span style="margin-right: 20px;">Census block</span> <span>Block group</span> </p> </div>
POPULATION	Population Count for the Census Block.
ARV_BG_TOT	Asset Replacement Value of Buildings of All Structure Types. Obtained from General Building Stock data, in whole dollars.

Attribute	Definition
ARV_CN_TOT	Asset Replacement Value of Contents for All Structure Types. Obtained from General Building Stock data, in whole dollars.
ARV_BG_RES	Asset Replacement Value of Residential Buildings. Obtained from General Building Stock data, in whole dollars.
ARV_CN_RES	Asset Replacement Value of Contents for Residential Structures. Obtained from General Building Stock data, in whole dollars.
ARV_BG_COM	Asset Replacement Value of Commercial Buildings. Obtained from General Building Stock data, in whole dollars.
ARV_CN_COM	Asset Replacement Value of Contents for Commercial Structures. Obtained from General Building Stock data, in whole dollars.
ARV_BG_OTH	Asset Replacement Value of Buildings of Other Structure Types. Obtained from General Building Stock data, in whole dollars.
ARV_CN_OTH	Asset Replacement Value of Contents of Other Structure Types. Obtained from General Building Stock data, in whole dollars.
TOT_BLDG	Count of all Buildings in the Census Block. This is an Enhanced Field and should be obtained from local data sources.
RES_BLDG	Count of Residential Buildings in the Census Block. This is an Enhanced Field and should be obtained from local data sources.
COM_BLDG	Count of Commercial Buildings in the Census Block. This is an Enhanced Field and should be obtained from local data sources.
OTH_BLDG	Count of Buildings of other types in the Census Block. This is an Enhanced Field and should be obtained from local data sources.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the Census Block lies. If a Census Block crosses a HUC-8 boundary, the field shall be populated with the HUC-8 value in which the majority of the Census Block lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

### *Field Properties – S\_CenBlk\_Ar*

## Appendix O

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CEN_BLK_ID	UPK, FK	R	Text	17		L_RA_AAL L_RA_Refined L_RA_Composite L_Local_GBS
POPULATION		R	Long Integer	Default		N/A
ARV_BG_TOT		R	Long Integer	Default		N/A
ARV_CN_TOT		R	Long Integer	Default		N/A
ARV_BG_RES		R	Long Integer	Default		N/A
ARV_CN_RES		R	Long Integer	Default		N/A
ARV_BG_COM		R	Long Integer	Default		N/A
ARV_CN_COM		R	Long Integer	Default		N/A
ARV_BG_OTH		R	Long Integer	Default		N/A
ARV_CN_OTH		R	Long Integer	Default		N/A
TOT_BLDG		E	Long Integer	Default		N/A
RES_BLDG		E	Long Integer	Default		N/A
COM_BLDG		E	Long Integer	Default		N/A
OTH_BLDG		E	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

### *Relationship Classes – S\_CenBlk\_Ar*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CenBlk_AAL	S_CenBlk_Ar	CEN_BLK_ID	L_RA_AAL	CEN_BLK_ID	1:M
CenBlk_Refined	S_CenBlk_Ar	CEN_BLK_ID	L_RA_Refined	CEN_BLK_ID	1:M
CenBlk_Composite	S_CenBlk_Ar	CEN_BLK_ID	L_RA_Composite	CEN_BLK_ID	1:M
CenBlk_LocalGBS	S_CenBlk_Ar	CEN_BLK_ID	L_LocalGBS	CEN_BLK_ID	1:1
CenBlk_SourceCit	S_CenBlk_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_CSLF\_Ar*

The **S\_CSLF\_Ar** is a **polygon feature class. It depicts the changes in spatial extents between the previous and newly revised FIRMs.** The contributing engineering factor attributes communicate the likely reasons for the changes. The feature class is created by unioning the newly revised S\_Fld\_Haz\_Ar feature class with those from the previous FIRMs covering the same area(s). **If the floodplains that contribute to the S\_CSLF\_Ar feature class extend beyond the S\_FRD\_Proj\_Ar project boundary, they should not be clipped by the project boundary, but included in the FRD for the areas being studied for regulatory products. If a CSLF polygon has multiple models of the same type (e.g., two hydrologic models), then the CSLF polygons should be subdivided accordingly. If the CSLF polygon spans FIRM panels that have different effective dates, then those polygons should be divided at the panel boundaries.** See Appendix N of the FEMA G&S for more detail on creating and attributing the feature class.

This feature class can be used to visualize the changes in the floodplains. By symbolizing the feature class on the various contributing factor attributes, the user should be able to gain an understanding of where and why the floodplain changed. The table is also used as the foundation for summarizing the CSLF data by community in the L\_CSLF\_Summary table.

This feature class is linked to the FRD\_Model\_Info table by the NEW\_MODEL and PRE\_MODEL fields allowing the user to easily find which models were associated with the CSLF polygons. The feature class is also related to the L\_SourceCit table by the PRE\_SRCCIT, NEW\_SRCCIT, and SOURCE\_CIT fields to document the previous and current FIRM databases used to develop the CSLF. Although a formal relationship class cannot exist to a different database, the feature class is associated with the Coordinated Needs Management Strategy (CNMS) data using the CNMS\_ID field.

**The project team should determine the definition of structures to be used in populating the structures field listed below (e.g., minimum footprint area, inhabitable versus inhabitable, NFIP insured).** Given that this is an enhanced field, the definition of what constitutes a structure will be largely based on the available local data and what attributes they maintain on the building footprints. The result of this decision should be documented in the metadata.

### *Attribute Definitions – S\_CSLF\_Ar*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CSLF_ID	CLSF Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.

Attribute	Definition
CNMS_ID	CNMS Identifier. Foreign Key to S_Studies_Ar feature class in the CNMS Database. This identifier is composed of the 5-digit county FIPS code, '02' indicating the S_Studies_Ar feature class, and a 5-digit unique sequential number.
AREA_SF	Area of the change polygon, measured in square feet in the local projection.
PRE_ZONE	Previous Flood Zone Designation (see D_Zone for valid values). This is the flood zone designation from the previous, effective FIRM.
PRE_ZONEST	Previous Flood Zone Subtype Designation (see D_ZoneSubtype for valid values). This is the designation from the previous, effective FIRM.
PRE_MODEL	Models used for previous, effective FIRM. This is a foreign key to the Model_Info table.
PRE_TOPO	Topographic Type used for previous delineation (see D_Topo_Typ for valid values).
PRE_SRCCIT	Source Citation for previous FIRM. This is a foreign key to the L_Source_Cit table.
NEW_ZONE	New Flood Zone Designation (see D_Zone for valid values). This is the flood zone designation from the current project.
NEW_ZONEST	New Flood Zone SubType Designation (see D_ZoneSubtype for valid values). This is the flood zone designation from the current project.
NEW_MODEL	Models used for new delineation. This is a foreign key to the Model_Info table.
NEW_TOPO	Topographic Type used for new delineation (see D_Topo_Typ for valid values).
NEW_SRCCIT	Source Citation for new FIRM. This is a foreign key to the L_Source_Cit table.
PEAKDSCHG	Peak Discharge Change (see D_Change for valid values). The change to the study's peak discharges that may have impacted analysis (e.g., Increase/Decrease/Negligible/Unknown) [aka, CNMS element C2].
MDLMETHODS	Model Methods Change (see D_TrueFalse for valid values). The presence of significant changes to primary assumptions associated with the updated model methodology since last the last study (e.g., True/False/Unknown) [aka, CNMS element C3].
FLD_CTRLCHG	Flood Control Structures Change (see D_Change for valid values). The change to the study's major flood control structure(s) that may have impacted analysis since the last study (e.g., Increase/Decrease/Negligible/ Unknown). [aka, CNMS element C4].

Attribute	Definition
HYDSTRCHG	Hydraulic Structures Change (see D_Change for valid values). The change to the study's number of hydraulic structures that may have impacted analysis since the last study (e.g., Increase/Decrease/Negligible/ Unknown). [aka, CNMS element C6 & S4].
TOPOCHG	Topography Change (see D_TrueFalse for valid values). The change in the underlying topography used for mapping the floodplain may have impacted the analysis since the last study (e.g., True/False/Unknown).
SEDCHG	Sediment Change (see D_Change for valid values). The presence of significant changes to channel sedimentation since last the last study (e.g., True/False/Unknown) [aka, CNMS element C7].
EROSIONCHG	Erosion Change (see D_Change for valid values). The presence of significant changes to channel erosion or scour since last the last study (e.g., True/False/Unknown) [aka, CNMS element C7].
CHANNELCHG	Channel Change (see D_TrueFalse for valid values). The presence of significant changes to channel geometry since last the last study (e.g., True/False/Unknown) [aka, CNMS element C5 & S5].
LEVEECHG	Levee Change (see D_TrueFalse for valid values). The change in the levee status or modeling parameters/scenario for the levee may have impacted the analysis since the last study (e.g., True/False/Unknown).
RUNOFFCHG	Runoff Change (see D_Change for valid values). The change to the study's runoff characteristics due landuse, vegetation or imperviousness changes that may have impacted analysis (e.g., Increase/Decrease/Negligible/Unknown) [aka, CNMS elements S3 & S7].
DUNECHG	Dune Change (see D_Change for valid values). The presence of significant changes to frontal dunes since last the last study (e.g., True/False/Unknown) [aka, CNMS element S8].
OTHCHG	Other Changes. The description of other changes the Mapping Partner believes to have contributed to the results of the analysis.
SFHACHG	SFHA Change (see D_Change for valid values). The type of SFHA change for each CSLF polygon based upon previous and new flood zones (i.e., does this polygon indicate an Increase/Decrease/Zero change in the SFHA).
NONSFHACHG	Non-SFHA Change (see D_Change for valid values). The type of non-SFHA change for each CSLF polygon based upon previous and new flood zones (i.e., does this polygon indicate an Increase/Decrease/Zero change in the non-SFHA area).

Attribute	Definition
FLDWYCHG	Floodway Change (see D_Change for valid values). The type of floodway change for each CSLF polygon based upon previous and new flood zones (i.e., does this polygon indicate an Increase/Decrease/Zero change in the floodway area).
STRUCTURES	The estimated count of affected structures within the area of change. This is an enhanced field.
POPULATION	The estimated affected population within the area of change. This is an enhanced field.
CID	This is the six-digit CID assigned by FEMA in which this CSLF polygon lies. See the definition in S_FRD_Pol_Ar for more detail. If the CSLF polygon does not lie in an area covered by a FEMA community identifier, this field shall be populated with a null value (See Section O.3.4.9).
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the CSLF polygon feature lies. If a feature crosses a HUC-8 boundary, the field shall be populated with the HUC-8 value in which the majority of the feature lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.. This field should be populated with the SOURCE_CIT for the current flood risk project.
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

### *Field Properties – S\_CSLF\_Ar*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CSLF_ID	UPK	R	Text	25		N/A
CNMS_ID	FK	R	Text	12		S_Studies_Ar (CNMS)
AREA_SF		R	Double	Default	Default	N/A
PRE_ZONE		R	Text	4		D_Zone

## Appendix O

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
PRE_ZONEST		R	Text	4		D_ZoneSubtype
PRE_MODEL	FK	A	Text	11		Model_Info
PRE_TOPO		A	Text	4		D_Topo_Typ
PRE_SRCCIT	FK	A	Text	25		L_Source_Cit
NEW_ZONE		R	Text	4		D_Zone
NEW_ZONEST		R	Text	4		D_ZoneSubtype
NEW_MODEL	FK	R	Text	11		Model_Info
NEW_TOPO		R	Text	4		D_Topo_Typ
NEW_SRCCIT	FK	R	Text	25		L_Source_Cit
PEAKDSCHG		A	Text	1		D_Change
MDLMETHODS		A	Text	1		D_TrueFalse
FLD_CTRLCHG		A	Text	1		D_Change
HYDSTRCHG		A	Text	1		D_Change
TOPOCHG		A	Text	1		D_TrueFalse
SEDCHG		A	Text	1		D_Change
EROSIONCHG		A	Text	1		D_Change
CHANNELCHG		A	Text	1		D_TrueFalse
LEVEECHG		A	Text	1		D_TrueFalse
RUNOFFCHG		A	Text	1		D_Change
DUNECHG		A	Text	1		D_Change
OTHCHG		A	Text	25		N/A
SFHACHG		A	Text	1		D_Change
NONSFHACHG		A	Text	1		D_Change
FLDWYCHG		A	Text	1		D_Change
STRUCTURES		E	Long Integer	Default		N/A
POPULATION		E	Double	Default	Default	N/A
CID	FK	R	Text	6		S_FRD_Pol_Ar
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

## *Relationship Classes – S\_CSLF\_Ar*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CSLF_New_Model	S_CSLF_Ar	NEW_MODEL	FRD_Model_Info	MDL_NFO_ID	1:1
CSLF_Pre_Model	S_CSLF_Ar	PRE_MODEL	FRD_Model_Info	MDL_NFO_ID	1:1
CSLF_Pre_SourceCit	S_CSLF_Ar	PRE_SRCCIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_New_SourceCit	S_CSLF_Ar	NEW_SRCCIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_SourceCit	S_CSLF_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
	S_CSLF_Ar	CNMS_ID <sup>1</sup>	S_Studies_Ar(CNMS)	CNMS_ID	1:1

<sup>1</sup>The CNMS\_ID field is used to provide linkage from the S\_CSLF\_Ar feature class to the CNMS database. A relationship class cannot be defined for this relationship, because the data are external to the FRD.

*Feature Class: S\_FRD\_Pol\_Ar*

**This feature class is the combination of the S\_Pol\_Ar feature class from all FIRM databases in the project area. There should be one record (polygon) per community. This will necessitate the use of multi-part polygons for non-contiguous community boundaries. The polygon(s) should be clipped at the project boundary using the S\_FRD\_Proj\_Ar feature class. Any remaining portion should be moved to S\_Carto\_Ar if required for display on the FRM (e.g., in the Project Locator Map).**

**This feature class should only contain communities that have summary information presented in Section 3 of the FRR.** Other political areas from the S\_Pol\_Ar layer in FIRM databases (e.g., national parks, military bases, etc.) that are not presented in the FRR, but are desired to show on the FRM, should be moved to the S\_Carto\_Ar feature class.

This feature class may be used for query and visualization of risk assessment data by community. By joining the various lookup tables (e.g., L\_RA\_Summary, L\_Claims, L\_Exposure, L\_CSLF\_Summary, and L\_AOMI\_Summary) using the relationship classes, the user can symbolize on many of the fields in these tables by community. For example, the user may want to display the Average Annual Loss Per Capita by community on a map symbolized using a color ramp. This feature class is also linked to the L\_Source\_Cit table to document the sources for the data.

*Attribute Definitions – S\_FRD\_Pol\_Ar*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
POL_AR_ID	Political Area Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail. This field should be renumbered after appending all the constituent S_Pol_Ar feature classes to provide uniqueness in this feature class.
DFIRM_ID	Flood Risk Project Identifier. For a single-jurisdiction flood risk project, the value is composed of the 2-digit state FIPS code and the 4-digit FEMA CID code (e.g., 480001). For a countywide flood risk project, the value is composed of the 2-digit state FIPS code, the 3-digit county FIPS code, and the letter “C” (e.g., 48107C). Within each FIRM database, the DFIRM_ID value is identical.

Attribute	Definition
CID	Community Identification Number. This is the six-digit community number assigned by FEMA. If the jurisdiction does not have a community number assigned by FEMA, the CID is created by combining the state FIPS code with the abbreviation contained in the COMM_NO field (i.e., FED, ST, or OTHR), followed by a sequential number (e.g., a tribal land may be 36OTHR01).
POL_NAME1	Political Area Name 1 - This is the primary name of the community. This is the area with Floodplain Management Jurisdiction. This would correspond to the official name of this jurisdiction used by the FEMA within the NFIP. For unincorporated areas of a county, this must be the county name (e.g., Montgomery County). For cities, towns, and villages the name should be of the format "City of Floodville" or "Town of Waterloo". In the case where FED, ST, or OTHR is used in the CID field, the Mapping Partner must enter an appropriate name describing the political area.
POL_NAME2	Political Area Name 2. This is the secondary name of the area shown on FIRM panels. Populated if there is a common name for an area other than the official jurisdiction name. Also used in situations where islands, National Parks, National Forests, military bases, or other area boundaries and/or labels need to be shown on the FRM.
CO_FIPS	County FIPS Code. This is the three-digit county FIPS code. This is a standard numbering system that is used by the Federal government. Defined in FIPS Pub 6-4.
ST_FIPS	State FIPS. This is the two-digit code that corresponds to the state FIPS code. This is a standard numbering system that is used by the Federal government. Defined in FIPS Pub 6-4. Acceptable values for this field are listed in the D_State_FIPS domain.
COMM_NO	Community Number. This is the four-digit number assigned by FEMA to each community for tracking purposes under the NFIP. This number can be obtained from the community status book that can be viewed at <a href="http://www.msc.fema.gov">www.msc.fema.gov</a> .
POPULATION	Population for portion of community in this project area.
TOT_POP	Total population of the community.
PCT_POP	Percent of the community's population in this project area.
LND_AR_SM	Land Area. Area in square miles of the community in this project area.
TOT_LND_AR	Total Land Area. Total land area of the community in square miles.
PCT_LND_AR	Percentage Land Area. Percentage of the community's land area in this project area.

Attribute	Definition
NFIPSTATUS	NFIP Status (see D_TrueFalse for valid values). This is a true/false status field which indicates if the community participates in the NFIP. If the community has been placed in suspended status, a value of false should be used to designate that the community is no longer participating.
CRS_RATING	FEMA Community Rating System (CRS) Classification for the community (1 ~ 10).
PASTDECLAR	Past Declarations. Number of past federal flood emergency declarations. Since declarations are normally made at the county level, if the portion of the community for this project is in that county, then that declaration would apply in tallying the declarations for the community. The data in this field should not be aggregated to larger political areas because of the potential for counting the same declaration multiple times.
FLD_POLICY	Flood Policies. Number of flood insurance policies for this portion of the community in the project area.
POLICY_COV	Flood Policy Coverage. Dollar amount of flood insurance coverage for this portion of the community in the project area.
HMP_STATUS	HMP Status (see D_TrueFalse for valid values). This is a true/false status field indicating if the community participates in a FEMA approved Hazard Mitigation Plan.
HMP_NAME	Name of the Hazard Mitigation Plan in which the community participates.
HMP_EXPIRE	Expiration date of the Hazard Mitigation Plan in which the community participates.
POL_TYP	Political Boundary Type (i.e., Local, County, State, Federal) – Used for symbology on the FRM.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the community lies. If a community is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the community being studied lies shall be used. If the portion of the community being studied is in multiple sub-basins, the sub-basin in which the greatest portion of the community lies shall be used.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.. See the definition in L_Source_Cit for additional detail.

## Appendix O

Attribute	Definition
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

### *Field Properties – S\_FRD\_Pol\_Ar*

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
POL_AR_ID		R	Text	25		N/A
DFIRM_ID		R	Text	6		N/A
CID	UPK, FK	R	Text	12		L_CSLF_Summary, L_AOMI_Summary, L_Claims, L_Exposure, and L_RA_Summary
POL_NAME1		R	Text	50		N/A
POL_NAME2		A	Text	50		N/A
CO_FIPS		R	Text	3		N/A
ST_FIPS		R	Text	2		D_State_FIPS
COMM_NO		R	Text	4		N/A
POPULATION		R	Long Integer	Default		N/A
TOT_POP		R	Long Integer	Default		N/A
PCT_POP		R	Double	Default	Default	N/A
LND_AR_SM		R	Double	Default	Default	N/A
TOT_LND_AR		R	Double	Default	Default	N/A
PCT_LND_AR		R	Double	Default	Default	N/A
NFIPSTATUS		R	Text	1		D_TrueFalse
CRS_RATING		R	Short Integer	Default		D_CRS_Rating
PASTDECLAR		R	Long Integer	Default		N/A
FLD_POLICY		R	Long Integer	Default		N/A
POLICY_COV		R	Double	Default	Default	N/A
HMP_STATUS		R	Text	1		D_TrueFalse
HMP_NAME		A	Text	100		N/A
HMP_EXPIRE		A	Date	Default		N/A
POL_TYP		R	Text	3		D_Pol_Typ
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

### *Relationship Classes – S\_FRD\_Pol\_Ar*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
PolAr_RA_Sum	S_FRD_Pol_Ar	CID	L_RA_Summary	RA_SUMM_ID	1:M
PolAr_Claims	S_FRD_Pol_Ar	CID	L_Claims	CLAIMS_ID	1:1
PolAr_Exposure	S_FRD_Pol_Ar	CID	L_Exposure	EXPOS_ID	1:1
PolAr_CSLF_Sum	S_FRD_Pol_Ar	CID	L_CSLF_Summary	CSLFSUMMID	1:M
PolAr_AOMI_Sum	S_FRD_Pol_Ar	CID	L_AOMI_Summary	AOMISUMMID	1:M
PolAr_SourceCit	S_FRD_Pol_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_FRD\_Proj\_Ar*

**This feature class represents the spatial ‘footprint’ of the project (or portion of the project if multiple suites of products are created for the project). The single polygon that ‘best’ represents the project area should be used.** The criteria for ‘best’ is different for different types of projects. For a HUC-8 sub-basin, the HUC boundary from the WBD should be used. For PMR projects, the FIRM panel boundaries should be used. **These features shall be multi-part polygons to support non-contiguous PMR project footprints.**

This feature class is used to clip other feature classes delivered in the FRD and is linked to the L\_Source\_Cit table to document the sources for the data.

