# Guidance for Flood Risk Analysis and Mapping

## Changes Since Last FIRM

May 2014


FEMA

This guidance document supports effective and efficient implementation of flood risk analysis and mapping standards codified in the Federal Insurance and Mitigation Administration Policy FP 204-07801.

For more information, please visit the Federal Emergency Management Agency (FEMA) Guidelines and Standards for Flood Risk Analysis and Mapping webpage (http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping), which explains the policy, related guidance, technical references, and other information about the guidelines and standards process.

Nothing in this guidance document is mandatory other than standards codified separately in the aforementioned Policy. Alternate approaches that comply with FEMA standards that effectively and efficiently support program objectives are also acceptable.

# Document History

| Affected Section or Subsection | Date | Description |
|---|---|---|
| First Publication | May 2014 | Initial version of new transformed guidance. The content was derived from the *Guidelines and Specifications for Flood Hazard Mapping Partners*, Procedure Memoranda, and/or Operating Guidance documents. It has been reorganized and is being published separately from the standards. |
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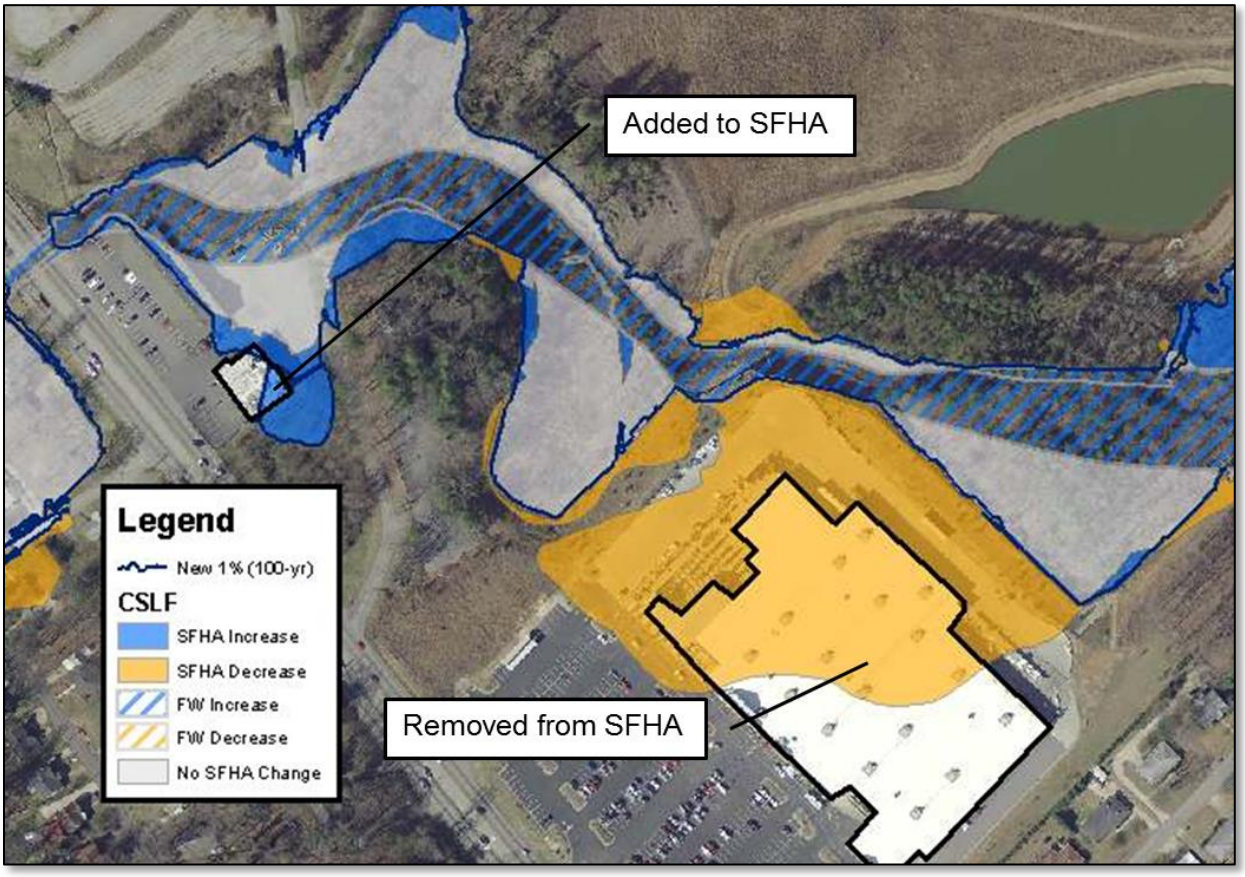
## 1.0 Definitions