### *Attribute Definitions – S\_FRD\_Proj\_Ar*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CASE_NO	FEMA Case Number. See the CASE_NO field in the S_FRD_Proj_Ar feature class for a more detailed description. The FEMA case number is an alphanumeric identifier assigned to this project which is generated by the MIP. An example of a FEMA case number for a flood risk project is 06-03-0002S, which is of the format YY-RR-####A. The YY represent the last two digits of the year, the RR is the FEMA region, #### is a sequential number, and A is an alphabetic suffix, which is usually S for studies. The case number shall be entered into the field in this format, including hyphens.
PROJ_NM	Project Name (e.g., Watershed, USA).
H_DATUM	Horizontal Datum used for all feature classes and rasters used in the project (see D_Horiz_Datum for valid values). Normally this would be NSRS07. See Section O.3.4.3 for other scenarios.
V_DATUM	Vertical Datum (see D_V_Datum for valid values) used for all feature classes and rasters used in the project. Normally this would be NAVD88. See Section O.3.4.3 for other scenarios.
PROJECTION	Projection (see D_Projection for valid values) used for all feature classes in project. Normally this would be GCS. See Section O.3.4.3 for other scenarios.
PROJ_ZONE	Projection Zone for the PROJECTION defined above, if applicable. Otherwise, use a null value (see Section O.3.4.9).
PROJ_UNIT	Projection Unit for the PROJECTION defined above. Normally this would be Decimal Degrees (DECDEG) for NAD83 or NSRS07. See Section O.3.4.3 for other scenarios.

Attribute	Definition
V_UNITS	Vertical Units for rasters, elevations stored in attributes, etc., normally US Survey Feet (USFT). See D_Length Units and Section O.3.4.3 for other possible values.
META_NM	Metadata filename (e.g., FRD_YRR1234S_metadata.xml).
HAZUS_VER	Hazus Version. The version of Hazus used in the risk assessments (e.g., 'MR4' or 'MR5').
CENSUS	Year of Census data used (e.g., 2000, 2010, etc.) for the Hazus analysis.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the project lies. If the project area spans multiple HUCs (e.g., large coastal study), populate this field with 'MULTI'.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail.
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

### Field Properties – S\_FRD\_Proj\_Ar

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CASE_NO	UPK	R	Text	12		N/A
PROJ_NM		R	Text	50		N/A
H_DATUM		R	Text	6		D_Horiz_Datum
V_DATUM		R	Text	6		D_V_Datum
PROJECTION		R	Text	6		D_Projection
PROJ_ZONE		A	Text	4		N/A
PROJ_UNIT		R	Text	6		D_Proj_Unit
V_UNITS		R	Text	4		D_Length_Units
META_NM		R	Text	50		N/A
HAZUS_VER		R	Text	4		N/A
CENSUS		R	Text	4		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit

## Appendix O

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

### *Relationship Classes – S\_FRD\_Proj\_Ar*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
Proj_SourceCit	S_FRD_Proj_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

*Feature Class: S\_FRM\_Callout\_Ln*

**This polyline feature class is used to display the callout/leader lines on the FRM. The line must be digitized from a centroid of the callout box to the geographic feature being highlighted by the callout box.**

This feature class is linked to the L\_Source\_Cit table to document the sources for the data.

*Attribute Definitions – S\_FRM\_Callout\_Ln*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
CALLOUT_ID	Callout Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
IMG_TITLE	Image Title. Title for placement with the callout box.
IMG_HEIGHT	Image Height. Height of the callout image depicted in inches on the map.
IMG_WIDTH	Image Width. Width of the callout image depicted in inches on the map.
IMG_CPTION	Image Caption. Caption to be placed under the image.
IMG_BINARY	Image Binary. The binary formatted image being depicted within the callout box. This image is stored as a managed raster as an attribute of the feature class.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail..
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

*Field Properties – S\_FRM\_Callout\_Ln*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
CALLOUT_ID	UPK	R	Text	25		N/A
IMG_TITLE		R	Text	50		N/A
IMG_HEIGHT		R	Float	Default	Default	N/A
IMG_WIDTH		R	Float	Default	Default	N/A
IMG_CPTION		R	Text	254		N/A
IMG_BINARY		R	Raster	N/A		N/A
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

*Relationship Classes – S\_FRM\_Callout\_Ln*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
Callout_SourceCit	S_FRM_Callout_Ln	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

### *Feature Class: S\_HUC\_Ar*

**The S\_HUC\_Ar feature class depicts the watersheds in and around the project area.** The USGS and NRCS have defined and cataloged watersheds by unique HUCs. The standard to be used for the definition of HUC-8, HUC-10, and HUC-12 cataloging units in the FRD is the WBD. The WBD is a companion dataset to the NHD. FEMA uses the HUC boundaries in the WBD to prioritize projects based on multiple criteria. **The boundaries delivered in the S\_HUC\_Ar feature class should be those HUCs used for the most recent FEMA prioritization.**

This feature class is used to develop the project area (S\_FRD\_Proj\_Ar) for sub-basin-based projects. The HUC boundaries are shown on the FRM and the project locator on the FRM.

This feature class has sub-types by the level of hydrologic unit (i.e., 8, 10, 12, or 14) and using DIGITS as the sub-type field.

This feature class is linked to the L\_Source\_Cit table to document the sources for the data.

### *Attribute Definitions – S\_HUC\_Ar*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
HUC_CODE	HUC Identifier (Primary Key). This should be the HUC identifier assigned by WBD.
HUC_NAME	Name of basin / sub-basin from WBD.
DIGITS	Number of digits in HUC-Code (8, 10, 12, or 14).
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail..
SHAPE_LENGTH	Internal field used by ArcGIS software to store the length of the feature's geometry.
SHAPE_AREA	Internal field used by ArcGIS software to store the area of the feature's geometry.

## *Field Properties – S\_HUC\_Ar*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
HUC_CODE	UPK	R	Text	14		N/A
HUC_NAME		R	Text	80		N/A
DIGITS		R	Short Integer	Default		N/A
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit
SHAPE_LENGTH		R	Double	Default	Default	N/A
SHAPE_AREA		R	Double	Default	Default	N/A

## *Relationship Classes – S\_HUC\_Ar*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
HUC_SourceCit	S_HUC_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

*Feature Class: S\_UDF\_Pt*

**This enhanced feature class locates UDFs for which site or location-specific risk assessments are performed.** There is one record for each UDF assessed. The results are stored in a risk assessment table (L\_RA\_UDF\_Summary) and related to this point feature class (at the centroid of the building footprint, parcel boundary, etc.). More information about how Hazus processes user-defined facility data may be found in the latest Hazus User and Technical documentation (e.g., Hazus Flood Model Technical Manual as well as the Hazus Flood Model User Manual).

This feature class provides the location and inventory data where site-specific risk assessments were performed. This table is linked with the L\_RA\_UDF\_Refined table to allow presentation of the UDF analysis on a thematic map. This feature class is also linked to the L\_Source\_Cit table to document the sources for the data.

*Attribute Definitions – S\_UDF\_Pt*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SHAPE	Shape Geometry Field. Internal field used by ArcGIS software to store the feature geometry.
UDF_ID	UDF Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
CEN_BLK_ID	Census Block Identifier. See the CEN_BLK_ID field in the S_CenBlk_Ar feature class for more detail.
OCCUP_TYP	Specific Occupancy Type from risk assessment analysis (see D_Occupancy_Typ for valid values).
FACTY_TYP	Facility Type (see D_Facility_Typ for valid values).
ARV_BLDG	Asset Replacement Value of Building.
ARV_CNTNT	Asset Replacement Value of Contents.
ARV_INVENT	Asset Replacement Value of Inventory.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the point representing the facility lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.
SOURCE_CIT	Source Citation from L_SOURCE_CIT. See field definition in L_Source_Cit for more detail..

*Field Properties – S\_UDF\_Pt*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SHAPE		R	Geometry	Default		N/A
UDF_ID	UPK, FK	R	Text	25		L_RA_UDF_Refined
CEN_BLK_ID	FK	R	Text	17		S_CenBlk_Ar
OCCUP_TYP		R	Text	5		D_Occupancy_Typ
FACLTYP_TYP		R	Text	4		D_Facility_Typ
ARV_BLDG		R	Long Integer	Default		N/A
ARV_CNTNT		R	Long Integer	Default		N/A
ARV_INVENT		R	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A
SOURCE_CIT	FK	R	Text	25		L_Source_Cit

*Relationship Classes – S\_UDF\_Pt*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
UDF_RA_UDF	S_UDF_Pt	UDF_ID	L_RA_UDF_Refined	UDF_ID	1:M
UDF_SourceCit	S_UDF_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

*Table: FRD\_Model\_Info*

**This table describes the models that were used in the most recent update completed for a flood risk project and the prior analyses.** This table identifies the previous (pre\_) and new (new\_) hydrologic, hydraulic, and coastal models used in the studies. By identifying the models used during the floodplain delineation processes, insight may be gained as to what contributing factors may have resulted in SFHA changes since the last FIRM update. **This table will have one record for each unique combination of models used to create the SFHAs that were used to develop the S\_CSLF\_Ar feature class.** Each record in the table could apply to many polygons in the S\_CSLF\_Ar feature class. Many of the fields in this table can be extracted from the S\_Submittal\_Info table for the FIRM projects.

Generally, each polygon in the S\_CSLF\_Ar feature class will refer to two records in the FRD\_Model\_Info table, one for the previous models used to delineate the prior floodplains and one for the new models used to generate the current floodplains. **If a CSLF polygon has multiple models of the same type (e.g., two hydrologic models), then the CSLF polygons should be subdivided accordingly. If the CSLF polygon spans FIRM panels that have different effective dates, then those polygons should be divided at the panel boundaries.**

This table is the intermediary between the S\_CSLF\_Ar feature class and the FRD\_Study\_Info table. This allows the user to examine a polygon in the CSLF, find out what models were used in the previous and new analyses, and which FIRM project they are associated with.

This table is linked to the S\_CSLF\_Ar table to provide an easy way to determine which model(s) are associated with each CSLF polygon.

*Attribute Definitions – FRD\_Model\_Info*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
MDL_NFO_ID	Model Info Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
STD_NFO_ID	Study Info Identifier. Foreign Key to FRD_Study_Info table to uniquely identify which study the model came from.
EFF_DATE	Effective Date for FIRM created with this model combination.
ANLYS_DATE	Analysis date when models were run. If the varying models are executed on different dates (e.g., the hydrologic model was executed a month before the hydraulic model), then the ANLYS_DATE field is populated with the latter of all the model execution dates.
STUDY_TYP	Study Type. Describes the type of study for which modeling was performed. See D_Study_Typ for possible values.

Attribute	Definition
HYDRO_MDL	Hydrologic Model used for the Analysis; null if not applicable. See D_Hydro_Mdl for possible values.
HYDRA_MDL	Hydraulic Model used for the Analysis; null if not applicable. See D_Hydra_Mdl for possible values.
SURGE_MDL	Surge Model used for the Analysis; null if not applicable. See D_Surge_Mdl for possible values.
WAVEHT_MDL	Wave Height Model used for the Analysis, null if not applicable. See D_Wave_Mdl for possible values.
RUNUP_MDL	Run-up Model used for the Analysis, null if not applicable. See D_Runup_Mdl for possible values.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin that the modeling represents. If the model affects multiple sub-basins, then populate this field with 'MULTI'.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### Field Properties – FRD\_Model\_Info

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
MDL_NFO_ID	UPK	R	Text	25		S_CSLF_Ar
STD_NFO_ID	FK	R	Text	25		FRD_Study_Info
EFF_DATE		R	Date	Default		N/A
ANLYS_DATE		R	Date	Default		N/A
STUDY_TYP		R	Text	4		D_Study_Typ
HYDRO_MDL		A	Text	4		D_Hydro_Mdl
HYDRA_MDL		A	Text	4		D_Hydra_Mdl
SURGE_MDL		A	Text	4		D_Surge_Mdl
WAVEHT_MDL		A	Text	4		D_Wave_Mdl
RUNUP_MDL		A	Text	4		D_Runup_Mdl
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

## *Relationship Classes – FRD\_Model\_Info*

<b>Relationship Class Name</b>	<b>Origin Table</b>	<b>Origin Field</b>	<b>Destination Table</b>	<b>Destination Field</b>	<b>Cardinality</b>
CSLF_New_Model	S_CSLF_Ar	NEW_MODEL	FRD_Model_Info	MDL_NFO_ID	1:1
CSLF_Pre_Model	S_CSLF_Ar	PRE_MODEL	FRD_Model_Info	MDL_NFO_ID	1:1
Model_Study	FRD_Model_Info	STD_NFO_ID	FRD_Study_Info	STD_NFO_ID	1:1

*Table: FRD\_Study\_Info*

The **FRD\_Study\_Info** table contains details about the **FIRM** projects in the flood risk project. The table is created by aggregating the Study\_Info tables from all current and past FIRM projects in the project area. **There should be one record for each FIRM within the project extents whose data has been incorporated into the FRD.**

This table is used as a lookup table from the FRD\_Model\_Info table to provide additional information about the projects and where the modeling was performed.

*Attribute Definitions – FRD\_Study\_Info*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
STD_NFO_ID	Study Info Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail. After aggregating the Study_Info tables from multiple FIRM databases, this field will likely need to be renumbered to provide unique values for all records in the table.
DFIRM_ID	Flood Risk Project Identifier. For a single-jurisdiction flood risk project, the value is composed of the 2-digit state FIPS code and the 4-digit FEMA CID code (e.g., 480001). For a countywide flood risk project, the value is composed of the 2-digit state FIPS code, the 3-digit county FIPS code, and the letter “C” (e.g., 48107C). Within each FIRM database, the DFIRM_ID value is identical.
STUDY_PRE	Study Prefix. This is the prefix of the flood risk project name such as ‘City of’ or ‘Town of’. This field is applicable for single-jurisdiction maps where the type of jurisdiction precedes the name of the jurisdiction in the map title. For county-wide maps or maps of the unincorporated portions of a county, this field is null. Acceptable values for this field are listed in the D_Study_Prefix domain.
STUDY_NM	Study Name. This attribute contains the main portion of the flood risk project name, which is shown in the title block of the hardcopy FIRM. For county-wide FIRMs, or FIRMs for the unincorporated portions of counties, the name should include the county or county equivalent descriptor (e.g., Washington County or Iberia Parish).
STATE_NM	State Name. This attribute contains the state name for the flood risk project and is shown in the title block of the hardcopy FIRM. Acceptable values are listed in the D_State_Name domain.

Attribute	Definition
CNTY_NM	County Name. This is the county (or county equivalent) name that the flood risk project falls within. The name should include the county or county equivalent descriptor (e.g., Washington County or Iberia Parish). The county name is also shown in the title block section of the hardcopy FIRM. If the study affects multiple counties, then populate this field with 'MULTI'.
JURIS_TYP	Political Jurisdiction Type. This attribute contains the type of jurisdiction for the political entity. This field is populated when the political entity has an associated jurisdiction type. If there is data in this attribute, it is also shown in the title block section of the hardcopy FIRM. Acceptable values for this field are listed in the D_Jurisdiction_Typ domain. If the study affects multiple jurisdictions, then populate this field with '9999 – Other'.
H_DATUM	Horizontal Datum. Valid entries for this attribute include NAD27 or NAD83. This is the horizontal datum used for the printed FIRM. The horizontal datum describes the reference system on which the horizontal coordinate information shown on the FIRM is based. NAD83 is the preferred horizontal datum. Acceptable values for this field are listed in the D_Horiz_Datum domain.
V_DATUM	Vertical Datum. This is the vertical datum of the printed FIRM. The vertical datum describes the reference surface from which elevation on the map is measured. Normally this would be NAVD88 for new studies. Acceptable values for this field are listed in the D_V_Datum table.
PROJECTION	Map Projection used for hardcopy FIRM publication. Acceptable values for this field are listed in the D_Projection domain.
PROJ_ZONE	Projection Zone. Many map projections and coordinate systems are divided into zones. This field is populated based on the projection selected for the final hardcopy map production. Applies if the projection used has a zone parameter such as UTM or state plane. The zone should be stated as the appropriate UTM or FIPS zone.
PROJ_UNIT	Projection Unit. When using map projections and coordinate systems, there is a unit associated with the projection defined in the PROJECTION field. This field is populated based on the projection selected for the final hardcopy map production. Acceptable values for this field are listed in the D_Proj_Unit table.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

*Field Properties – FRD\_Study\_Info*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
STD_NFO_ID	UPK	R	Text	25		N/A
DFIRM_ID	FK	R	Text	6		N/A
STUDY_PRE		A	Text	4		D_Study_Prefix
STUDY_NM		R	Text	128		N/A
STATE_NM		R	Text	4		D_State_Name
CNTY_NM		R	Text	128		N/A
JURIS_TYP		A	Text	4		D_Jurisdiction_Typ
H_DATUM		R	Text	6		D_Horiz_Datum
V_DATUM		R	Text	6		D_Vert_Datum
PROJECTION		R	Text	6		D_Projection
PROJ_ZONE		A	Text	4		N/A
PROJ_UNIT		R	Text	6		D_Proj_Unit
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

*Relationship Classes – FRD\_Study\_Info*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
Model_Study	FRD_Model_Info	STD_NFO_ID	FRD_Study_Info	STD_NFO_ID	1:1

*Table: FRR\_Custom*

**This table stores custom text written for the project and communities in Section 3 of the FRR, Flood Risk Analysis Results.** The actual text is to be stored as an Office Open XML 2.0 compliant markup fragment containing only text and styles. Styles should match those listed in the master FRR template document.

**There is one record for each community and one record for the project level summary for Section 3 of the FRR.**

*Attribute Definitions – FRR\_Custom*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
FRR_CUSTID	FRR Custom ID. For the case of the community records in this table, this is the six-digit CID assigned by FEMA. See the CID field in FRD_Pol_Ar for a more detailed explanation. For the case of the project summary record, the FRR_CUSTID field should be populated with the FEMA Case Number in the same format as the CASE_NO field below.
OVERVIEW_1	Custom text for overview paragraphs <u>before</u> the table in the Overview section of each community. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
OVERVIEW_2	Custom text for overview paragraphs <u>after</u> the table in the Overview section of each community. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
CSLF_1	Custom report text for changes since last FIRM paragraphs <u>before</u> the table in the CSLF section of each community. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
CSLF_2	Custom report text for changes since last FIRM paragraphs <u>after</u> the table in the CSLF section of each community. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
PRV_EFFDAT	Previous Effective Date. Custom text for previous FIRM effective date in plain text (e.g., “September 10, 2004”). Appears below the CSLF table in Section 3 of the FRR.
CUR_EFFDAT	Current Effective Date. Custom text for current FIRM effective date in plain text (e.g., “September 30, 2008”). Appears below the CSLF table in Section 3 of the FRR.
FDAG	Flood Depth and Analysis Grids text. Custom text for flood depth and analysis grids paragraphs. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.

Attribute	Definition
ELI_1	Custom text for estimated loss information (ELI) paragraphs <u>before</u> the table in the estimated loss information section of each community. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
ELI_2	Custom text for ELI paragraphs <u>after</u> the table in the estimated loss information section of each community. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
AOMI_1	Custom text for areas of mitigation interest paragraphs <u>before</u> the table in the AoMIs section for each community in Section 3 of the FRR. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
AOMI_2	Custom text for areas of mitigation interest paragraphs <u>after</u> the table in the AoMIs section for each community in Section 3 of the FRR. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties - FRR\_Custom*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
FRR_CUSTID	UPK, FK	R	Text	12		S_FRD_Pol_Ar
OVERVIEW_1		R	Blob	Default		N/A
OVERVIEW_2		A	Blob	Default		N/A
CSLF_1		R	Blob	Default		N/A
CSLF_2		A	Blob	Default		N/A
PRV_EFFDAT		R	Text	18		N/A
CUR_EFFDAT		R	Text	18		N/A
FDAG		R	Blob	Default		N/A
ELI_1		R	Blob	Default		N/A
ELI_2		A	Blob	Default		N/A
AOMI_1		R	Blob	Default		N/A
AOMI_2		A	Blob	Default		N/A
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

*Table: FRR\_Images*

This table stores custom images in the FRR. This includes the FRM image at the beginning of Section 3 that is displayed once, as well as custom sidebar images in each of the community results. If an image is for a community within Section 3, the CID field is populated. If it is not, it is assumed to be the FRM image.

*Attribute Definitions – FRR\_Images*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
FRR_IMG_ID	FRR Image Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
CID	Community Identification Number. This is the six-digit CID assigned by FEMA that this image pertains to and appears in that communities' section of the FRR. See S_FRD_Pol_Ar for more detail. For images in the project level custom text, use the FEMA Case Number to populate this field.
IMG_BINARY	Binary field containing the image. The image is stored in the fGDB as a managed raster, not a link to a location in the folder structure for the project.
IMG_HEIGHT	Height of the image in the document in inches.
IMG_WIDTH	Width of the image in the document in inches.
IMG_CPTION	Caption placed on the image.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

*Field Properties - FRR\_Images*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
FRR_IMG_ID	UPK	R	Text	25		N/A
CID	FK	R	Text	12		S_FRD_Pol_Ar
IMG_BINARY		R	Raster	N/A		N/A
IMG_HEIGHT		R	Float	Default	Default	N/A
IMG_WIDTH		R	Float	Default	Default	N/A
IMG_CPTION		R	Text	50		N/A

## Appendix O

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

*Table: FRR\_Project*

This table stores report material specific to the entire project (i.e., project-level, custom text for Section 7 of the FRR). Any text is to be stored as an Office Open XML 2.0 compliant markup fragment containing only text and styles. Styles should match those listed in the master FRR template document. **There should be one record in this table.**

*Attribute Definitions - FRR\_Project*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
FRR_PRJ_ID	FRR Project Identifier. User-defined Primary Key / Unique Identifier. This field should be sequentially numbered for all records in the table. See Section O.3.4.8 for more detail.
DATA_USED	Custom text for Section 7, <i>Data Used to Develop Flood Risk Products</i> in the FRR. This is an Office Open XML 2.0 compliant markup fragment containing only text and styles.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

*Field Properties - FRR\_Project*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
FRR_PRJ_ID	UPK	R	Text	25		N/A
DATA_USED		R	Blob	Default		N/A
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

*Table: L\_AOMI\_Summary*

This enhanced table stores summary counts by various classifications of AoMI points by community or partial community within the project area.

There is one record for each unique combination of community, mitigation interest type, and data source. There is also a set of summary records for the project area.

This table can be used by stakeholders to understand the types of mitigation opportunities and past successes within a community or sub-basin. This table is used to present a summary of the AoMI statistics for each community and the project area summary in Section 3 of the FRR similar to the following:

Table 3-6 L\_AOMI\_Summary

Type of Mitigation Interest	Number of Areas	Data Source
Dam	1	State CTP
Levee	2	State CTP
Stream Flow Constrictions	2	Local Public Works engineering models
Stream Flow Constrictions	3	FIRM
Significant Land Use Changes	1	Local Planning Division
Past Claims Hot Spot	1	State NFIP
Area of Mitigation Success	2	State Hazard Mitigation Officer (SHMO)

This table is linked with the S\_FRD\_Pol\_Ar to allow visualization of this summary on a thematic map.

#### *Attribute Definitions – L\_AOMI\_Summary*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
AOMISUMMID	AoMI Summary Identification Number. For the case of the community records in this table, this is the six-digit CID assigned by FEMA. See the CID field in FRD_Pol_Ar for a more detail explanation. For the case of the project summary record, the AOMISUMMID should be populated with the FEMA Case Number in the same format as the CASE_NO field below.
POL_NAME1	Political Area Name 1 - This is the primary name of the community. This field is included in this table instead of retrieval by joining to S_FRD_Pol_Ar table to make querying for the FRR easier. See the definition in S_FRD_Pol_Ar for more detail.
AOMI_CLASS	AOMI Classification. Describes the class of the AOMI (e.g., Riverine, Coastal, Past Claims, and Mitigation). Refer to the D_AOMI_Class domain for possible values.

Attribute	Definition
AOMI_TYP	AOMI Type. Identifies the type of the AOMI (e.g., Dams, Levee Status, etc). This field is used as the first column in the sample FRR table above. There should be one row in the above table for each different AOMI_TYP. Refer to the D_AOMI_Typ domain for possible values.
AOMI_CAT	AOMI Category. Categorizes the various information sources for standardization of names. Refer to D_AOMI_SourceCat for possible values.
AOMI_SRCE	AOMI Source. Describes the information source of the AoMIs data (e.g., State CTP, local public works, etc.). The Mapping Partner should exercise care in standardizing the spelling of data sources within a flood risk project (i.e., the AOMI_SRCE field in S_AOMI_Pt feature class, so that this summary table can be generated semi-automatically based on unique AOMI_SRCE in that feature class.
TOTAL	This is the total count of the number of AoMIs for each AoMI Type by AoMI Source in the S_AOMI_Pt feature class.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the community lies. If a community is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the community being studied lies shall be used. If the portion of the community being studied is in multiple sub-basins, the sub-basin in which the greatest portion of the community lies shall be used. For the project-level record (i.e., AOMISUMMID = CASE_NO), this field should be populated with “NP”.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_AOMI\_Summary*

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
AOMISUMMID	UPK, FK	R	Text	12		S_FRD_Pol_Ar
POL_NAME1		R	Text	50		N/A
AOMI_CLASS		R	Text	4		D_AOMI_Class
AOMI_TYP	UPK	R	Text	4		D_AOMI_Typ
AOMI_CAT		R	Text	4		D_AOMI_SourceCat
AOMI_SRCE	UPK	R	Text	50		N/A

## Appendix O

Field	Key Type	R/A/E/O	Type	Length/ Precision	Scale (SHP Only)	Domain or Related Table
TOTAL		R	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_AOMI\_Summary*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
PolAr_AOMI_Sum	S_FRD_Pol_Ar	CID	L_AOMI_Summary	AOMISUMMID	1:M

*Table: L\_Claims*

This table stores historic claims and repetitive loss information for each community or partial community within the project area. If there are less than five (5) claims, five (5) repetitive loss claims, or five (5) severe repetitive loss claims in a community, then those fields shall be null (see discussion in Section O.3.4.9) in this table.

There should be one record in the table for each community or partial community in the project area. There should also be an additional record for the totals for the entire project area. For this totals record, the CLAIMS\_ID field should be populated with the FEMA Case Number in the same format as the CASE\_NO field.

This table is used to provide the claims and repetitive loss data listed for each community in Section 3 of the FRR. For example,

- NFIP-recognized repetitive loss properties = 17 (11 residential and 6 commercial)
- NFIP-recognized severe repetitive loss properties = 4 (residential)

This table is linked with the S\_FRD\_Pol\_Ar to allow visualization of this summary for ad-hoc thematic mapping.

*Attribute Definitions – L\_Claims*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
CLAIMS_ID	Claims Identification Number. For the case of the community records in this table, this is the six-digit CID assigned by FEMA. See the FRD_Pol_Ar CID field for a more detailed explanation. For the case of the project summary record, the CLAIMS_ID should be populated with the FEMA Case Number in the same format as the CASE_NO field below.
POL_NAME1	Political Area Name 1 - This is the primary name of the community. This field is included in this table instead of retrieval by joining to S_FRD_Pol_Ar table to make querying for the FRR easier. See the definition in S_FRD_Pol_Ar for more detail. For the Project summary record (i.e., CLAIMS_ID = CASE_NO), the POL_NAME1 field should be populated with the project / sub-basin name (e.g., Watershed USA).
CLAIMS	Number of claims for the community or project area
CLAIMS_VAL	Total value of all claims for the community or project area. The value shall be stored in whole dollars, not thousands (e.g., \$1,000,000, not \$1,000 representing \$1 million).

Attribute	Definition
RLP_RES	Residential Repetitive Loss Properties. Count of Residential NFIP-recognized Repetitive Loss Properties.
RLP_COM	Commercial Repetitive Loss Properties. Count of Commercial NFIP-recognized Repetitive Loss Properties.
RLV_RES	Value of Residential NFIP-recognized Repetitive Loss Properties. The value shall be stored in whole dollars, not thousands (e.g., \$1,000,000, not \$1,000 representing \$1 million).
RLV_COM	Value of Commercial NFIP-recognized Repetitive Loss Properties. The value shall be stored in whole dollars, not thousands (e.g., \$1,000,000, not \$1,000 representing \$1 million).
SRL_RES	Severe Repetitive Loss Properties. Count of Residential NFIP-recognized Severe Repetitive Loss Properties.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the community lies. If a community is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the community being studied lies shall be used. If the portion of the community being studied is in multiple sub-basins, the sub-basin in which the greatest portion of the project area lies shall be used. For the project-level record (i.e., CLAIMS_ID = CASE_NO), this field should be populated with “NP.”
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_Claims*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
CLAIMS_ID	UPK, FK	R	Text	12		S_FRD_Pol_Ar
POL_NAME1		R	Text	50		N/A
CLAIMS		R	Long Integer	Default		N/A
CLAIMS_VAL		R	Double	Default	Default	N/A
RLP_RES		R	Long Integer	Default		N/A
RLP_COM		R	Long Integer	Default		N/A
RLV_RES		R	Double	Default	Default	N/A
RLV_COM		R	Double	Default	Default	N/A
SRL_RES		R	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar

## Appendix O

CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_Claims*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
PolAr_Claims	S_FRD_Pol_Ar	CID	L_Claims	CLAIMS_ID	1:1

*Table: L\_CSLF\_Summary*

**This table stores summary statistics of the CSLF analysis by Community, including the changes in area, population, and number of buildings in the SFHA, non-SFHA, and Floodway.** This table is used to present a summary of the CSLF statistics for each community and the total project in Section 3 of the FRR similar to the following table. These data may also be used by mitigation and local planners to understand the changes to the floodplains and floodways between successive iterations of FIRMs.

Table 3-7 L\_CSLF\_Summary

Areas of Change	Total Area (mi <sup>2</sup> )	Area Incr (mi <sup>2</sup> )	Area Decr (mi <sup>2</sup> )	Net Change (mi <sup>2</sup> )	Incr Population	Decr Population	Net Population	Incr Bldgs	Decr Bldgs	Net Bldgs
Area within SFHA	2.5	0.1	-0.3	-0.2	215	-230	-15	72	-78	-6
Area within Floodway	0.3	0.1	-0.0	0.1	12	-2	10	5	-2	3

The table contains up to three records for each community with a unique CID in the project area. The three records are for the SFHA, non-SFHA, and floodway areas for each community. The table also contains up to three records (SFHA, non-SFHA, and FLDWY) for the project total summaries. For those project total summary records, the CSLFSUMMID field should be populated with the FEMA Case Number. The combination of the CSLFSUMMID and LOCATION fields provide access to a unique record in this table.

In creating the L\_CSLF\_Summary table, the Mapping Partner will aggregate the polygon attribute values (i.e., area, population, and building counts) in the S\_CSLF\_Ar feature class by community (e.g., city, town, village, or unincorporated portion of a county). If individual CSLF polygons extend outside the project boundary in S\_FRD\_Proj\_Ar, only the portion within the project boundary should be aggregated. The aggregated values should represent the totals for that portion of the community in the project area.

This table is linked with the S\_FRD\_Pol\_Ar to allow visualization of this summary on a thematic map.

#### *Attribute Definitions – L\_CSLF\_Summary*

Attribute	Definition
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Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
CSLFSUMMID	CSLF Summary Identification Number. For the case of the community records in this table, this is the six-digit CID assigned by FEMA. See the CID field in S_FRD_Pol_Ar for more detail explanation. For the case of the project summary record, the CSLFSUMMID should be populated with the FEMA Case Number in the same format as the CASE_NO field below.
POL_NAME1	Political Area Name 1. This is the primary name of the community. This field is included in this table instead of retrieval by joining to S_FRD_Pol_Ar table to make querying for the FRR easier. See the definition in S_FRD_Pol_Ar for more detail. For the Project summary record (i.e., CSLFSUMMID = CASE_NO), the POL_NAME1 field should be populated with the project / watershed name (e.g., Watershed USA).
LOCATION	This field is the location for which the summary statistic is being totaled. Available coded values include SFHA, non-SFHA, and FLDWY, which are controlled by the D_SFHA_FLDWY domain.
AREA_SM	Area in square miles. This field is populated with the area in square miles for the respective location (SFHA, non-SFHA, or FLDWAY) for that community. The area shall be measured based on the local coordinate system used during data compilation. The result shall be expressed to the nearest 0.1 square mile.
AREA_INCR	Area Increase. This field is populated with the increase in area in square miles for the respective location (SFHA, non-SFHA, or FLDWAY) since the last FIRM for that community. The area shall be measured based on the local coordinate system used during data compilation. The result shall be expressed to the nearest 0.1 square mile.
AREA_DECR	Area Decrease. This field is populated with the decrease in area in square miles for the respective location (SFHA, non-SFHA, or FLDWAY) since the last FIRM for that community. The area shall be measured based on the local coordinate system used during data compilation. The result shall be expressed to the nearest 0.1 square mile. The value should include the negative sign indicating a decrease in area.
AREA_NET	Net Area. This field is populated with the net change in area in square miles for the respective location (SFHA, non-SFHA, or FLDWAY) since the last FIRM for that community. The area shall be measured based on the local coordinate system used during data compilation. The result shall be expressed to the nearest 0.1 square mile. If applicable, the value should include the negative sign indicating a decrease in area.

Attribute	Definition
POP_INCR	Population Increase. This field is populated with the increase in population for the respective location (SFHA, non-SFHA, or FLDWY) since the last FIRM for that community. This is an Enhanced field and shall be required if the enhanced option is designated in the MAS. This field is null for the project-level record.
POP_DECR	Population Decrease. This field is populated with the decrease in population for the respective location (SFHA, non-SFHA, or FLDWY) since the last FIRM for that community. This is an Enhanced field. The value should include the negative sign indicating a decrease in population. This field is null for the project-level record.
POP_NET	Population Net Change. This field is populated with the net change in population for the respective location (SFHA, non-SFHA, or FLDWY) since the last FIRM for that community. This is an Enhanced field. If applicable, the value should include the negative sign indicating a decrease in population. This field is null for the project-level record.
BLDG_INCR	Building Increase. This field is populated with the increase in the number of buildings for the respective location (SFHA, non-SFHA, or FLDWY) since the last FIRM for that community. This is an Enhanced field. This field is null for the project-level record.
BLDG_DECR	Building Decrease. This field is populated with the decrease in the number of buildings for the respective location (SFHA, non-SFHA, or FLDWY) since the last FIRM for that community. This is an Enhanced field. The value should include the negative sign indicating a decrease in affected buildings. This field is null for the project-level record.
BLDG_NET	Building Net Change. This field is populated with the net change in the number of buildings for the respective location (SFHA, non-SFHA, or FLDWY) since the last FIRM for that community. This is an Enhanced field. If applicable, the value should include the negative sign indicating a decrease in affected buildings. This field is null for the project-level record.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the community lies. If a community is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the community being studied lies shall be used. If the portion of the community being studied is in multiple sub-basins, the sub-basin in which the greatest portion of the project area lies shall be used. For the project-level record (i.e., CSLFSUMMID = CASE_NO), this field should be populated with “NP”.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.

## Appendix O

Attribute	Definition
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created.

### Field Properties – L\_CSLF\_Summary

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain / Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
CSLFSUMMID	UPK, FK	R	Text	12		S_FRD_Pol_Ar
POL_NAME1		R	Text	50		N/A
LOCATION	UPK	R	Text	7		D_SFHA_FLDWY
AREA_SM		R	Double	Default	Default	N/A
AREA_INCR		R	Double	Default	Default	N/A
AREA_DECR		R	Double	Default	Default	N/A
AREA_NET		R	Double	Default	Default	N/A
POP_INCR		E	Long Integer	Default		N/A
POP_DECR		E	Long Integer	Default		N/A
POP_NET		E	Long Integer	Default		N/A
BLDG_INCR		E	Long Integer	Default		N/A
BLDG_DECR		E	Long Integer	Default		N/A
BLDG_NET		E	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### Relationship Classes – L\_CSLF\_Summary

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
PolAr_CSLF_Sum	S_FRD_Pol_Ar	CID	L_CSLF_Summary	CSLFSUMMID	1:M

**Table: L\_Exposure**

**This table stores data regarding flood risk exposure for each community or partial community within the project area.** The information can be obtained by using the export functions from the Hazus Inventory menu. **The Mapping Partner shall use appropriate techniques (e.g., area-weighted summations) to aggregate the Census Block based risk assessment results by community, or partial community, and totaled for the project area.** If the Asset Replacement Values in S\_CenBlk\_Ar feature class represent values outside the project area, area-weighting should be used to determine the values for the portion(s) of the community within the project area. Note that the data stored in the L\_Exposure table are in whole dollars, but the data exported from Hazus are in \$1,000s. See Appendix N of the FEMA G&S for more information on aggregating the risk assessment exposure data.

**There should be one record in the table for each community or partial community in the project area. If a community extends beyond the project footprint, the summary results in this table should represent only the portion within the project area. There should also be an additional record for the totals for the entire project area.** For this totals record, the EXPOS\_ID field should be populated with the FEMA Case Number in the same format as the CASE\_NO field.

This FRD table is used to populate the Total Inventory columns of the Estimated Loss Information table for each community in the FRR. The same rounding rules for L\_RA\_Summary apply for the ARV fields in L\_Exposure. Following is a sample of the table:

**Table 3-8 Estimated Potential Losses for Flood Event Scenarios**

		Estimated Potential Losses for Flood Event Scenarios											
		Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized (\$/yr)	
		Estimated Value	Percent of Total	Dollar Losses	Loss Ratio	Dollar Losses	Loss Ratio	Dollar Losses	Loss Ratio	Dollar Losses	Loss Ratio	Dollar Losses	Loss Ratio
Residential Building/ Contents	\$17,200,000	78%	\$1,300,000	7%	\$1,600,000	10%	\$2,300,000	14%	\$4,000,000	23%	\$30,000	0%	
Commercial Building/ Contents	\$1,100,000	5%	\$40,000	3%	\$60,000	5%	\$100,000	11%	\$300,000	22%	\$20,000	1%	
Other Building/ Contents	\$3,700,000	17%	\$20,000	1%	\$70,000	2%	\$100,000	3%	\$200,000	6%	\$0	0%	
<b>Total Building/ Contents</b>	<b>#####</b>	<b>100%</b>	<b>\$1,360,000</b>	<b>6%</b>	<b>\$1,730,000</b>	<b>8%</b>	<b>\$2,500,000</b>	<b>12%</b>	<b>\$4,500,000</b>	<b>20%</b>	<b>\$50,000</b>	<b>0%</b>	
Business Disruption	N/A	N/A	\$90,000	N/A	\$200,000	N/A	\$200,000	N/A	\$500,000	N/A	\$0	N/A	
<b>TOTAL</b>	<b>#####</b>	<b>N/A</b>	<b>\$1,450,000</b>	<b>N/A</b>	<b>\$1,930,000</b>	<b>N/A</b>	<b>\$2,700,000</b>	<b>N/A</b>	<b>\$5,000,000</b>	<b>N/A</b>	<b>\$50,000</b>	<b>N/A</b>	

This table is linked with the S\_FRD\_Pol\_Ar to allow visualization of this exposure data on a thematic map.

### *Attribute Definitions – L\_Exposure*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
EXPOS_ID	Exposure Identification Number. For the case of the community records in this table, this is the six-digit CID assigned by FEMA. See the CID field in S_FRD_Pol_Ar for more detail. For the case of the project summary record, the EXPOS_ID should be populated with the FEMA Case Number in the same format as the CASE_NO field below.
POL_NAME1	Political Area Name 1. This is the primary name of the community. This field is included in this table instead of retrieval by joining to S_FRD_Pol_Ar table to make querying for the FRR easier. See the definition in S_FRD_Pol_Ar for more detail. For the Project summary record (i.e., CLAIMS_ID = CASE_NO), the POL_NAME1 field should be populated with the project / watershed name (e.g., Watershed USA).
TOT_BLDG	Total Buildings. Total building count for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data.
ARV_TOT	Asset Replacement Value of all Buildings. Total building and contents asset replacement value of all buildings for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data. The value is expressed in whole dollars.
RES_BLDG	Residential Buildings. Residential buildings count for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data.
ARV_RES	Asset Replacement Value of Residential Buildings. Total residential building and contents replacement value of all buildings for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data. The value is expressed in whole dollars.
COM_BLDG	Commercial Buildings. Commercial buildings count for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data.