The Changes Since Last FIRM (CSLF) dataset reflects changes that have occurred in the horizontal extent of the regulatory floodway, 1% annual chance floodplain, and 0.2% annual chance floodplain. The CSLF dataset does not provide information on the vertical change in flood elevations (see Figure 1). This information is provided in the Water Surface Elevation Change Grid.

**Figure 1: CSLF Example**



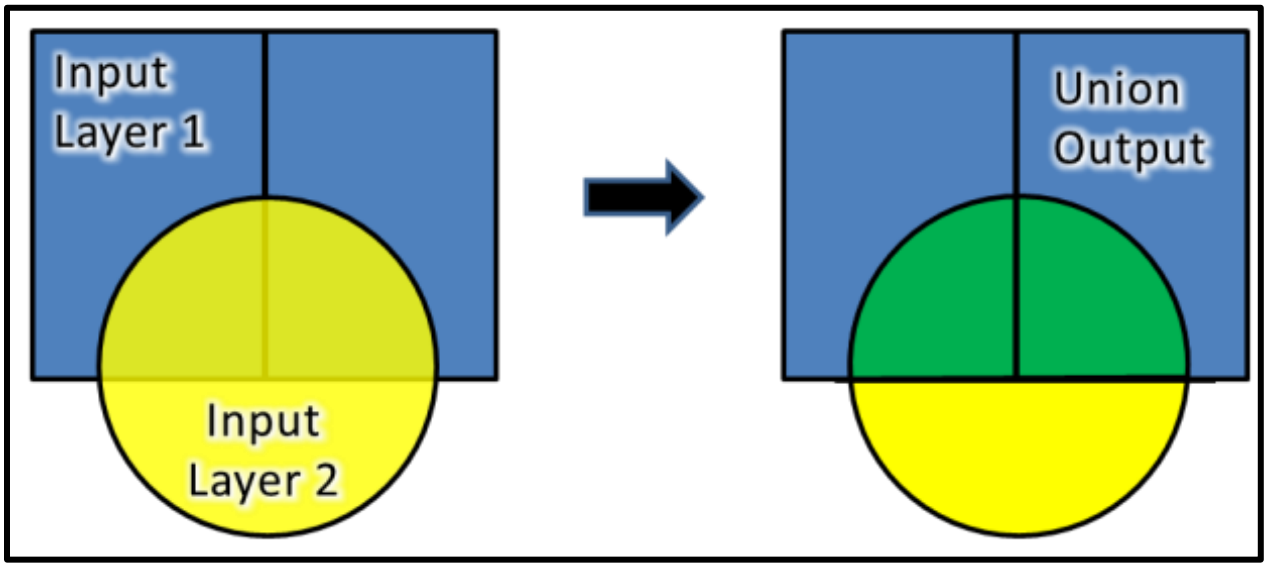

## 2.0 Dataset Creation

In order to prevent rework, it is recommended that the creation of the CSLF dataset be performed after the Flood Insurance Rate Map (FIRM) Database has passed the QR2 quality review. The CSLF dataset is generally created through two separate processes – geographic unioning and attribution of the resulting polygons:

- Geographic "unioning" is performed using the effective floodplain and floodway boundary layers from the National Flood Hazard Layer (NFHL), the political areas, the new/revised floodplain, and the project area boundary. This process will yield change polygons representing changes in extent to the 1% and 0.2% annual chance floodplains and the regulatory floodway, and representing the political areas and project area boundary intersections. A basic example of unioning is shown in the Figure 2.

- CSLF attribution is conducted for all change polygons created in the unioning process. This will normally require assigning CSLF attributes, and may include population of the Contributing Engineering Factor attributes.

**Figure 2: Unioning Geographic Datasets**




This two-step process should result in a dataset that shows changes to the horizontal floodplain and floodway extent, and changes to the flood zone designations. This dataset can also provide insight into why the changes occurred.