Attribute	Definition
ARV_COM	Asset Replacement Value of Commercial Buildings. Total commercial building and contents replacement value of all buildings for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data. The value is expressed in whole dollars.
OTH_BLDG	Other Buildings. Count of other building types for the community within the project area. Other building types include industrial, agricultural, education, religious, and government structures; obtained from the Hazus inventory data and/or supplemented with local general building stock data.
ARV_OTH	Asset Replacement Value of Buildings of Other Types. Total building and contents replacement value of all other building types for the community within the project area; obtained from the Hazus inventory data and/or supplemented with local general building stock data. The value is expressed in whole dollars.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the community lies. If a community is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the community being studied lies shall be used. If the portion of the community being studied is in multiple sub-basins, the sub-basin in which the greatest portion of the project area lies shall be used. For the project-level record (i.e., EXPOS_ID = CASE_NO), this field should be populated with “NP”.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_Exposure*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
EXPOS_ID	UPK, FK	R	Text	12		S_FRD_Pol_Ar
POL_NAME1		R	Text	50		N/A
TOT_BLDG		R	Long Integer	Default		N/A
ARV_TOT		R	Double	Default	Default	N/A
RES_BLDG		R	Long Integer	Default		N/A
ARV_RES		R	Double	Default	Default	N/A
COM_BLDG		R	Long Integer	Default		N/A
ARV_COM		R	Double	Default	Default	N/A

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OTH_BLDG		R	Long Integer	Default		N/A
ARV_OTH		R	Double	Default	Default	N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_Exposure*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
PolAr_Exposure	S_FRD_Pol_Ar	CID	L_Exposure	EXPOS_ID	1:1

*Table: L\_Local\_GBS*

**This enhanced table stores data collected from local sources to replace the General Building Stock data from Hazus used in the AAL analysis.** These inventory data are then used to update the values by community in the L\_Exposure table using the local data.

**This table has one record for each Census Block with updated General Building Stock data. This data should be compiled for the entire Census Block, not restricted to the area inside the project boundary, nor just inside the floodplain.**

This table is linked to the S\_CenBlk\_Ar table. This allows the user to manipulate and display the local GBS data in lieu of the default GBS data from Hazus.

The Asset Replacement Value fields in this table are in whole dollars (i.e., \$1,000,000 to represent \$1 million as opposed to \$1,000 representing \$1 million in thousands of dollars).

*Attribute Definitions – L\_Local\_GBS*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
CEN_BLK_ID	Census Block Identifier. See the CEN_BLK_ID field in the S_CenBlk_Ar feature class for more detail.
POPULATION	Population for the Census Block.
ARV_BG_TOT	Asset Replacement Value of all building types.
ARV_CN_TOT	Asset Replacement Value of the contents for all building types.
ARV_BG_RES	Asset Replacement Value of residential buildings.
ARV_CN_RES	Asset Replacement Value of the contents for residential buildings.
ARV_BG_COM	Asset Replacement Value of commercial buildings.
ARV_CN_COM	Asset Replacement Value of the contents for commercial buildings.
ARV_BG_OTH	Asset Replacement Value of buildings of other types.
ARV_CN_OTH	Asset Replacement Value of the contents for buildings of other types.
TOT_BLDG	Number of buildings of all types for the Census Block.
RES_BLDG	The number of residential buildings for the Census Block.
COM_BLDG	The number of commercial buildings for the Census Block.
OTH_BLDG	The number of buildings of other types for the Census Block. Other building types include industrial, agricultural, education, religious, and government structures; obtained from local general building stock data.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the Census Block lies. If a Census Block is in multiple HUC-8 sub-basins, the sub-basin in which the largest portion of the Census Block lies shall be used.

Attribute	Definition
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_Local\_GBS*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
CEN_BLK_ID	UPK, FK	R	Text	17		S_CenBlk_Ar
POPULATION		R	Long Integer	Default		N/A
ARV_BG_TOT		R	Long Integer	Default		N/A
ARV_CN_TOT		R	Long Integer	Default		N/A
ARV_BG_RES		R	Long Integer	Default		N/A
ARV_CN_RES		R	Long Integer	Default		N/A
ARV_BG_COM		R	Long Integer	Default		N/A
ARV_CN_COM		R	Long Integer	Default		N/A
ARV_BG_OTH		R	Long Integer	Default		N/A
ARV_CN_OTH		R	Long Integer	Default		N/A
TOT_BLDG		R	Long Integer	Default		N/A
RES_BLDG		R	Long Integer	Default		N/A
COM_BLDG		R	Long Integer	Default		N/A
OTH_BLDG		R	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_Local\_GBS*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CenBlk_LocalGBS	S_CenBlk_Ar	CEN_BLK_ID	L_Local_GBS	CEN_BLK_ID	1:1

*Table: L\_RA\_AAL*

**This table stores the Hazus output data from the Level 1 AAL analysis conducted nationally for each county.** This is the baseline level of analysis for determining flood risk. **There is one record in the table for each combination of Census Block, hazard type, and return period for the assessment performed.** In the absence of further refined analysis, these risk assessment data are used to illustrate the flood risk for a community on the FRM. The return periods used in the AAL Study are: 10%, 2%, 1%, 0.5%, 0.2%. Note that the AAL study has a 0.5% annual chance event, whereas the five standard frequencies used for regulatory analysis use a 4% annual chance event. **In addition to the records for each return period, the table contains one record for the average annual loss per hazard type for each Census Block.**

The calculated risks are then spatially intersected with the community extents to estimate the level of risk for each community.

This table is linked with the S\_CenBlk\_Ar to allow visualization of this data by Census Block on a thematic map.

#### *Attribute Definitions – L\_RA\_AAL*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
CEN_BLK_ID	Census Block Identifier. See the CEN_BLK_ID field in the S_CenBlk_Ar feature class for more detail.
HAZARD_TYP	Hazard Type. Indicates the Hazard Type for which the remaining fields apply. The valid values for this field are in the domain D_Hazard_Typ and include Riverine, Coastal, Levee and Total. In addition to a set of records for each of the individual hazard types for which analysis was performed, a set of records should be included for the sum of the constituent hazard types.
RETURN_PER	Return Period. Indicates the return period for which the remaining fields apply. The valid values for this field are in the domain D_Event. In addition to one record for each percent chance event (10%, 2%, 1%, 0.5%, 0.2%) used in the assessment, a record should be included for the average annualized event.
TOT_LOSSES	Total Losses. For each Census Block, the estimate of the total value of all losses for the combination of hazard type and return period.
BL_TOT	Total Building Losses. For each Census Block, the estimate of total value of building for the combination of hazard type and return period.
CL_TOT	Total Content Losses. For each Census Block, the estimate of total value of content loss for the combination of hazard type and return period.

Attribute	Definition
BL_RES	Residential Building Loss. For each Census Block, the estimate of total value of residential building for the combination of hazard type and return period.
CL_RES	Residential Content Loss. For each Census Block, the estimate of total value of content loss for residential buildings for the combination of hazard type and return period.
BL_COM	Commercial Building Loss. For each Census Block, the estimate of total value of commercial building for the combination of hazard type and return period.
CL_COM	Commercial Content Loss. For each Census Block, the estimate of total value of content loss for commercial buildings for the combination of hazard type and return period.
BL_OTH	Building Loss for Other Building Types. For each Census Block, the estimate of total value of building losses for other types of buildings for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
CL_OTH	Content Loss for Other Building Types. For each Census Block, the estimate of total value of content losses for other types of building for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
BUS_DISRPT	Business Disruption. For each Census Block, the estimate of business disruption costs for the combination of hazard type and return period.
NUM_RES	Number of Residential Buildings damaged. For each Census Block, the estimate of the number of residential building types damaged for the combination of hazard type and return period.
NUM_COM	Number of Commercial Buildings damaged. For each Census Block, the estimate of the number of commercial building types damaged for the combination of hazard type and return period.
NUM_OTH	Number of Buildings damaged or Other building types. For each Census Block, the estimate of the number of other building types damaged for the combination of hazard type and return period. Other building types include industrial, agricultural, education, religious, and government.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the Census Block lies. If a Census Block is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the Census Block being studied lies shall be used.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.

Attribute	Definition
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### Field Properties – L\_RA\_AAL

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
CEN_BLK_ID	UPK, FK	R	Text	17		S_CenBlk_Ar
HAZARD_TYP	UPK	R	Text	4		D_Hazard_Typ
RETURN_PER	UPK	R	Text	6		D_Event
TOT_LOSSES		R	Double	Default	Default	N/A
BL_TOT		R	Double	Default	Default	N/A
CL_TOT		R	Double	Default	Default	N/A
BL_RES		R	Double	Default	Default	N/A
CL_RES		R	Double	Default	Default	N/A
BL_COM		R	Double	Default	Default	N/A
CL_COM		R	Double	Default	Default	N/A
BL_OTH		R	Double	Default	Default	N/A
CL_OTH		R	Double	Default	Default	N/A
BUS_DISRPT		R	Double	Default	Default	N/A
NUM_RES		E	Long Integer	Default		N/A
NUM_COM		E	Long Integer	Default		N/A
NUM_OTH		E	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### Relationship Classes – L\_RA\_AAL

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CenBlk_AAL	S_CenBlk_Ar	CEN_BLK_ID	L_RA_AAL	CEN_BLK_ID	1:M

*Table: L\_RA\_Composite*

**This table stores the results of the composite risk analysis, where the AAL data and the refined data are combined.** In most cases, the refined risk assessment results take precedence over the AAL, but there are circumstances where the AAL results are used (see Appendix N of the FEMA G&S for details). For a given Census Block, the composite dataset should represent either the refined or AAL results for all data fields. The field RA\_SOURCE indicates if the results in this table are for the Refined or AAL analysis.

**This table contains one record for each Census Block for each return period analyzed per hazard type. In addition, the table contains one record for the average annual loss per hazard type for each Census Block.** Note that for the refined analysis, typically the 0.5% annual chance event used in the AAL study is not included because it is not required for the regulatory products. Conversely, the regulatory products require analysis of the 4% annual chance event that was not performed in the AAL study. Therefore, normally neither of these events would be included in the L\_RA\_Composite table.

The table is used in combination with the S\_CenBlk\_Ar and S\_FRD\_Pol\_Ar feature classes to derive the L\_RA\_Summary table, which presents the risk assessments results by community.

This table is linked with the S\_CenBlk\_Ar to allow visualization of this data by Census Block on a thematic map.

*Attribute Definitions – L\_RA\_Composite*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
CEN_BLK_ID	Census Block Identifier. See the CEN_BLK_ID field in the S_CenBlk_Ar feature class for more detail.
HAZARD_TYP	Hazard Type. Indicates the Hazard Type for which the remaining fields apply. The valid values for this field are in the domain D_Hazard_Typ and include Riverine, Coastal, Levee and Total. In addition to a set of records for each of the individual hazard types for which analysis was performed, a set of records should be included for the sum of the constituent hazard types.
RETURN_PER	Return Period. Indicates the return period for which the remaining fields apply. The valid values for this field are in the domain D_Event. In addition to one record for each percent chance event (10%, 2%, 1%, 0.5%, 0.2%) used in the assessment, a record should be included for the average annualized event.
RA_SOURCE	Risk Assessment Source. Indicates if the results in this table for this record are for the Refined or AAL analysis.

Attribute	Definition
TOT_LOSSES	Total Losses. For each Census Block, the estimate of the total value of all losses for the combination of hazard type and return period.
BL_TOT	Total Building Losses. For each Census Block, the estimate of total value of building for the combination of hazard type and return period.
CL_TOT	Total Content Losses. For each Census Block, the estimate of total value of content loss for the combination of hazard type and return period.
BL_RES	Residential Building Loss. For each Census Block, the estimate of total value of residential building for the combination of hazard type and return period.
CL_RES	Residential Content Loss. For each Census Block, the estimate of total value of content loss for residential buildings for the combination of hazard type and return period.
BL_COM	Commercial Building Loss. For each Census Block, the estimate of total value of commercial building for the combination of hazard type and return period.
CL_COM	Commercial Content Loss. For each Census Block, the estimate of total value of content loss for commercial buildings for the combination of hazard type and return period.
BL_OTH	Building Loss for Other Building Types. For each Census Block, the estimate of total value of building losses for other types of buildings for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
CL_OTH	Content Loss for Other Building Types. For each Census Block, the estimate of total value of content losses for other types of buildings for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
BUS_DISRPT	Business Disruption. For each Census Block, the estimate of business disruption costs for the combination of hazard type and return period.
NUM_RES	Number of Residential Buildings damaged. For each Census Block, the estimate of the number of residential building types damaged for the combination of hazard type and return period.
NUM_COM	Number of Commercial Buildings damaged. For each Census Block, the estimate of the number of commercial building types damaged for the combination of hazard type and return period.
NUM_OTH	Number of Buildings damaged or Other building types. For each Census Block, the estimate of the number of other building types damaged for the combination of hazard type and return period. Other building types include industrial, agricultural, education, religious, and government.

Attribute	Definition
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the Census Block lies. If a Census Block crosses a HUC-8 boundary, the field shall be populated with the HUC-8 value in which the majority of the Census Block lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_RA\_Composite*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
CEN_BLK_ID	UPK, FK	R	Text	17		S_CenBlk_Ar
HAZARD_TYP	UPK	R	Text	4		D_Hazard_Typ
RETURN_PER	UPK	R	Text	6		D_Event
RA_SOURCE		R	Text	3		D_RA_Source
TOT_LOSSES		R	Double	Default	Default	N/A
BL_TOT		R	Double	Default	Default	N/A
CL_TOT		R	Double	Default	Default	N/A
BL_RES		R	Double	Default	Default	N/A
CL_RES		R	Double	Default	Default	N/A
BL_COM		R	Double	Default	Default	N/A
CL_COM		R	Double	Default	Default	N/A
BL_OTH		R	Double	Default	Default	N/A
CL_OTH		R	Double	Default	Default	N/A
BUS_DISRPT		R	Double	Default	Default	N/A
NUM_RES		E	Long Integer	Default		N/A
NUM_COM		E	Long Integer	Default		N/A
NUM_OTH		E	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_RA\_Composite*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CenBlk_Composite	S_CenBlk_Ar	CEN_BLK_ID	L_RA_Composite	CEN_BLK_ID	1:M

*Table: L\_RA\_Refined*

**This table stores the results of the refined risk analysis.** This analysis could be from using updated flood depth rasters or from using updated local General Buildings Stock data in particular study areas. This table is compared with the L\_RA\_AAL table, and based on criteria from Appendix N of the FEMA G&S, the L\_RA\_Composite table is created.

**This table contains one record for each Census Block for each return period analyzed per hazard type for the area being studied. In addition, the table contains one record for the average annual loss per hazard type for each Census Block.** Note that for the refined analysis, typically the 0.5% annual chance event used in the AAL study is not included because it is not required for the regulatory products. Conversely, the regulatory products require analysis of the 4% annual chance event that was not performed in the AAL study.

This table is linked with the S\_CenBlk\_Ar to allow visualization of these data by Census Block on a thematic map.

*Attribute Definitions – L\_RA\_Refined*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
CEN_BLK_ID	Census Block Identifier. See the CEN_BLK_ID field in the S_CenBlk_Ar feature class for more detail.
HAZARD_TYP	Hazard Type. Indicates the Hazard Type for which the remaining fields apply. The valid values for this field are in the domain D_Hazard_Typ and include Riverine, Coastal, Levee and Total. In addition to a set of records for each of the individual hazard types for which analysis was performed, a set of records should be included for the sum of the constituent hazard types.
RETURN_PER	Return Period. Indicates the return period for which the remaining fields apply. The valid values for this field are in the domain D_Event. In addition to one record for each percent chance event (10%, 2%, 1%, 0.5%, 0.2%) used in the assessment, a record should be included for the average annualized event.
TOT_LOSSES	Total Losses. For each Census Block, the estimate of the total value of all losses for the combination of hazard type and return period.
BL_TOT	Total Building Losses. For each Census Block, the estimate of total value of building for the combination of hazard type and return period.
CL_TOT	Total Content Losses. For each Census Block, the estimate of total value of content loss for the combination of hazard type and return period.

Attribute	Definition
BL_RES	Residential Building Loss. For each Census Block, the estimate of total value of residential building for the combination of hazard type and return period.
CL_RES	Residential Content Loss. For each Census Block, the estimate of total value of content loss for residential buildings for the combination of hazard type and return period.
BL_COM	Commercial Building Loss. For each Census Block, the estimate of total value of commercial building for the combination of hazard type and return period.
CL_COM	Commercial Content Loss. For each Census Block, the estimate of total value of content loss for commercial buildings for the combination of hazard type and return period.
BL_OTH	Building Loss for Other Building Types. For each Census Block, the estimate of total value of building losses for other types of buildings for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
CL_OTH	Content Loss for Other Building Types. For each Census Block, the estimate of total value of content losses for other types of buildings for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
BUS_DISRPT	Business Disruption. For each Census Block, the estimate of business disruption costs for the combination of hazard type and return period.
NUM_RES	Number of Residential Buildings damaged. For each Census Block, the estimate of the number of residential building types damaged for the combination of hazard type and return period.
NUM_COM	Number of Commercial Buildings damaged. For each Census Block, the estimate of the number of commercial building types damaged for the combination of hazard type and return period.
NUM_OTH	Number of Buildings damaged or Other building types. For each Census Block, the estimate of the number of other building types damaged for the combination of hazard type and return period. Other building types include industrial, agricultural, education, religious, and government.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the Census Block lies. If a Census Block crosses a HUC-8 boundary, the field shall be populated with the HUC-8 value in which the majority of the Census Block lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.

Attribute	Definition
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_RA\_Refined*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
CEN_BLK_ID	UPK, FK	R	Text	17		S_CenBlk_Ar
HAZARD_TYP	UPK	R	Text	4		D_Hazard_Typ
RETURN_PER	UPK	R	Text	6		D_Event
TOT_LOSSES		R	Double	Default	Default	N/A
BL_TOT		R	Double	Default	Default	N/A
CL_TOT		R	Double	Default	Default	N/A
BL_RES		R	Double	Default	Default	N/A
CL_RES		R	Double	Default	Default	N/A
BL_COM		R	Double	Default	Default	N/A
CL_COM		R	Double	Default	Default	N/A
BL_OTH		R	Double	Default	Default	N/A
CL_OTH		R	Double	Default	Default	N/A
BUS_DISRPT		R	Double	Default	Default	N/A
NUM_RES		E	Long Integer	Default		N/A
NUM_COM		E	Long Integer	Default		N/A
NUM_OTH		E	Long Integer	Default		N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_RA\_Refined*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
CenBlk_Refined	S_CenBlk_Ar	CEN_BLK_ID	L_RA_Refined	CEN_BLK_ID	1:M

**Table: L\_RA\_Summary**

This table summarizes the results by community of the composite analysis performed by Census Block. **The Mapping Partner shall use appropriate techniques (e.g., area-weighted summations) to aggregate the L\_RA\_Composite data, which stores the risk assessment loss estimates by Census Block, to the L\_RA\_Summary table, which stores the loss estimates by community.** If the estimated losses in the L\_RA\_Composite table represent values outside the project area, area-weighting should be used to determine the values for the portion(s) of the community within the project area. See Appendix N of the FEMA G&S for more information on aggregating the loss estimates to the community level.

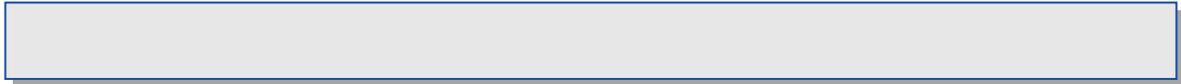
**This table contains one record for each community or partial community within the project area for each hazard type for each return period analyzed, including the average annual loss. If a community extends beyond the project footprint, the summary results in this table should represent only the portion within the project area. The table also has one record for each hazard type for each return period for the project area.**

This table is used to populate the Estimated Potential Losses columns of the Estimated Loss Information table for each community and for the cumulative project area in the FRR. Following is a sample of the table:

<b>Estimated Potential Losses for Flood Event Scenarios</b>												
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized (\$/yr)	
	Estimated Value	Percent of Total	Dollar Losses	Loss Ratio								
Residential Building/Contents	\$17,200,000	78%	\$1,300,000	7%	\$1,600,000	10%	\$2,300,000	14%	\$4,000,000	23%	\$30,000	0%
Commercial Building/Contents	\$1,100,000	5%	\$40,000	3%	\$60,000	5%	\$100,000	11%	\$300,000	22%	\$20,000	1%
Other Building/Contents	\$3,700,000	17%	\$20,000	1%	\$70,000	2%	\$100,000	3%	\$200,000	6%	\$0	0%
<b>Total Building/Contents</b>	<b>\$22,000,000</b>	<b>100%</b>	<b>\$1,360,000</b>	<b>6%</b>	<b>\$1,730,000</b>	<b>8%</b>	<b>\$2,500,000</b>	<b>12%</b>	<b>\$4,500,000</b>	<b>20%</b>	<b>\$50,000</b>	<b>0%</b>
Business Disruption	N/A	N/A	\$90,000	N/A	\$200,000	N/A	\$200,000	N/A	\$500,000	N/A	\$0	N/A
<b>TOTAL</b>	<b>\$22,000,000</b>	<b>N/A</b>	<b>\$1,450,000</b>	<b>N/A</b>	<b>\$1,930,000</b>	<b>N/A</b>	<b>\$2,700,000</b>	<b>N/A</b>	<b>\$5,000,000</b>	<b>N/A</b>	<b>\$50,000</b>	<b>N/A</b>

This table is linked with the S\_FRD\_Pol\_Ar to allow visualization of this summary on a thematic map.