## 2.1 Geographic Unioning

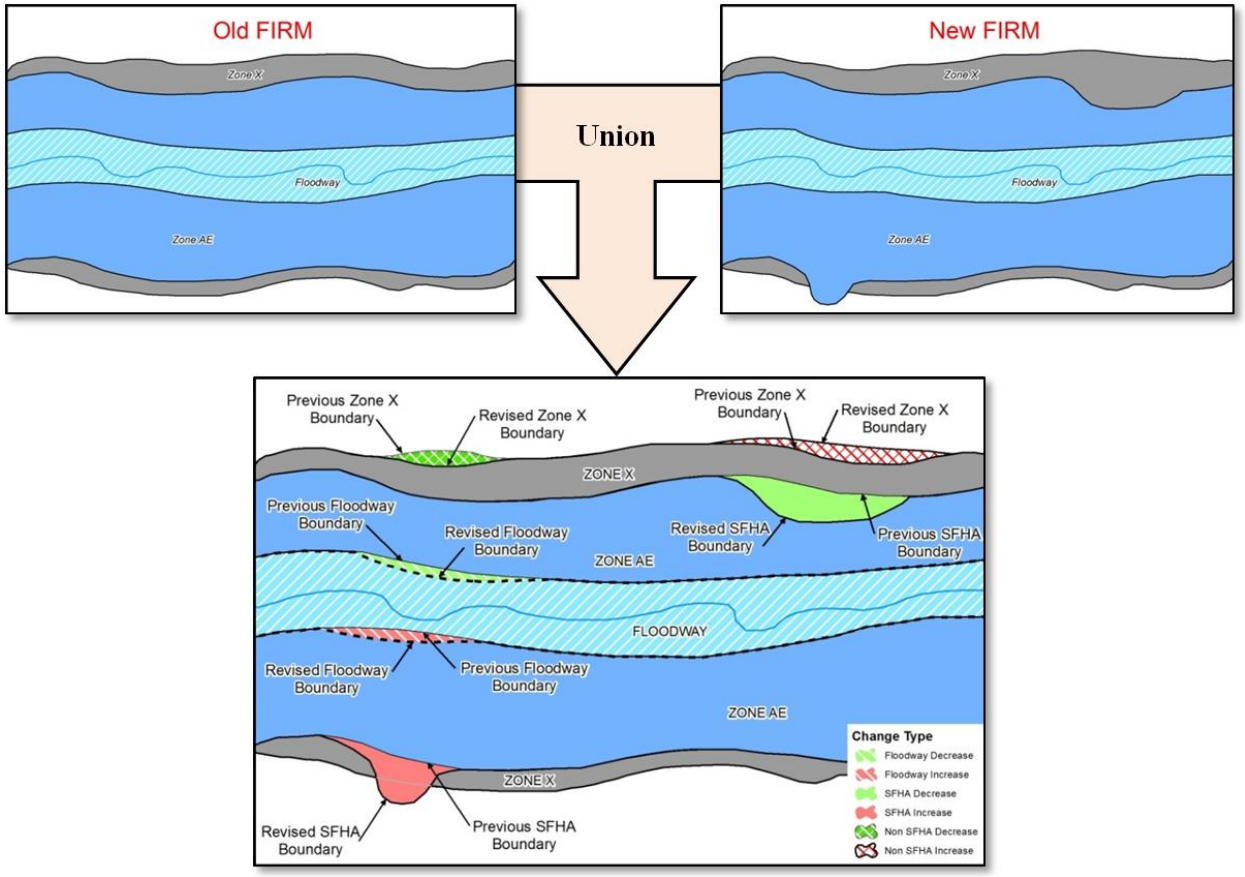
For this process, Mapping Partners may consider applying the following intermediate steps:

1. Perform a geospatial union of the previously effective and the new/updated flood hazard data layers to produce a new composite CSLF polygon layer for the project area that possesses all combinations of previous and new flood zone types. When the political areas and project area boundary layers are also included in the union process, the resulting CSLF polygons can be attributed with those IDs as well.

2. Remove any polygons that possess an attribute of 'unshaded Zone X' for both previous and new flood zone types. Areas that were mapped as unshaded Zone X on the previous FIRMs and that remain as unshaded Zone X on the new FIRMs should not be delivered within the CSLF dataset.