### *Attribute Definitions – L\_RA\_Summary*



Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
RA_SUMM_ID	Summary Identification Number. For the case of the community records in this table, this is the six-digit CID assigned by FEMA. See S_FRD_Pol_Ar for more detail. For the case of the project summary record, the RA_SUMM_ID should be populated with the FEMA Case Number in the same format as the CASE_NO field below.
POL_NAME1	Political Area Name 1. This is the primary name of the community. This field is included in this table instead of retrieval by joining to S_FRD_Pol_Ar table to make querying for the FRR easier. See the definition in S_FRD_Pol_Ar for more detail.
HAZARD_TYP	Hazard Type. Indicates the Hazard Type for which the remaining fields apply. The valid values for this field are in the domain D_Hazard_Typ and include Riverine, Coastal, Levee and Total. In addition to a set of records for each of the individual hazard types for which analysis was performed, a set of records should be included for the sum of the constituent hazard types.
RETURN_PER	Return Period. Indicates the return period for which the remaining fields apply. The valid values for this field are in the domain D_Event. In addition to one record for each percent chance event (10%, 2%, 1%, 0.5%, 0.2%) used in the assessment, a record should be included for the average annualized event.
TOT_LOSSES	Total Losses. The estimate of total value of all losses for the combination of hazard type and return period.
BC_TOT	Total Building and Content Loss. The estimate of total loss of all building types and contents for the combination of hazard type and return period.
BC_RES	Residential Building and Content Loss. The estimate of total loss of residential buildings and contents for the combination of hazard type and return period.
BC_COM	Commercial Building and Content Loss. The estimate of total loss of commercial buildings and contents for the combination of hazard type and return period.
BC_OTH	Building and Content Loss for Buildings of Other Types. The estimate of total loss of buildings and contents for other types of buildings for the combination of hazard type and return period. Other buildings type categories are industrial, agricultural, education, religious, and government.
BUS_DISRPT	Business Disruption. The estimate of business disruption costs for the combination of hazard type and return period.

Attribute	Definition
LR_TOT	The Total Loss Ratio for each combination of hazard type and return period.
LR_BC	The Loss Ratio for all buildings and contents for each combination of hazard type and return period.
LR_BC_RES	The Loss Ratio for residential buildings and contents for each combination of hazard type and return period.
LR_BC_COM	The Loss Ratio for commercial buildings and contents for each combination of hazard type and return period.
LR_BC_OTH	The Loss Ratio for other building types and contents for each combination of hazard type and return period.
NUM_RES	Number of Residential Buildings damaged. The estimate of the number of residential buildings damaged for the combination of hazard type and return period.
NUM_COM	Number of Commercial Buildings damaged. The estimate of the number of commercial buildings damaged for the combination of hazard type and return period.
NUM_OTH	Number of Buildings damaged of Other building types. The estimate of the number of buildings of other building types damaged for the combination of hazard type and return period. Other building types include industrial, agricultural, education, religious, and government.
AAL_PERCAP	The Average Annualized Loss Per Capita. There should be one record in the table for each community and project area by hazard type. The RETURN_PER for these records should be AvgAnn. For all other return periods, this field should be populated with a null value (See Section O.3.4.9). This loss should be reported to the nearest whole dollar.
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the community lies. If a community is in multiple HUC-8 sub-basins, the sub-basin in which the portion of the community being studied lies shall be used. If the portion of the community being studied is in multiple sub-basins, the sub-basin in which the greatest portion of the project area lies shall be used. For the project-level record (i.e., RA_SUMM_ID = CASE_NO), this field should be populated with “NP.”
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

Notes:

1. Total Building/Content Losses = Residential Building/Content Loss + Commercial Building/Content Loss + Other Building/Content Loss.
2. Loss ratio = Dollar Losses / Estimated Value. Loss ratios are computed using actual loss and value numbers from the risk assessment analysis, not rounded numbers. Populate the table to the nearest percent.
3. Dollar losses under \$100,000 should be rounded to the nearest \$10,000. Dollar losses over \$100,000 should be rounded to the nearest \$100,000.

### *Field Properties – L\_RA\_Summary*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
RA_SUMM_ID	UPK, FK	R	Text	12		S_FRD_Pol_Ar
POL_NAME1		R	Text	50		N/A
HAZARD_TYP	UPK	R	Text	4		D_Hazard_Typ
RETURN_PER	UPK	R	Text	6		D_Event
TOT_LOSSES		R	Double	Default	Default	N/A
BC_TOT		R	Double	Default	Default	N/A
BC_RES		R	Double	Default	Default	N/A
BC_COM		R	Double	Default	Default	N/A
BC_OTH		R	Double	Default	Default	N/A
BUS_DISRPT		R	Double	Default	Default	N/A
LR_TOT		R	Double	Default	Default	N/A
LR_BC		R	Double	Default	Default	N/A
LR_BC_RES		R	Double	Default	Default	N/A
LR_BC_COM		R	Double	Default	Default	N/A
LR_BC_OTH		R	Double	Default	Default	N/A
NUM_RES		E	Long Integer	Default		N/A
NUM_COM		E	Long Integer	Default		N/A
NUM_OTH		E	Long Integer	Default		N/A
AAL_PERCAP		A	Double	Default	Default	N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_RA\_Summary*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
PolAr_RA_Sum	S_FRD_Pol_Ar	CID	L_RA_Summary	RA_SUMM_ID	1:M



*Table: L\_RA\_UDF\_Refined*

**This enhanced table stores the results of refined analyses for each User Defined Facility.** This information is used by the FRR authors to describe the estimated losses associated with a specific facility.

**This table contains one record for each facility for each hazard type for each return period analyzed, including the average annual loss estimate.**

This table is linked with the S\_UDF\_Pt to allow visualization of these risk assessment results on a thematic map.

*Attribute Definitions – L\_RA\_UDF\_Refined*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
UDF_ID	Unique Identifier for this facility. See S_UDF_Pt for more detailed explanation.
HAZARD_TYP	Hazard Type. Indicates the Hazard Type for which the remaining fields apply. The valid values for this field are in the domain D_Hazard_Typ and include Riverine, Coastal, Levee and Total. In addition to a set of records for each of the individual hazard types for which analysis was performed, a set of records should be included for the sum of the constituent hazard types.
RETURN_PER	Return Period. Indicates the return period for which the remaining fields apply. The valid values for this field are in the domain D_Event. In addition to one record for each percent chance event (10%, 2%, 1%, 0.5%, 0.2%) used in the assessment, a record should be included for the average annualized event.
BLDG_LOSS	Building Loss. Asset Value Loss to the nearest dollar for the Building for the combination of Hazard Type and Return Period.
BLDGPCTDAM	Percent damage to building for the combination of Hazard Type and Return Period. The result should be expressed to the nearest tenth of a percent (0.1%).
CNT_LOSS	Contents Loss. Asset Value Loss to the nearest dollar for the contents of the building for the combination of Hazard Type and Return Period.
CNT_PCTDAM	Percent Damage for the contents of the building for the combination of Hazard Type and Return Period. The result should be expressed to the nearest tenth of a percent (0.1%).
INV_LOSS	Inventory Loss. Asset Value Loss to the nearest dollar for the inventory for the combination of Hazard Type and Return Period.

Attribute	Definition
INV_PCTDAM	Percent Damage for the inventory for the combination of Hazard Type and Return Period. The result should be expressed to the nearest tenth of a percent (0.1%).
HUC8_CODE	WBD 8-digit Hydrologic Unit Code for the sub-basin in which the facility lies.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_RA\_UDF\_Refined*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
UDF_ID	UPK, FK	R	Text	25		S_UDF_Pt
HAZARD_TYP	UPK	R	Text	4		D_Hazard_Typ
RETURN_PER	UPK	R	Text	6		D_Event
BLDG_LOSS		R	Long Integer	Default		N/A
BLDGPCTDAM		R	Double	Default	Default	N/A
CNT_LOSS		R	Long Integer	Default		N/A
CNT_PCTDAM		R	Double	Default	Default	N/A
INV_LOSS		R	Long Integer	Default		N/A
INV_PCTDAM		R	Double	Default	Default	N/A
HUC8_CODE	FK	R	Text	8		S_HUC_Ar
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

### *Relationship Classes – L\_RA\_UDF\_Refined*

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
UDF_RA_UDF	S_UDF_Pt	UDF_ID	L_RA_UDF_Refined	UDF_ID	1:M

*Table: L\_Source\_Cit*

**This table is used to document the sources of the data used in the FRD.** This table uses a standard set of prefixes to categorize the data sources (see Section O.3.6). These citations provide a link to the metadata where the data sources are more fully described. Many of the records for this table can be compiled from the L\_Source\_Cit tables in the individual FIRM databases. In order to minimize work by having to sequentially renumbering all the SOURCE\_CIT values from combining the L\_Source\_Cit tables from multiple FIRM databases, the Mapping Partner may suffix the SOURCE\_CIT from the source FIRM database with the DFIRM\_ID to provide a unique identifier.

**This table has an entry for each different data source used in the flood risk project and is linked with all the feature classes to document the sources for the data.**

*Attribute Definitions – L\_Source\_Cit*

Attribute	Definition
OBJECTID	Object Identifier. Internal Primary Key used by ArcGIS software to provide unique access to each record.
SOURCE_CIT	Source Citation identifier used in the FIRM Database and in the FIRM metadata file. Default source abbreviations are listed in Table O-6 of this document. Source citations start with the type of source followed by sequential numbers, for example “BASE1”, “BASE2”, etc. See Section O.3.6 for allowable prefixes.
DFIRM_ID	Flood Risk Project Identifier. For a single-jurisdiction flood risk project, the value is composed of the 2-digit state FIPS code and the 4-digit FEMA CID code (e.g., 480001). For a countywide flood risk project, the value is composed of the 2-digit state FIPS code, the 3-digit county FIPS code, and the letter “C” (e.g., 48107C). Within each FIRM database, the DFIRM_ID value is identical.
CITATION	Citation Used in FIS Report text and Bibliography and References Table. A short and unique citation name (Author and Year) used within the FIS report to reference this publication, such as “U.S. Census 2010.”
PUBLISHER	Publisher Name Used in FIS Report Bibliography and References Table. This is the name of the publishing entity.
TITLE	Title of referenced publication or data Used in FIS Report Bibliography and References Table. Should include the volume number if applicable.
AUTHOR	Author/Editor Used in FIS Report Bibliography and References Table... This is the author or editor of the reference. Multiple authors may be listed in this field.
PUB_PLACE	Publication Place Used in FIS Report Bibliography and References Table. This is the place of publication (e.g., “Washington DC”).

Attribute	Definition
PUB_DATE	Publication Date Used in FIS Report Bibliography and References Table. This is the date of publication or date of issuance.
WEBLINK	Reference Web Address Used in FIS Report Bibliography and References Table. This is the web address for the reference, if applicable.
SRC_SCALE	Scale of the source data, if applicable. For example 1:24000. Used in FIS Report Bibliography and References Table.
MEDIA	Media through which the source data were received.
CASE_NO	FEMA Case Number. See the CASE_NO field in S_FRD_Proj_Ar for more detail.
VERSION_ID	Version Identifier. Identifies the product version and relates the feature to standards according to which it was created. See Section O.3.6 for more detail.

### *Field Properties – L\_Source\_Cit*

Field	Key Type	R/A/E/O	Type	Length/Precision	Scale (SHP Only)	Domain or Related Table
OBJECTID	PK	R	ObjectID	Default		N/A
SOURCE_CIT	UPK, FK	R	Text	25		S_Huc_Ar, S_Carto_Ar, S_Carto_Ln, S_Carto_Pt, S_FRD_Pol_Ar, S_FRD_Proj_Ar, S_CSLF_Ar, S_CenBlk_Ar, S_AOMI_Pt, S_UDF_Pt
DFIRM_ID	FK	R	Text	6		FRD_Study_Info
CITATION		R	Text	25		N/A
PUBLISHER		R	Text	254		N/A
TITLE		R	Text	254		N/A
AUTHOR		A	Text	254		N/A
PUB_PLACE		A	Text	100		N/A
PUB_DATE		R	Date	Default		N/A
WEBLINK		A	Text	128		N/A
SRC_SCALE		A	Text	12		N/A
MEDIA		R	Text	50		N/A
CASE_NO	FK	R	Text	12		S_FRD_Proj_Ar
VERSION_ID		R	Text	11		N/A

## *Relationship Classes – L\_Source\_Cit*

<b>Relationship Class Name</b>	<b>Origin Table</b>	<b>Origin Field</b>	<b>Destination Table</b>	<b>Destination Field</b>	<b>Cardinality</b>
HUC_SourceCit	S_Huc_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CartoAr_SourceCit	S_Carto_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CartoLn_SourceCit	S_Carto_Ln	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CartoPt_SourceCit	S_Carto_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
PolAr_SourceCit	S_FRD_Pol_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
Proj_SourceCit	S_FRD_Proj_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_SourceCit	S_CSLF_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_Pre_SourceCit	S_CSLF_Ar	PRE_SRCCIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_New_SourceCit	S_CSLF_Ar	NEW_SRCCIT	L_Source_Cit	SOURCE_CIT	1:1
CenBlk_SourceCit	S_CenBlk_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
AOMI_SourceCit	S_AOMI_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
UDF_SourceCit	S_UDF_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
Callout_SourceCit	S_FRM_Callout_Ln	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1

#### O.3.4.11. Rasters

Raster datasets and their descriptions are listed in the Depth and Analysis Rasters section of the schema (Table O-2). As previously mentioned, depth and analysis rasters are contained within the FRD fGDB as well as exported as individual GeoTiff files.

**All rasters are floating point rasters with a resolution of 0.1 units, except the hillshade raster, which is an integer raster.** Using 0.1 units of resolution for all rasters does not imply that the underlying methods of data collection and analysis support that precision. The users of the data should familiarize themselves with the methods used to create the data by examining the metadata and these guidelines and use their judgment if the level of accuracy is suitable for their particular requirements. The units of each of the floating point rasters are feet, feet/second, or percent as appropriate for the data presented. See the descriptions of each raster in the following sections for the appropriate unit.

**All rasters delivered as part of the FRD shall be based on the UTM projection, NAD83 datum. The UTM zone is the zone in which the majority of the project area lies.**

**All rasters delivered as part of an FRD shall have the same cell size, extents, origin, and rotation** so that they may easily be superimposed on one another without reprojection, transformation, or other geoprocessing.

Several of the rasters are delivered for multiple exceedance probability events. In the following descriptions as well as on the data model poster, these events are represented as xxxpct as part of the raster name (e.g., Depth\_xxxpct). The xxx's represent a percent annual chance flood event, examples include:

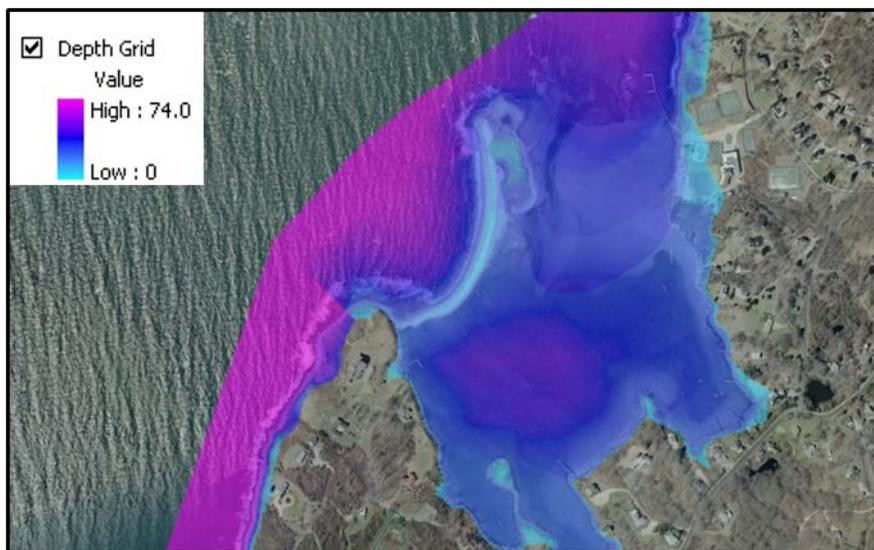
- *0\_2 – 0.2 percent annual chance flood event (aka, 500-yr event)*
- *0\_5 – 0.5 percent annual chance flood event (aka, 200-yr event)*
- *01 – 1 percent annual chance flood event (aka, 100-yr event)*
- *10 – 10 percent annual chance flood event (aka, 10-yr event)*

The assumptions, methods, and procedures for creating each of these rasters are described in Appendix N of the FEMA G&S.

### *Raster: CST\_Dpthxxxpct*

**This raster dataset represents water depth in feet for a coastal type of analysis** and is obtained by subtracting the ground surface model from the water surface model for a given flood event. This water surface is normally the highest water surface elevation between the stillwater, wave height, wave runoff, and surge elevations. Coastal flood depth rasters are typically generated for only the 1% annual chance flood event. See Appendix N of the FEMA *G&S* for further guidance on creating this raster dataset.

### *Cartographic Example*



### *Raster: Depth\_xxxpct*

**This raster dataset represents water depth in feet for a non-coastal type of analysis** and is obtained by subtracting the ground surface model from the water surface model for a given flood event. Flood Depth Rasters are typically generated for all riverine flooding return periods available for a particular flooding source. For the standard flood risk project scope, this corresponds to the 0.2%, 1%, 2%, 4%, and 10% flooding return periods. However, local flood mitigation studies may require additional frequencies. Examples would include the 0.5% annual chance (200-year) for a refined annualized loss estimate and more frequent flooding events such as the 20% and 50% annual chance (5- and 2-year return periods, respectively) flood events. If additional frequencies are desired, those should be coordinated with the local officials and the FEMA Project Officer. These additional frequencies would be enhanced datasets.

See Appendix N of the FEMA G&S for further guidance on creating this raster dataset.

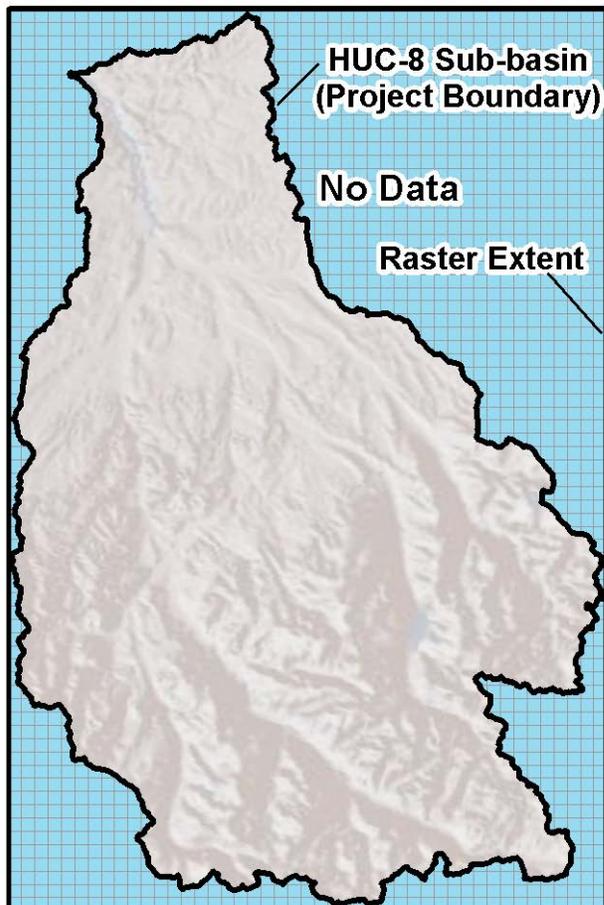
### *Cartographic Example*



### *Raster: Hillshade*

This raster dataset is used as a backdrop for the FRM. The hillshade is a shaded relief dataset using a Digital Elevation Model (DEM) raster as the input and considering an illumination source.

### *Cartographic Example*



### *Raster: Pct30yrChance*

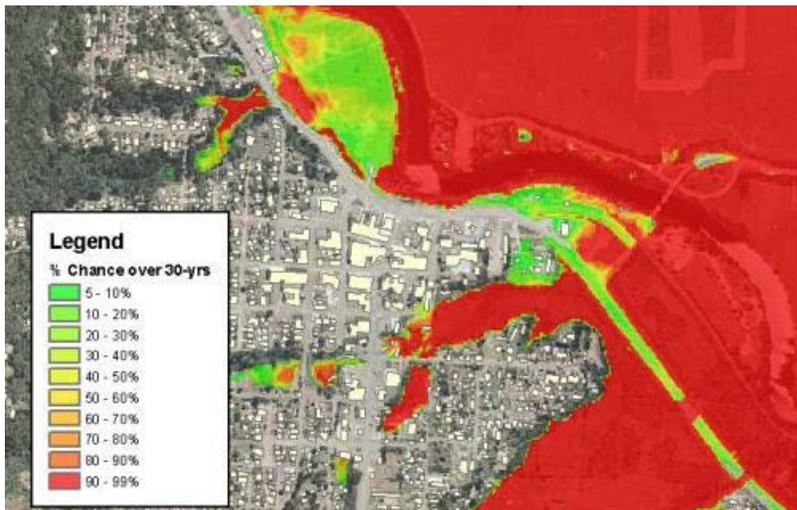
This raster dataset represents the probability of flooding at least once within a 30-year period for all locations within the extent of the 0.2% annual chance floodplain. Therefore, the units are expressed as a percent (e.g., 5.1%). This percent chance is calculated at each cell of the raster using the PctAnnChance raster as input, according to the following equation:

$$\text{Cell Value} = 1 - (1 - p)^n$$

Where:  $p$  is the percent annual chance of flooding (PctAnnChance), and  $n = 30$

See Appendix N of the FEMA *G&S* for further guidance on creating this raster dataset.

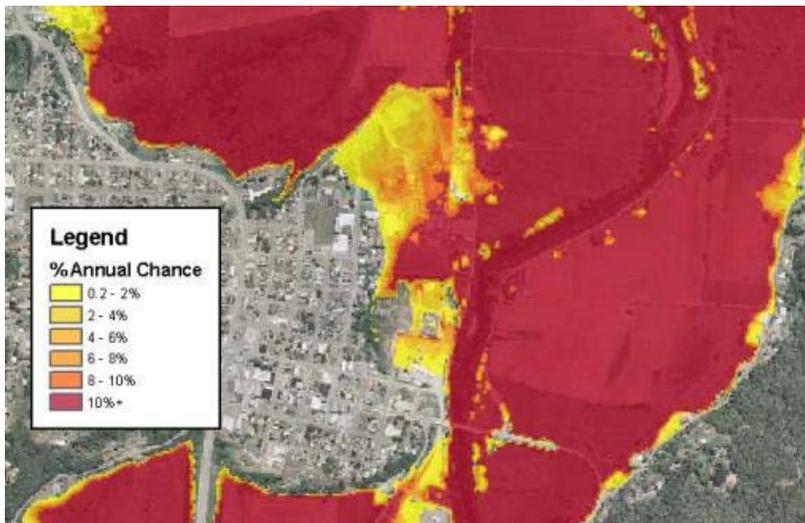
### *Cartographic Example*



### *Raster: PctAnnChance*

This raster dataset represents the percent annual chance of flooding for locations along the flooding source within the 0.2% chance floodplain. Therefore, the units are expressed as a percent (e.g., 5.1%). This dataset is calculated using the five standard water surface elevation grids. See Appendix N of the FEMA *G&S* for further guidance on creating this raster dataset.

### *Cartographic Example*



### *Raster: Vel\_xxxpct [E]*

**Velocity rasters represent the flood water velocities (in feet/second) within the floodplain for a given annual chance flood event.** Velocity data are often used in conjunction with depth information to help identify locations where erosion, scour, or other structural instability may occur, and can be an effective tool to communicate potential impact/damage to built structures. This dataset does not replace regulatory velocity information that may be published on a FIRM or in the FIS Report.

See Appendix N of the FEMA *G&S* for further guidance on creating this raster dataset.

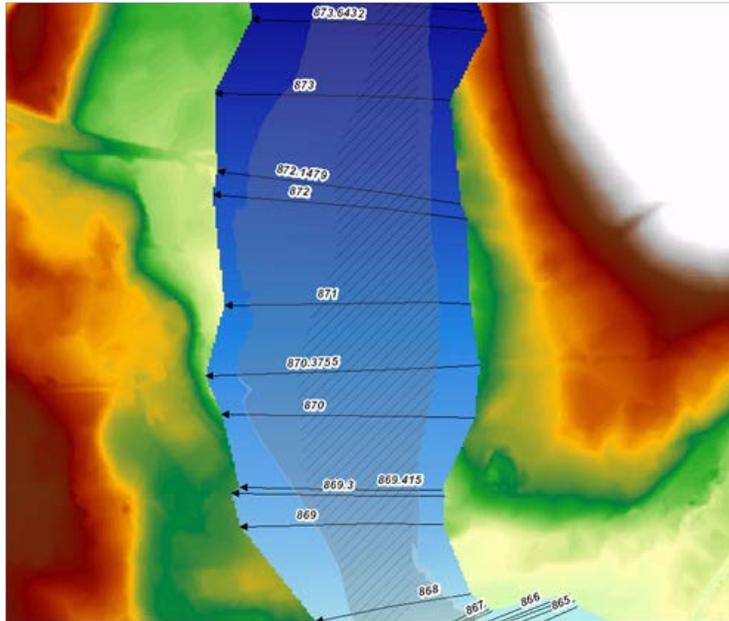
### *Cartographic Example*



### *Raster: WSE\_xxxpct [E]*

**This raster dataset represents the water surface elevation for a given flood event.** See Appendix N of the FEMA *G&S* for further guidance on creating this raster dataset.

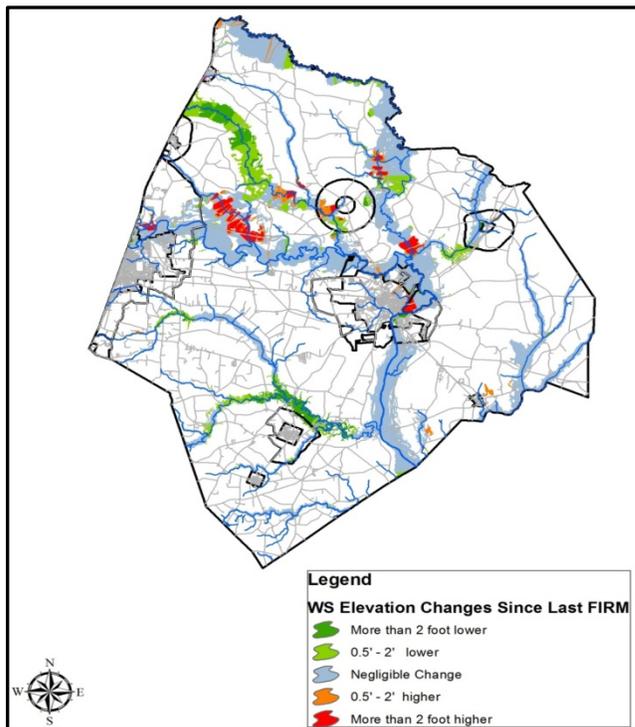
### *Cartographic Example*



### *Raster: WSE\_Change [E]*

The **Water Surface Elevation (WSE) Change** raster reflects the changes in water surface elevation for the 1 percent annual chance flood event, to the nearest tenth of a foot between successive FIRM studies. For areas where the previous water surface elevation grid data does not exist, cross sections or other data needed to recreate the effective water surface elevation surface will need to be captured in digital format. This raster contains the water surface elevation changes that are common to both the previous and newly-studied water surface elevation input rasters. All other cells should be reflected as “NO DATA”. This raster should be considered a vertical companion to the S\_CSLF\_Ar feature class, which illustrates the horizontal component of change. See Appendix N of the FEMA G&S for further guidance on creating this raster dataset.

### *Cartographic Example*



### O.3.4.12. Relationship Classes

To enable easier and consistent use of the FRD, pre-defined relationships have been established between certain tables using what is known as a “relationship class.” The use of table relationship classes will allow Mapping Partners to create or update information stored in one table and simply “relate” that information to another table based on a common field. In Figure O-9 below, the attributes of the Average Annualized Loss table (L\_RA\_AAL) are related to the Census Block polygons (S\_CenBlk\_Ar) using a relationship class (CenBlk\_AAL) and a common field (CEN\_BLK\_ID).

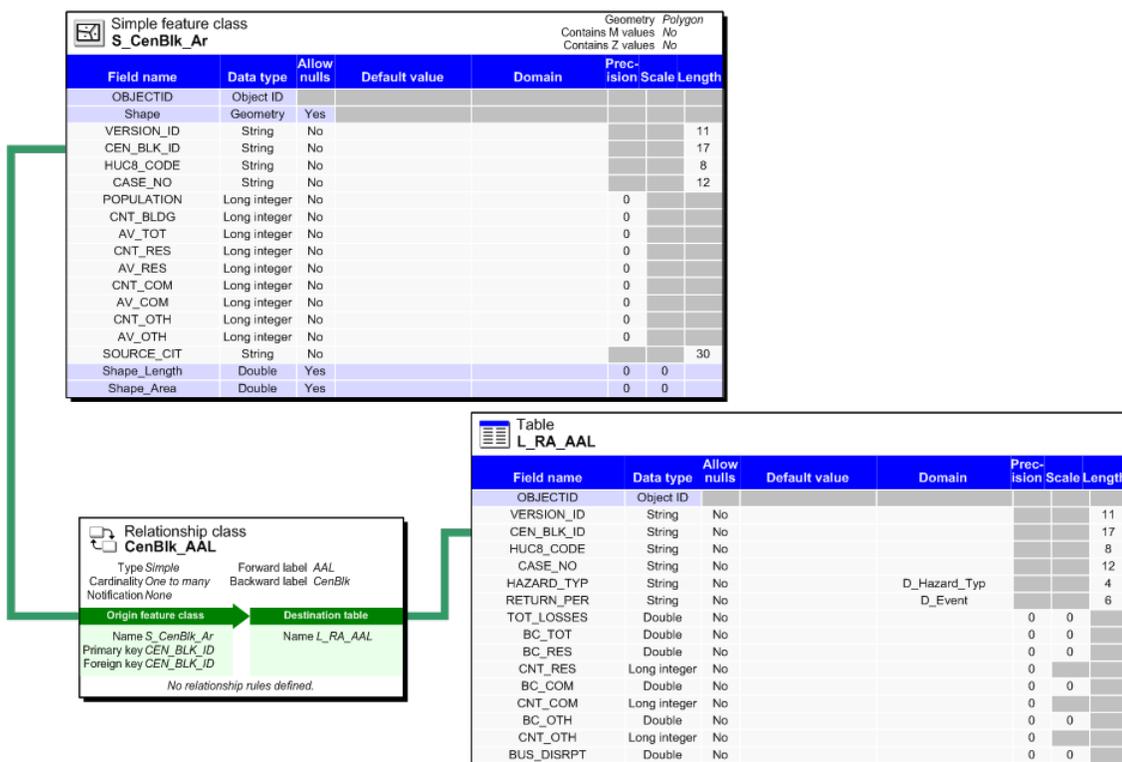


Figure O-h. Example Relationship Class

Not all tables/feature classes having a foreign key to another table have a relationship class defined. In the FRD, those relationships (e.g., the relationship class illustrated above would allow a user to easily query or symbolize Census Blocks based on AAL results) likely to be joined for thematic map creation have a relationship class defined. Furthermore, some relationship classes have been defined to enforce referential integrity (e.g., the multiple relationship classes with the L\_Source\_Cit table). In other cases, where the foreign key is likely populated with repetitive values (e.g., CASE\_NO or HUC8\_CODE) for the whole FRD, a relationship class has not been defined for the delivered FRD. Mapping Partners may find it useful to create a relationship class or otherwise enforce the foreign key relationship to provide referential integrity.

Table O-4 lists all of the relationship classes in the FRD.

Table 3-9 FRD Relationship Classes

Relationship Class Name	Origin Table	Origin Field	Destination Table	Destination Field	Cardinality
AOMI_SourceCit	S_AOMI_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
Callout_SourceCit	S_FRM_Callout_Ln	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CartoAr_SourceCit	S_Carto_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CartoLn_SourceCit	S_Carto_Ln	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CartoPt_SourceCit	S_Carto_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CenBlk_AAL	S_CenBlk_Ar	CEN_BLK_ID	L_RA_AAL	CEN_BLK_ID	1:M
CenBlk_Refined	S_CenBlk_Ar	CEN_BLK_ID	L_RA_Refined	CEN_BLK_ID	1:M
CenBlk_Composite	S_CenBlk_Ar	CEN_BLK_ID	L_RA_Composite	CEN_BLK_ID	1:M
CenBlk_LocalGBS	S_CenBlk_Ar	CEN_BLK_ID	L_Local_GBS	CEN_BLK_ID	1:1
CenBlk_SourceCit	S_CenBlk_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_New_Model	S_CSLF_Ar	NEW_MODEL	FRD_Model_Info	MDL_NFO_ID	1:1
CSLF_Pre_Model	S_CSLF_Ar	PRE_MODEL	FRD_Model_Info	MDL_NFO_ID	1:1
CSLF_Pre_SourceCit	S_CSLF_Ar	PRE_SRCCIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_New_SourceCit	S_CSLF_Ar	NEW_SRCCIT	L_Source_Cit	SOURCE_CIT	1:1
CSLF_SourceCit	S_CSLF_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
HUC_SourceCit	S_HUC_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
Model_Study	FRD_Model_Info	STD_NFO_ID	FRD_Study_Info	STD_NFO_ID	1:1
PolAr_Claims	S_FRD_Pol_Ar	CID	L_Claims	CLAIMS_ID	1:1
PolAr_CSLF_Sum	S_FRD_Pol_Ar	CID	L_CSLF_Summary	CSLFSUMMID	1:M
PolAr_Exposure	S_FRD_Pol_Ar	CID	L_Exposure	EXPOS_ID	1:1
PolAr_RA_Sum	S_FRD_Pol_Ar	CID	L_RA_Summary	RA_SUMM_ID	1:M
PolAr_AOMI_Sum	S_FRD_Pol_Ar	CID	L_AOMI_Summary	AOMISUMMID	1:M
PolAr_SourceCit	S_FRD_Pol_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
Proj_SourceCit	S_FRD_Proj_Ar	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
UDF_RA_UDF	S_UDF_Pt	UDF_ID	L_RA_UDF_Refined	UDF_ID	1:M
UDF_SourceCit	S_UDF_Pt	SOURCE_CIT	L_Source_Cit	SOURCE_CIT	1:1
N/A	S_CSLF_Ar	CNMS_ID	S_Studies_Ar (CNMS)	CNMS_ID	1:1

1:1 indicates a one-to-one relationship.

1:M indicates a one-to-many relationship.

### O.3.4.13. Domains

The FRD uses geodatabase domains to provide standardized lists of acceptable values for some fields.

**Mapping Partners will utilize these domains, or obtain approval from FEMA to add a domain value when preparing the FRD to provide consistency.** Many of the domains in the FRD are shared with the FIRM, Data Capture Standards (DCS), and CNMS database designs. See the *Guidelines and Standards for Mapping Partners Domain Tables Guide* for details on the individual domains and the process for updating the domains. Figure O-10 shows the D\_AOMI\_Type domain for the AOMI\_Typ field

Coded value domain	
D_AOMI_Typ	
Description	AOMI Type
Field type	String - Shape Field Width = 60
Split policy	Default value
Merge policy	Default value
Code	Description
0100	Dams
0200	Non-Accredited Levees
0210	Accredited Levees
0300	Coastal Structures
0400	Streamflow Constrictions
0500	Key Emergency Routes Overtopped
0600	Past Claims Hot Spot
0700	Individual Assistance (IA) or Public Assistance (PA)
0800	Significant Land Use Change
0900	Areas of Significant Erosion
1000	Non-Levee Embankments
1100	At Risk Essential Facilities
2000	Other Flood Risk Areas
3000	Areas of Mitigation Success
9999	Other

in the S\_AOMI\_Pt feature class.

**One of the requirements for the FRD delivery is to export the geodatabase elements to SHP format.** During the export process, the Mapping Partner will add fields (with corresponding field widths) as listed in Table O-5 and populate the field based on the descriptions corresponding to each coded value in the domain. Additionally, the Mapping Partner will export all the domains to dbf files and include in the submittal to FEMA.

Table O-3-10. FRD Domains

D_AOMI_Class	S_AOMI_PT	AOMI_CLASS	D_AOMICLSS	30
	L_AOMI_Summary	AOMI_CLASS	D_AOMICLSS	
D_AOMI_SourceCat	S_AOMI_Pt	AOMI_CAT	D_AOMICAT	30
	L_AOMI_Summary	AOMI_CAT	D_AOMICAT	
D_AOMI_Typ	L_AOMI_Summary	AOMI_TYP	D_AOMITYP	60
	S_AOMI_Pt	AOMI_TYP	D_AOMITYP	
D_Carto_Hydro_Code	S_Carto_Ar	F_CODE	D_F_CODE	25
	S_Carto_Ln	F_CODE	D_F_CODE	
	S_Carto_Pt	F_CODE	D_F_CODE	
D_Carto_Trans_Code	S_Carto_Ln	F_CODE	D_F_CODE	25
	S_Carto_Pt	F_CODE	D_F_CODE	
D_Carto_Typ	S_Carto_Ar	F_TYPE	D_F_TYPE	15
	S_Carto_Ln	F_TYPE	D_F_TYPE	
	S_Carto_Pt	F_TYPE	D_F_TYPE	
D_Change	S_CSLF_Ar	PEAKDSCHG	D_PEAKDSCH	12
	S_CSLF_Ar	FLD_CTRLCHG	D_FLDCTRC	
	S_CSLF_Ar	HYDSTRCHG	D_HYDSTRC	

## Appendix O

Domain Name	Table	fGDB SHP Code Field	SHP Description Field Name	SHP Field Width
	S_CSLF_Ar	SEDCHG	D_SEDCHG	
	S_CSLF_Ar	EROSIONCHG	D_EROSCHG	
	S_CSLF_Ar	RUNOFFCHG	D_RNOFFCHG	
	S_CSLF_Ar	DUNECHG	D_DUNECHG	
	S_CSLF_Ar	SFHACHG	D_SFHACHG	
	S_CSLF_Ar	FLDWYCHG	D_FLDWYCHG	
	S_CSLF_Ar	NONSFHACHG	D_NONSFHA	
D_CRS_Rating	S_FRD_Pol_Ar	CRS_RATING		
D_Event	L_RA_AAL	RETURN_PER	D_RETRNPER	30
	L_RA_Refined	RETURN_PER	D_RETRNPER	
	L_RA_Composite	RETURN_PER	D_RETRNPER	
	L_RA_UDF_Refined	RETURN_PER	D_RETRNPER	
	L_RA_Summary	RETURN_PER	D_RETRNPER	
D_Facility_Typ	S_UDF_Pt	FACTLY_TYP	D_FAC_TYP	12
D_Hazard_Typ	L_RA_AAL	HAZARD_TYP	D_HAZ_TYP	8
	L_RA_Refined	HAZARD_TYP	D_HAZ_TYP	
	L_RA_Composite	HAZARD_TYP	D_HAZ_TYP	
	L_RA_UDF_Refined	HAZARD_TYP	D_HAZ_TYP	
	L_RA_Summary	HAZARD_TYP	D_HAZ_TYP	
D_Horiz_Datum	S_FRD_Proj_Ar	H_DATUM	D_H_DAT	35
	FRD_Study_Info	H_DATUM	D_H_DAT	
D_Hydra_Mdl	FRD_Model_Info	HYDRA_MDL	D_HYDRAMDL	100
D_Hydro_Mdl	FRD_Model_Info	HYDRO_MDL	D_HYDROMDL	100
D_Jurisdiction_Typ	FRD_Study_Info	JURIS_TYP	D_JURISTYP	25
D_Length_Units	S_FRD_Proj_Ar	V_UNITS	D_V_UNITS	15
D_Occupancy_Typ	S_UDF_Pt	OCCUP_TYP	D_OCCUPTYP	40
D_Pol_Typ	S_FRD_Pol_Ar	POL_TYP	D_POL_TYP	8
D_Proj_Unit	S_FRD_Proj_Ar	PROJ_UNIT	D_PRJUNIT	25
	FRD_Study_Info	PROJ_UNIT	D_PRJUNIT	
	FRD_Study_Info	PROJ_SUNIT	D_PRJSUNIT	
D_Projection	S_FRD_Proj_Ar	PROJECTION	D_PRJCTN	128
	FRD_Study_Info	PROJECTION	D_PRJCTN	
	FRD_Study_Info	PROJ_SECND	D_PRJ_SCND	
D_RA_Source	L_RA_Composite	RA_SOURCE	D_RA_Source	25
D_Runup_Mdl	FRD_Model_Info	RUNUP_MDL	D_RUNUPMDL	30
D_SFHA_FLDWY	L_CSLF_Summary	LOCATION	D_LOCATION	30
D_State_FIPs	S_FRD_Pol_Ar	ST_FIPS	D_ST_FIPS	35
D_State_Name	FRD_Study_Info	STATE_NM	D_STATE_NM	30
D_Study_Prefix	FRD_Study_Info	STUDY_PRE	D_STUDYPRE	20
D_Study_Typ	FRD_Model_Info	STUDY_TYP	D_STUDYTYP	30

Domain Name	Table	fGDB SHP Code Field	SHP Description Field Name	SHP Field Width
D_Surge_Mdl	FRD_Model_Info	SURGE_MDL	D_SURGEMDL	40
D_Topo_Typ	S_CSLF_Ar	PRE_TOPO	D_PRE_TOPO	20
	S_CSLF_Ar	NEW_TOPO	D_NEW_TOPO	
D_TrueFalse	S_CSLF_Ar	MDLMETHODS	D_MDLMETH	10
	S_CSLF_Ar	CHANNELCHG	D_CHNNLCHG	
	S_FRD_Pol_Ar	NFIPSTATUS	D_NFIPSTAT	
	S_FRD_Pol_Ar	HMP_STATUS	D_HMP_STAT	
D_V_Datum	S_FRD_Proj_Ar	V_DATUM	D_V_DATUM	40
	FRD_Study_Info	V_DATUM	D_V_DATUM	
D_Wave_Mdl	FRD_Model_Info	WAVEHT_MDL	D_WAVHTMDL	25
D_Zone	S_CSLF_Ar	PRE_ZONE	D_PRE_ZONE	35
	S_CSLF_Ar	NEW_ZONE	D_NEW_ZONE	
D_ZoneSubtype	S_CSLF_Ar	PRE_ZONEST	D_PREZONST	60
	S_CSLF_Ar	NEW_ZONEST	D_NEWZONST	

### 0.3.5. Versioning

In keeping with FEMA's database and products versioning strategy, tables within the FRD contain a VERSION\_ID field. This field contains the 4-point version number (e.g., 1.5.2.1) representing the standards by which the data were compiled and should be validated. Since new version numbers can be established frequently, no versioning domain is established in the individual database standards, but FEMA's quality review tools may maintain a list of acceptable version numbers.

### 0.3.6. Data Source Coordination

As specified in Volume 1, Section 1.3 and Appendix I of these *G&S*, a Mapping Partner must perform initial research to avoid duplication of effort during a flood risk project. The assigned **Mapping Partner shall identify and use existing digital data whenever possible, while still meeting the required standards and quality of work. Normally data needed for a project is identified and collected during the Discovery phase.** Specific guidance on searching for existing data and documenting the data used is provided in the *Geospatial Data Coordination Implementation Guide* (on the Tools & Links tab of <https://hazards.fema.gov>).

Potential sources of data may be state, county, or local government agencies responsible for GIS, planning agencies, or real estate assessment agencies. Digital floodplain data also may be available from FEMA, if the area has been previously converted to digital format. In particular, **the Mapping Partner shall obtain the FIRM data available for the project area from the NFHL.** The requirements for project Discovery and base maps are specified in Volume 1, Appendix I, and Appendix M.

As part of data collection, coordination, and submittal, **the Mapping Partner that produces the FRD must document the data sources, date of collection or digitizing, scale, projections, coordinate systems, horizontal datum, vertical datum, and units of all digital data used and submitted.** The FRD FGDC-compliant metadata file is used to store this information and is submitted with the FRD. **For each data source used (both vector and raster), the Mapping Partner shall add a record to the L\_Source\_Cit table described herein, and add a corresponding Source Citation entry to the FRD metadata file in the Lineage section under Data Quality. Source Citation Type Abbreviations, followed by sequential numbers, shall be used in creating the references.** These abbreviations are presented in Table O-6.

Table O-3-11. Source Citation Type Abbreviations

Source Citation Type Abbreviations	Use
BASE	For all base map sources (includes roads, railroads, airports, hydrography). This abbreviation would typically be used for S_Carto_Ar, S_Carto_Ln and the hillshade raster.
FIRM	For features extracted from an existing FIRM database.
LOMC	For information derived from a Letter of Map Change (LOMC).
HAZUS	For features extracted from or developed during a Hazus assessment. Would typically be used for S_CenBlk_Ar.
FIS	For information taken from a previously published FIS report, including Floodway Data Tables and Flood Profiles.
STUDY	For information developed or acquired for the current flood risk project. This abbreviation would typically be used for S_AOMI_Pt, S_CSLF_Ar, S_FRD_Proj_Ar and S_FRD_Pol_Ar.

**The Mapping Partner that produces the FRD data shall number each source citation type abbreviation for a distinct data source (e.g., BASE1, BASE2, BASE3, etc.).** All spatial tables in the standards discussed in this appendix have a SOURCE\_CIT field tied to values in the L\_Source\_Cit lookup table. **The Mapping Partner that produces the FRD digital data shall populate the field with the Source Citation (i.e., prefix plus sequential number) from the lookup table that applies to the related spatial feature.** These SOURCE\_CIT field values are associated with documented source descriptions in the L\_Source\_Cit table and corresponding metadata files. In order to minimize work by having to sequentially renumbering all the SOURCE\_CIT values from combining the L\_Source\_Cit tables from multiple FIRM databases, the Mapping Partner may suffix the SOURCE\_CIT from the source FIRM database with the DFIRM\_ID to provide a unique identifier.

### O.3.7. Metadata

To facilitate the use of these data and the transfer of data files between users, **a metadata file shall accompany all digital data submittals, including the FRD. Only one FRD metadata file is required for each flood risk project. However, in this file, the assigned Mapping Partner must**

**distinguish between the different origins of the various datasets included. The metadata file shall follow the latest FRD metadata profile.**

**This metadata file must include a description of the source material from which the data were derived and the methods of derivation, including all transformations involved in producing the final digital files. The description must include the dates of the source material and the dates of ancillary information used for updates.** The date assigned to a source must reflect the date that the information corresponds to the ground. If the Mapping Partner does not know this date, the Mapping Partner may use the date of publication and indicate as such. For each data source in the metadata file, the Mapping Partner shall assign a Source Citation identification as described in Section O.3.6.

**The Mapping Partner shall describe any data created by merging information obtained from distinct sources in sufficient detail to identify the actual source for each element in the file.**

**The Overview Description Section of the Entity and Attribute Information should include a list of all FRD feature classes and tables included in the submittal. In this list, those tables without data should be identified.**

## O.4. Flood Risk Report

### O.4.1. Overview

The Flood Risk Report provides non-regulatory information to help local or Tribal officials, floodplain managers, planners, and emergency managers, as well as State and Federal officials and agencies and others better understand their flood risks, take steps to mitigate those risks, and communicate those risks to their citizens and local businesses. Because flood risk is related to physical systems of watersheds, streams, and coastlines, not community limits, the FRR provides flood risk data for the entire study area as well as for each individual community. This also emphasizes that flood risk reduction activities may impact areas beyond jurisdictional boundaries. This document is intended to be tailored to the flood risk project so that it only includes applicable information and does not include information that does not apply to the project (e.g., no discussion of areas of mitigation interest if not included in the project, no discussion of Changes Since Last Firm in the Section 3 results pages for areas that were not previously mapped, etc.). It is also intended to read in non-technical terms in order to better communicate concepts and results to non-technical stakeholders.

**Each FRR shall include the following sections:**

- i. Preface
- ii. Table of Contents
1. Introduction
2. Risk Analysis
3. Flood Risk Analysis Results
4. Actions to Reduce Flood Risk
5. Acronyms and Definitions
6. Additional Resources
7. Data Used to Develop Flood Risk Products

### O.4.2. Report Standards

Except for the bolded text and those items listed in the Table of Standards, the following guidelines for the FRR are not mandatory. The FRR guidance presented herein (including fonts, font sizes, and colors specified as RGB values) should be emulated as a best practice unless individual flood risk project goals and objectives necessitate the need to deviate otherwise. Consistency in flood risk products increases production efficiency and helps to maintain a high quality level and professional appearance. However, variations from these guidelines are acceptable to support community needs for alternative tools to support outreach, hazard mitigation planning, or actions to reduce risk. These guidelines, should provide a strong framework to enable Mapping Partners to develop an FRR that effectively communicates flood risk to project stakeholders.

The FRR should be created by Mapping Partners using a Microsoft Word template from FEMA and data from the FRD. Within the template, standard text is provided for use in all FRRs across the nation. Italicized text in the template is only for use as applicable, so that any italicized text not applicable shall be deleted from the FRR. Some portions of the FRR, particularly in Section 3 where the community results are presented, are tailored by the writer based upon the nature of the flood risk project and that study area. If a particular enhanced flood risk project product is not part of the deliverable, remove the associated language that is shown in italics.

**For delivery to the local communities, a Portable Document Format (PDF) must be digitally converted from the native word processing electronic file, not made by scanning a hardcopy printout of the document. The table of contents must be hyperlinked to applicable sections of the document. The PDF must contain bookmarks for each section heading in the table of contents.** Future revisions should be made using the native Microsoft Word file.

### O.4.2.1. Report Cover

The title on the report cover should describe the project area beginning with the name of the flood risk project area, which may be a sub-basin or specific area. In alphabetical order, list the independent cities and incorporated jurisdictions within the project area. Then, list the counties (as applicable) within the project area in alphabetical order. If a county or corporate area spans more than one sub-basin, place an asterisk after the name of the county or corporate area to indicate any communities that are only partially covered by the project area and do not include full community-wide results.

The FRR may be delivered several times throughout a project's lifetime (e.g., as each county's regulatory products become effective). Each time the FRR is delivered for the project area, increment the report number, by a single integer beginning with 001. Update the report date to reflect the date of delivery of the FRR.

### O.4.2.2. Table of Contents

The Table of Contents lists all of the sections and subsections included in the FRR.

For the risk analysis results presented in community pages in Section 3, the name of the flood risk project area including the sub-basin name and code. The naming convention should be in agreement with the WBD source data for compatibility as sub-basins are modified (e.g., Lower North Canadian River [11100302]). In Section 3, Flood Risk Analysis Results, the community and tribal entity summaries should be updated with their respective names and be listed in alphabetical order. The county summaries should be listed in ascending alphabetical order by name following the community and tribal areas.

## O.4.2.3. General Content

Much of the report is standard language and will not require updating. All sections, tables, and figures in the FRR template should be included in the actual FRR unless it is boilerplate language shown as italics. The FRR template contains boilerplate language that will not need to be changed from study to study. However, the Mapping Partner is responsible for changing community specific data and assuring that the community flood risk is discernable throughout the prepared report. Table O-7 shows the distribution of standard text among the FRR sections.

**Table O-4-1. Standard Text in FRR Sections**

FRR Section #	FRR Section Name	All Standard Text (100%) - No adjustments required	Standard Text, but italicized portions may be deleted if not applicable	Some Standard Text, some italicized portions may be deleted if not applicable, some free-form text and data in tables	Free-form text/ graphic (100%)
	Preface	X			
1	Introduction	X			
1.1	About Flood Risk	X			
1.2	Uses of this Report	X			
1.3	Sources of Risk Assessment Data Used	X			
1.4	Related Resources	X			
2	Risk Analysis	X			
2.1	Overview	X			
2.2	Analysis of Risk		X		
2.2.1	Changes Since Last FIRM (CSLF)		X		
2.2.2	Flood Depth and Analysis Rasters		X		
2.2.3	Estimated Loss Information		X		
2.2.4	Areas of Mitigation Interest (AoMIs)		X		
3	Flood Risk Analysis Results		X		
3.1	Flood Risk Map (graphic only, no text)				X
3.2	Flood Risk Project (e.g., Watershed USA) Summary			X	
3.3 , etc.	Community Summaries			X	
4	Actions to Reduce Flood Risk	X			
4.1	Types of Mitigation Actions		X		
4.2	Identifying Specific Actions for Your Community	X			

FRR Section #	FRR Section Name	All Standard Text (100%) - No adjustments required	Standard Text, but italicized portions may be deleted if not applicable	Some Standard Text, some italicized portions may be deleted if not applicable, some free-form text and data in tables	Free-form text/graphic (100%)
4.3	Mitigation Programs and Assistance	X			
5	Acronyms and Definitions	X			
5.1	Acronyms	X			
5.2	Definitions	X			
6	Additional Resources	X			
7	Data Used to Develop Flood Risk Products				X

#### O.4.2.4. Report Elements (Listed By Section)

Each section of the FRR is outlined below. First, a brief description of the section of the FRR is provided. Where appropriate, detailed instruction is included for the preparation of the FRR associated with each project area.

##### Sections 1.1 through 2.2

These sections use standard language in the form of a narrative. This information should not need to be changed, except for areas where selected fill-ins occur in the Word document template.

##### Section 2.2.1, Changes Since Last FIRM (CSLF)

This section uses standard language to describe the CSLF dataset. CSLF may not be provided if there is no existing digital FIRM. When CSLF data are not provided, this section should state “Changes Since Last FIRM are not provided in this project.”

##### Section 2.2.2, Flood Depth and Analysis Rasters

This section uses standard language to describe the various depth and analysis rasters created as part of a study.

##### Section 2.2.3, Estimated Flood Loss Information

This section uses standard language to describe the usefulness of Hazus (a free risk assessment software application developed by FEMA) in risk assessment and the characteristics of its various outputs.

### Section 2.2.3, Areas of Mitigation Interest (AoMIs)

This section uses standard language to describe the various AoMIs and how they are useful in mitigation planning. AoMIs is an enhanced dataset and should not be included unless it has been ordered as part of the project.

### Section 3.1, Flood Risk Map

The FRM should be inserted in this section and be kept on a page by itself. A blank page should be inserted in the document in order to maintain an even number of pages in the section, resulting in the map on one separate 2-sided page. The FRM should be inserted as a thumbnail image or as a complete 8½” x 11” page.

The Flood Risk Map is created separately. Guidance for the creation of the FRM can be found in this appendix in Section O.5, Flood Risk Map.

### Section 3.2, Flood Risk Project Summary

This section uses standard language to communicate flood risk within the project area. **This section shall include a summary table listing all the communities within the project area in alphabetical order, neglecting any prefixes (e.g., Village of, City of), then list all counties.**

Table 4-2 Communities Within the Project Area

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Village of Coastland	0123465	555	24	0.7	30	Y	4	Y
Village of Drytown	0123475	1,232	10	1.4	15	Y	3	N
City of Floodville	0123456	22,784	30	8	25	Y	9	Y
City of Metropolis	0124386	12,444	100	8.5	100	Y	10	N
Town of Waterloo	0123468	3,633	100	3.3	100	Y	10	N
A County	0123471	112,541	44	300	50	Y	2	Y
B County	0123482	66,320	30	205	33	Y	1	Y
C County	0123485	21,998	5	40	20	Y	6	Y

The project area summary table will need to be populated as follows:

**Table 4-3 Population Elements**

Element	Description
<b>Community Name</b>	In ascending order by name, enter the names of each unique community within the project area. After listing the jurisdictions. List all of the counties within the project area in ascending order by name. The values in the table represent 'unincorporated' portions of the county.
<b>CID</b>	Enter the Community Identification Number that corresponds to each community or jurisdiction listed to the left.
<b>Total Community Population</b>	Enter the total population for the area listed in the first column.
<b>Percent of Population in Watershed</b>	Calculate the percentage of the jurisdictions population contained within the project area.
<b>Total Community Land Area (square miles)</b>	Enter the total land area in square miles for the area listed in the first column.
<b>Percent of Land Area in Watershed</b>	Calculate the percentage of the jurisdictions land area contained within the project area.
<b>NFIP</b>	Enter a "Y" for each jurisdiction listed in the first column that participates in the NFIP. If a jurisdiction is not participating in the NFIP, enter an "N".
<b>CRS Rating</b>	Enter the CRS rating that corresponds to each jurisdiction listed in the first column.
<b>Mitigation Plan</b>	Enter a "Y" for each jurisdiction listed in the first column that is covered by a current FEMA approved Hazard Mitigation Plan. If a jurisdiction is not currently covered in a Hazard Mitigation Plan, enter an "N".

Information needed to populate the project area summary table is available in the FRD in the locations indicated below:

Information type	Associated Table in the FRD	Associated Field in the Table
Community Name	S_FRD_Pol_Ar	POL_NAME1
CID	S_FRD_Pol_Ar	CID
Total Community Population	S_FRD_Pol_Ar	POPULATION

Information type	Associated Table in the FRD	Associated Field in the Table
Percent of Population in Watershed	S_FRD_Pol_Ar	PCT_POP
Total Community Land Area (square miles)	S_FRD_Pol_Ar	TOT_LND_AR
Percent of Land Area in Watershed	S_FRD_Pol_Ar	PCT_LND_AR
NFIP	S_FRD_Pol_Ar	NFIPSTATUS
CRS Rating	S_FRD_Pol_Ar	CRS_STATUS
Mitigation Plan	S_FRD_Pol_Ar	HMP_NAME

**The project summary section shall have a CSLF summary table**, populated by using the area values (the first four lines in the table below) contained in the L\_CSLF\_Summary table in the FRD. A second enhanced CSLF summary table showing the changes in buildings and population should be shown if part of the project scope. The values reported are dependent on the LOCATION field which will be either SFHA or Floodway. The fields from which to derive this information are listed below:

Information Type	Associated Field in the Table
<b>Total Area (square miles)</b>	AREA_SM
<b>Area Increase (square miles)</b>	AREA_INCR
<b>Area Decrease (square miles)</b>	AREA_DECR
<b>Net Change (square miles)</b>	AREA_NET
<b>Increase Population</b>	POP_INCR
<b>Decrease Population</b>	POP_DECR
<b>Net Population</b>	POP_NET
<b>Increase Buildings</b>	BLDG_INCR
<b>Decrease Buildings</b>	BLDG_DECR
<b>Net Buildings</b>	BLDG_NET

**The project summary section shall include a risk assessment summary table** containing the following data from the FRD. The information required is listed in the following table:

Information Type	Associated Table in the FRD	Associated Field in the Table
Total Inventory Estimated Value	L_RA_Summary	TOT_LOSSES
Total Inventory Percent of Total	L_RA_Summary	LR_TOT
10% (10-yr), 2% (50-yr), 1% (100-yr), 0.2% (500-yr) and Annualized (\$/yr) Dollar Losses	L_RA_Summary	RETURN_PER
		BC_TOT
		BC_RES
		BC_COM
		BC_OTH
		BUS_DISRPT
10% (10-yr), 2% (50-yr), 1% (100-yr), 0.2% (500-yr) and Annualized (\$/yr) Loss Ratio	L_RA_Summary	RETURN_PER
		LR_TOT
		LR_BC_RES
		LR_BC_COM
		LR_BC_OTH
		BUS_DISRPT

The following rounding rules have been applied to the summary table in the FRD:

Table 4-4 Rounding Values Applied to Summary Table in FRD

Value	Rounding Factor
All loss ratios	rounded to nearest percent
Dollar loss Under \$100,000	rounded to nearest \$10,000
Dollar loss Over \$100,000	rounded to nearest \$100,000

If Section 3.2 results in an odd number of pages, a blank page should be inserted in the document in order to maintain an even number of pages in the section. This allows Section 3.3 to start on a right-hand page when printed 2-sided.

**Section 3. 3.x, etc., Community Summaries**

This section uses standard language to communicate flood risk within the communities being studied. **A new section will need to be created for each jurisdiction within the project area.** The communities should be inserted in the same order as the project summary table in Section 3.2. For each new section created, a section number must be assigned. The numbering will begin with 3.3 and for each jurisdiction added the number after the decimal will be increased by one whole number for each instance. For example, if there are 10 communities in the project, the first community will be Section 3.3 and the final community will be Section 3.12. Each jurisdiction should have its corresponding CID listed in parenthesis after its respective name in the section title.

**This section shall include a Community Overview table** populated with the same data used in the Project Area Summary table in Section 3.2. For the purposes of this section, it is populated only with the data relevant to the community described by the particular section.

Below the community summary table, insert values from the FRD for the number of Past Federal Disaster Declarations for flooding within each community. Update NFIP Policy Coverage information NFIP recognized repetitive loss properties information for each community. Indicate the number of commercial and residential properties within the total. If all properties are either residential or commercial, state “All commercial” or “All residential.” Update NFIP-recognized severe repetitive loss properties information for each community. Only residential properties can be categorized as severe repetitive loss by the NFIP, so state “All residential.” The following table describes the source of the data and how it is to be calculated for reporting purposes:

Information type	Associated Table in the FRD	Associated Field in the Table
Past Federal Disaster Declarations for flooding within the project area	S_FRD_PoL_Ar	PASTDECLAR
NFIP Policy Coverage information	S_FRD_PoL_Ar	FLD_POLICY POLICY_COV
NFIP-recognized repetitive loss properties information for the project area	L_Claims	RLP_RES & RLP_COM
NFIP-recognized severe repetitive loss properties information for the project area	L_Claims	SRL_RES

**Each community shall have a CSLF summary table**, populated by using the area values (the first four lines in the table below) contained in the L\_CSLF\_Summary table in the FRD. A second enhanced CSLF summary table showing the changes in buildings and population should be shown if part of the project scope. The values reported are dependent on the LOCATION field which will be either SFHA or Floodway. The fields from which to derive this information are listed below:

Table 4-5 CSLF Summary Table

Information Type	Associated Field in the Table
Total Area (square miles)	AREA_SM
Area Increase (square miles)	AREA_INCR
Area Decrease (square miles)	AREA_DECR
Net Change (square miles)	AREA_NET

Information Type	Associated Field in the Table
Increase Population	POP_INCR
Decrease Population	POP_DECR
Net Population	POP_NET
Increase Buildings	BLDG_INCR
Decrease Buildings	BLDG_DECR
Net Buildings	BLDG_NET

Each community shall have a risk assessment summary table containing the estimated loss information for each community in the flood risk project area from values contained in the FRD. The information required is listed in the following table:

Information Type	Associated Table in the FRD	Associated Field in the Table
Total Inventory Estimated Value	L_RA_Summary	TOT_LOSSES
Total Inventory Percent of Total	L_RA_Summary	LR_TOT
10% (10-yr), 2% (50-yr), 1% (100-yr), 0.2% (500-yr) and Annualized (\$/yr) Dollar Losses	L_RA_Summary	RETURN_PER
		BC_TOT
		BC_RES
		BC_COM
		BC_OTH
10% (10-yr), 2% (50-yr), 1% (100-yr), 0.2% (500-yr) and Annualized (\$/yr) Loss Ratio	L_RA_Summary	BUS_DISRPT
		RETURN_PER
		LR_TOT
		LR_BC_RES
		LR_BC_COM
		LR_BC_OTH
		BUS_DISRPT

The following rounding rules should be applied to the summary table and in the FRD:

Value	Rounding Factor
All loss ratios	rounded to nearest percent
Dollar loss under \$100,000	rounded to nearest \$10,000
Dollar loss over \$100,000	rounded to nearest \$100,000

**If an AoMI data set is ordered for the study, summarize the conditions that affect flooding in the study region.** This section is intended to be a user defined narrative and does not employ standard language. Update the table in this section using the following values found in the FRD:

Information Type	Associated Table in the FRD	Associated Field in the Table
Type of Mitigation Interest	L_AoMI_Summary [E]	AoMI_TYP
Number of Areas	L_AoMI_Summary [E]	TOTAL
Data Source	L_AoMI_Summary [E]	AoMI_SOURCE

If the final section for any jurisdiction results in an odd number of pages, a blank page should be inserted in the document in order to maintain an even number of pages in the section, resulting in a separate section when printed 2-sided.

#### **Section 4.1, Types of Mitigation Actions**

This section uses standard language to discuss the various mitigation actions that stakeholders can take following the assessment of flood risk.

#### **Section 4.2, Identifying Specific Actions for Your Community**

This section uses standard language to outline examples of methodologies that communities can employ to identify what actions are appropriate for that community.

#### **Section 4.3, Mitigation Programs and Assistance**

This section uses standard language to describe the various funding sources available to communities that wish to take further mitigation action. If an AoMIs dataset is ordered for the study, Mapping Partners summarize the conditions that affect flooding in the study region. This section is intended to be a user defined narrative and does not employ standard language.

#### **Section 5, Acronyms and Definitions**

This section lists acronyms and definitions that pertain to the standard language in the FRR. Because the language is standard throughout, changes to the content of this section will most likely not need to be made. Should a change be warranted, maintain alphabetical order of listings and keep within the same format used in the section being updated.

#### **Section 6, Additional Resources**

This section lists supplemental resources that a community can use to learn more about the topics being discussed in this report. All resources should be listed alphabetically by title and given a brief description. Should the need arise to add to the list of FEMA publications, follow the following format and insert into the list alphabetically in ascending order:

[Author], [Year of publication]. [Title], FEMA[Publication #]. [City of Publication], [State of Publication], [Month and Year of publication].

See examples below:

FEMA, 2007f. *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings*, FEMA 577. Washington, DC, June 2007.

FEMA, 2008. *Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program*, FEMA 9-0372, Third Edition. Washington, DC, December 2007.

### **Section 7, Data Used to Develop Flood Risk Products**

This section will include paragraphs of free-form text describing the data leveraged by the local/state stakeholders in the production of this flood risk project. This is not intended to be an exhaustive list of resources, nor is it intended to duplicate information presented in the Discovery report. It is intended to provide a list of sources for the data leveraged for the flood risk project for local staff to encourage communication within entities housing data related to the project area.

#### **O.4.2.5. Enhanced Report Features**

In flood risk projects that include enhanced datasets, the FRR should not include any extra sections besides those outlined above; however, the content of the sections could change, depending upon the particular enhancements and the opportunity to convey specific information within the sections as desired by the communities.

#### **O.4.2.6. Paper Report**

Mapping Partners will furnish the FRR in PDF format and Microsoft Word format. These formats will support being able to be printed 2-sided in color on 8.5" x 11" paper. FEMA will distribute the final products. However, it is anticipated that Mapping Partners / FEMA will likely provide hard-copy drafts at various meetings throughout the flood risk project.

The Flood Risk Map, Flood Risk Project Area Summary and Community Summary pages found in Section 3 should be aligned so that each is contained within an even number of pages to allow each section to be exclusive to itself. A community should be able to pull out their respective summary pages without portions of other community results sharing the page. This may require the insertion of a blank page as needed in order to maintain an even number of pages per community (required for printing 2-sided). On blank pages, insert "This page left intentionally blank."

## 0.5. Flood Risk Map

### 0.5.1. Overview

This section provides standards for the elements that are shown on each Flood Risk Map, including the mapping format, presentation of base data, flood data, flood risk information, areas of mitigation interest, map frame sizing, legend, title block, and graphical presentation of risk information. As a component of the FRR, the FRM's intent is to provide a geographic summary of risks within the project area. The FRM is not a regulatory product and is intended to focus the user's attention to specifically-identified risk areas within the flood risk project area. In most cases, the FRM is created along with the FRD as companion elements to the hydrologic and hydraulic study (or restudy) of flooding sources for a given watershed, coastal area, or site-specific project area, and distributed to various stakeholders.

The intent is for the FRR and FRM to be used as facilitation tools for involving communities and planners in collaborative activities related to local flood risk challenges. Often, the amount of data and information collected may not reasonably be shown on a single FRM for the project area. In such cases, the user should refer to the FRD for more detailed information. All information depicted on the FRM and within the FRR is obtained directly from the FRD. This integrated approach to the management of flood risk data allows the Mapping Partner to produce a map that requires little or no manual cartographic finishing. A minimum list of required data and information to show on the FRM is listed below. The creation of flood risk datasets as standalone products (i.e., without the creation of new/revised flood hazard data) are at the discretion of the FEMA Regions and is based on multiple factors, including relative flood risk and local stakeholder contributions.

### 0.5.2. Map Standards

Other than the bolded text and those items listed in the Table of Standards, the following guidelines for the FRM are not mandatory requirements that must appear on all versions of the FRM. The FRM guidance presented herein should be emulated as a best practice unless individual flood risk project goals and objectives necessitate the need to deviate otherwise. Consistency in flood risk products increases production efficiency and helps to maintain a high quality level and professional appearance. However, variations from these guidelines are acceptable to support community needs for alternative tools to support outreach, hazard mitigation planning, or actions to reduce risk. These guidelines should provide a strong framework to enable Mapping Partners to develop an FRM that effectively communicates flood risk to project stakeholders.

#### 0.5.2.1. Page Size

**All FRM panels shall be printed full page, portrait orientation or landscape orientation, on ARCH E-size paper** using the dimensions shown below:

- Trimmed paper size:
  - Portrait: (ARCH E) Height 48” x Width 36”
  - Landscape: (ARCH E) Height 36” x Width 48”
- Map Panel border:
  - Portrait: Height 37.25” x Width 35”
  - Landscape: Height 25.25” x Width 47”

The following sections describe the dimensions and locations of all the elements on the FRM.

#### 0.5.2.2. Map Title

**The title on the map shall be the name of the project area. This title should match the FRR and the data in the field PROJ\_NM in the S\_FRD\_Proj\_Ar feature class.**

#### 0.5.2.3. Legend (Map Symbology)

**The map legend shall contain those items that are needed to assist the map user in interpreting map symbols, base data, flood data, flood risk, and AoMIs.** The FRM legend elements are standardized and should not vary. However, in cases where enhanced features are not shown on the map, the Mapping Partner should remove all references to enhanced feature content from the FRM legend. For example, if no AoMIs are included, the AoMIs portion would be removed from the legend and the remaining legend elements should be distributed to provide a balanced appearance.

#### 0.5.2.4. Project Locator

The project locator serves as a reference to orient the map user as to where the project area exists in relation to other known locations, (e.g., adjacent watersheds or counties). The following guidelines should be followed when preparing **the project locator, which shall be shown on every FRM:**

- The diagram size may vary with the size of the watershed or project area and the space constraints of the diagram.
- The diagram should center on the project area and at a minimum will show adjacent county or watershed boundaries significant to the project area.
- Visible states and significant bodies of water should also be labeled.
- The diagram should have the mapped Project Area highlighted.
- North orientation should be consistent with the Project Locator and the Map Panel.

### O.5.2.5. Title Block

**Every FRM should contain a title block that contains the name of the project area** (and HUC-8 code if applicable), and the release date. The project area name should match the FRR and the data in the field PROJ\_NM in the S\_FRD\_Proj\_Ar feature class.

### O.5.2.6. Scale, North Arrow

The extent of the FRM is to be determined by the Mapping Partner. The initial extent is based on the project area (S\_FRD\_Proj\_Ar); yet allowing room for supporting data, extra room within the layout for callout boxes, and then scaled to fit appropriately. **The map should also have a north arrow, a scale bar, and scale text.**

## O.5.3. Page Content

### O.5.3.1. Geographic Extent

The FRM will most often be prepared on a HUC-8 sub-basin basis. This follows FEMA's watershed based approach to represent the impacts of floods in a natural flow regime rather than in relation to political boundaries.

### O.5.3.2. Map Body

**The body of the FRM shall be comprised of base data, flood data, flood risk data, and areas of mitigation interest (if applicable).** All features depicted in the map body are described the four subsections: O.5.3.3.1, Base Data Types; O.5.3.3.2 , Flood Data Types; O.5.3.3.3 Flood Risk Types; and O.5.3.4.1, Areas of Mitigation Interest.

Labels are to be initially placed automatically for as many features as possible, with the source of each label coming directly from within the database. In areas with a large number of features to be labeled, the Mapping Partner should take advantage of font size flexibility for placing feature labels. Reducing font size on applicable features should be considered before overprinting that feature.

#### *Overprinting*

Overprinting is the placement of text such that it overlaps other map features or text. Overprinting shall be avoided, but if it becomes necessary, the user should choose to overprint base data features that are of least importance to the theme of the map.

#### *Leader Lines*

Labels may be leadered to a feature using a plain leader if space does not permit the label to be within or adjacent to the feature.

### O.5.3.3. Required Features

This subsection provides guidance on the required features for each FRM, a description of each feature, and contains a table of their graphic and label standards.

#### *O.5.3.3.1. Base Data Types*

Base data form the backdrop against which all FRD information is viewed. Base data must cover the entire geographic area of the project area. Such layers should include: political boundary features, planimetric data such as transportation features, and hydraulic structures. Some base data must also be expanded to cover the extent of the FRM, such as watershed and political boundaries. The locations of features in the base map data files are used “as is” and thus FIRM base map accuracy requirements do not apply. Base map features from one source may be clipped where they meet those from another source.

The assigned Mapping Partner should depict the following types of base data features on the FRM if they occur within the mapped area:

- Boundaries that identify county and state boundaries, corporate limits (where applicable), extraterritorial jurisdictional areas (ETJs), HUC-8 sub-basin boundaries, and HUC-10 watershed boundaries should be depicted.
- Major transportation features: Interstates, U.S. highways, state highways, and significant airports (where applicable) should be depicted.
- Hydraulic structures (i.e., levees, dams, and significant hydraulic structures) should be depicted.
- A hillshade of the watershed should be depicted as a background layer.

#### *Boundary Features*

Political entities should be depicted and labeled as described below. The Mapping Partner should use leader lines as appropriate to reduce clutter.

Political entities (incorporated areas, areas of extraterritorial Jurisdiction, etc.) should be labeled with their formal name.

When ETJs are significant enough to be labeled on a FIRM, they should be shown on the FRM. In instances where the ETJ boundary resides outside the corporate limits, only the outermost boundary line should be shown and the area labeled with the community name.

All other areas, such as military and Tribal lands, state and national parks or forests are not required, but should be shown on the FRM if they are relevant to flood risk in the FRM project

area. These features should be labeled by name at least once. In crowded or segmented areas, these labels can be leadered, but leadering is not required.

The HUC-8 sub-basin boundary is the basis for the FRM, unless a different project area has been specified. This information should be pulled directly from the S\_HUC\_Ar feature class within the FRD.

The HUC-10 watershed boundary should also be shown on the FRM. This information should be stored in the S\_HUC\_Ar feature class within the FRD.

When boundaries of different types are coincident with each other or with base map features, the Mapping Partner shall show only one.

When additional jurisdictions fall outside the project area are needed for the FRM, those features shall reside in the S\_Carto\_Ar feature class.

### ***Transportation Features***

Interstates, U.S. highways, state highways, and major airports should be shown and labeled on the FRM. Road shield labels shall be placed on the line it represents, and horizontal to the map frame. County highways, major roads, and other airports should be added for clarity at the Mapping Partner's discretion, as long as their addition does not render the map unreadable due to excessive clutter. Road name labels may be leadered into the feature as necessary.

### ***Hydraulic Structures***

All levees (or other flood control features), dams or other significant hydraulic structures stored within the S\_Carto\_Ln, S\_Carto\_Ar, or S\_Carto\_Pt feature classes in the FRD should be shown on the FRM. A label may be placed if the structure(s) necessitate a label.

### ***Hillshade***

The watershed hillshade should be shown on the Flood Risk Map to convey a sense of the watershed's overall topographic relief.

### ***O.5.3.3.2. Flood Data Types***

The assigned Mapping Partner should depict the following types of flood features on the FRM if they occur within the mapped area:

### ***Hydrographic Features***

Hydrographic features (streams, lakes, ponds, bays, and oceans) that have an identified flood hazard, and formal name should be labeled. In areas where a large number of small stream features could render the map unreadable due to excessive clutter, it is acceptable for only the main streams to be labeled. Stream name labels should be placed parallel to the feature. The application of curved

labels, also known as splining, is allowed. Large hydrographic features, such as oceans and lakes, may be labeled using larger font sizes where applicable.

### ***Restudy Areas***

Restudy areas are a buffer of the newly studied stream centerlines. The buffer should be approximately 0.25" measured at map panel scale on the FRM.

### ***New SFHAs***

New SFHAs are from newly studied, non-coastal flooding sources resulting from the flood risk project. All SFHAs within the FIRM database not related to coastal flooding should be used to compose this layer.

### ***Coastal Surge Influenced Area***

Coastal Surge Influenced Areas are any newly studied coastal flooding polygons resulting from the flood risk project. Only coastal flooding SFHAs within the FIRM database should be used to compose this layer.

### ***O.5.3.3. Flood Risk Types***

The flood risk data are based on the Asset Loss Total values from the Composite Risk Analysis (table L\_RA\_Composite, field TOT\_LOSSES.) The objective of this layer is to show the dollar exposure risk of certain areas. The categories are defined as being Very Low to Very High. The quantity ranges are to be determined relative to the total risk within the watershed; normalization methods can be used to aid in this determination.

## **O.5.3.4. Enhanced Features**

This subsection provides guidance on the enhanced features that were deemed important by the communities in question and thus added to the FRM.

### ***O.5.3.4.1. Areas of Mitigation Interest***

AoMIs are specific points within each project area that were identified during the project lifecycle as specific factors that either cause increased flooding, or increased flood damage. The following points are highlighted AoMIs:

- Accredited Levee;
- Non-Accredited Levee::;
- Dams;
- Coastal Structures;
- Stream Flow Constrictions;
- Past Claims Hot Spot;

- Key Emergency Routes Overtopped During Frequent Flooding Events;
- At-Risk Essential Facilities;
- Individual Assistance (IA) and Public Assistance (PA) Data;
- Significant Land Use Changes (within the past 5 years and looking forward 5 years);
- Areas of Significant Riverine or Coastal Erosion;
- Non- Levee Embankments;
- Other Flood Risk Areas;
- Areas of Mitigation Success; and
- Other

#### **O.5.3.5. Callouts**

The Project Team shall work with the community to determine what items are to be shown on the FRM as callouts. A callout is used to highlight areas of significant interest to the community. Each callout should contain an image, title, and descriptive text to be shown on the FRM. These callouts can be used to highlight things such as AoMIs (i.e., S\_AOMI\_Pt), areas of high risk, or other significant locations. Callouts are to be stored in the S\_FRM\_Callout\_Ln feature class.

##### ***O.5.3.5.1. Callout Placement***

Callouts should be placed in the areas surrounding the project area in the white space of the map and should not overlap the project area. The S\_FRM\_Callout\_Ln feature class within the FRD will depict where the callout is to be placed on the map. The callout box is to be centered on the initial (from) node of the line, while the final (to) node of the line shall point to the actual map feature being showcased by the callout. Each line in S\_FRM\_Callout\_Ln will contain information about the image, title, and descriptive text to be used for that callout. There is to be one line per callout box. Each line is used as the leader line for the callout boxes. The size of the callout image is suggested to be 4" x 6" or 6" x 4", with the descriptive text box directly below the image and matching the width of the image. The Mapping Partner should adjust the layout orientation of the callout box according to the image orientation of the image being included (portrait or landscape).

- Callout Image:
  - Callout Height stored in the FRD: Table Name S\_FRM\_Callout\_Ln, Field Name: IMG\_HEIGHT
  - Callout Width stored in the FRD: Table Name S\_FRM\_Callout\_Ln, Field Name: IMG\_WIDTH
  - Format: 300 dpi, 24-bit depth

- Storage: Stored in the FRD: Table Name S\_FRM\_Callout\_Ln, Field Name: IMG\_BINARY
- Callout title text stored in the FRD: Table Name: S\_FRM\_Callout\_Ln, Field Name: IMG\_TITLE
- Callout descriptive text stored in the FRD: Table Name: S\_FRM\_Callout\_Ln, Field Name: IMG\_CPTION
- Callout descriptive text box: White Fill, Outline: Line weight 1 Pt., Black, 5 Pt. Margins
- Callout descriptive text box Size: Width 6” or 4”, Height will vary to fit the amount of text
- Callout descriptive text box is to be placed directly below Callout Image Box, center aligned with the Callout Image Box

## O.6. Deliverables / Submittals

A complete flood risk submittal to the Map Service Center is required and is composed of the items listed below.

1. FRD files in ESRI fGDB AND SHP formats
2. Digital Rasters in the fGDB AND GeoTiff formats
3. Metadata file in accordance with FEMA's FRD metadata profile
4. PDF AND .docx versions of the FRR
5. PDF AND .mxd versions of the FRM

All deliverable files must meet the standards set forth by the Map Service Center. Refer to the MSC's guidance (*MSC Deliverables Guide*) regarding the deliverable package for additional information.

### O.6.1. Database Submittal

Before submittal to FEMA, the Mapping Partner will export the FRD vector datasets and tables to SHP and dbf formats, respectively. When performing the export to SHP format, for the coded-value domains, partners must create and populate the domain description fields as described in Section O.3.4.13 with the actual descriptions (not the coded value). Furthermore, in exporting to SHP format, the field length is limited to 254 characters. Therefore, in exporting the NOTES field on the S\_AOMI\_Pt feature class, the NOTES field will be split into NOTES1, NOTES2, NOTES3, and NOTES4, each having a field width of 254 characters.

Several of the feature classes (e.g., FRR\_Project, FRR\_Images, FRR\_Custom, S\_FRM\_Callout\_Ln) have fields with a raster or blob data type. Because the SHP format does not support these data types, those SHP files will not contain those fields (e.g., IMG\_BINARY).

**The Mapping Partner will deliver all the tables and feature classes as specified in the fGDB-based FRD, even if they contain no records (e.g., enhanced tables). However, only SHP files and dbf tables that contain data are delivered.**

**The Mapping Partner must also export all depth and analysis rasters to GeoTIFF format.** This will allow FEMA to distribute the FRD to users that may not utilize ESRI software.

# Attachment A

## Flood Risk Database (FRD) Data Model Poster