The result of applying the above steps should produce a data layer containing all combinations of floodplain change as shown in Figure 3.

**Figure 3: Geographic Unioning of Previous and New/Revised Floodplain Polygons**




## 2.2 FRD-Related Guidance

The CSLF dataset is made up of the following tables in the Flood Risk Database (FRD):

- S_CSLF_Ar
- L_CSLF_Summary
- FRD_Model_Info

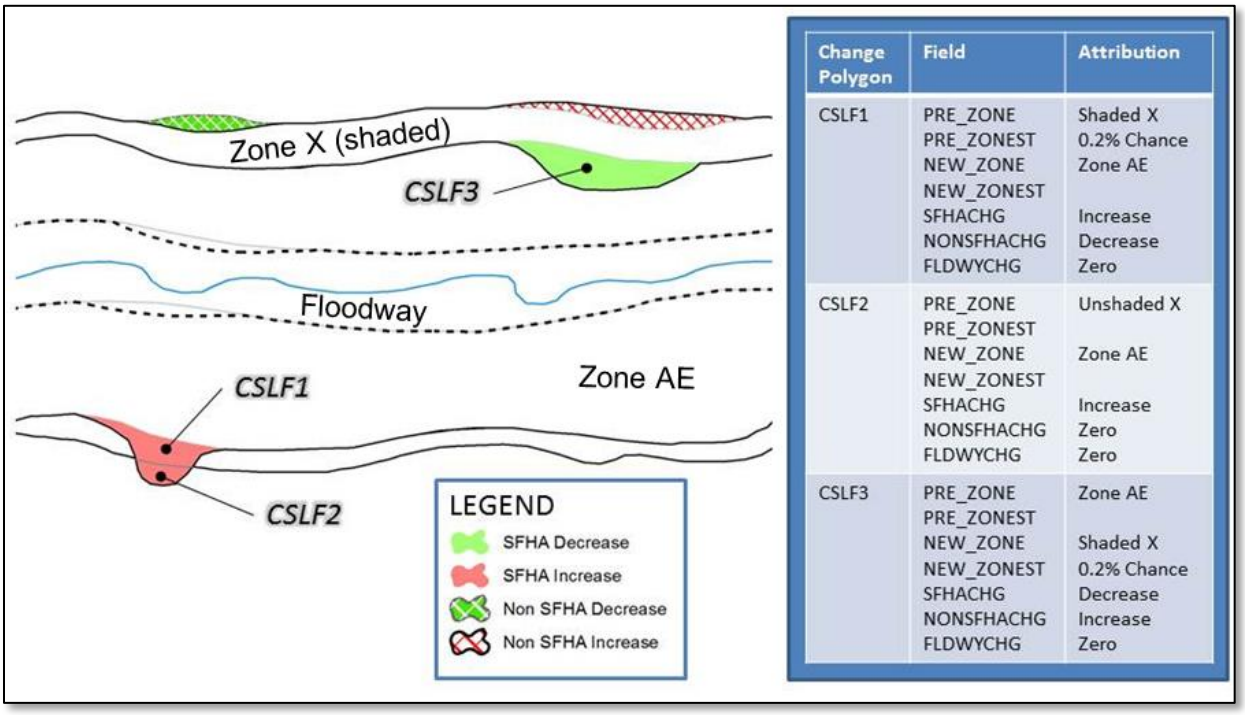
The attributes of S_CSLF_Ar are generally divided between "Standard" attributes and Contributing Engineering Factors attributes. The *Flood Risk Database Technical Reference* contains a complete list of the CSLF attributes and field descriptions, and specifies which fields must be populated and which are enhanced. Additional guidance specific to some of these attributes is below.

### 2.2.1 S_CSLF_Ar – Standard Attributes

Standard CSLF attributes reflect the "before" and "after" condition of the subject area, such as the previous and new flood hazard zone. Each change polygon within the CSLF dataset stores an attribute that indicates whether that area reflects a Special Flood Hazard Area (SFHA) increase, an SFHA decrease, or no SFHA change. There are similar attributes to capture the changes in non-SFHA areas (e.g. whether the shaded X expanded or contracted), floodway areas, and Coastal High Hazard Areas (CHHA) (i.e. VE zones). When populating these CSLF

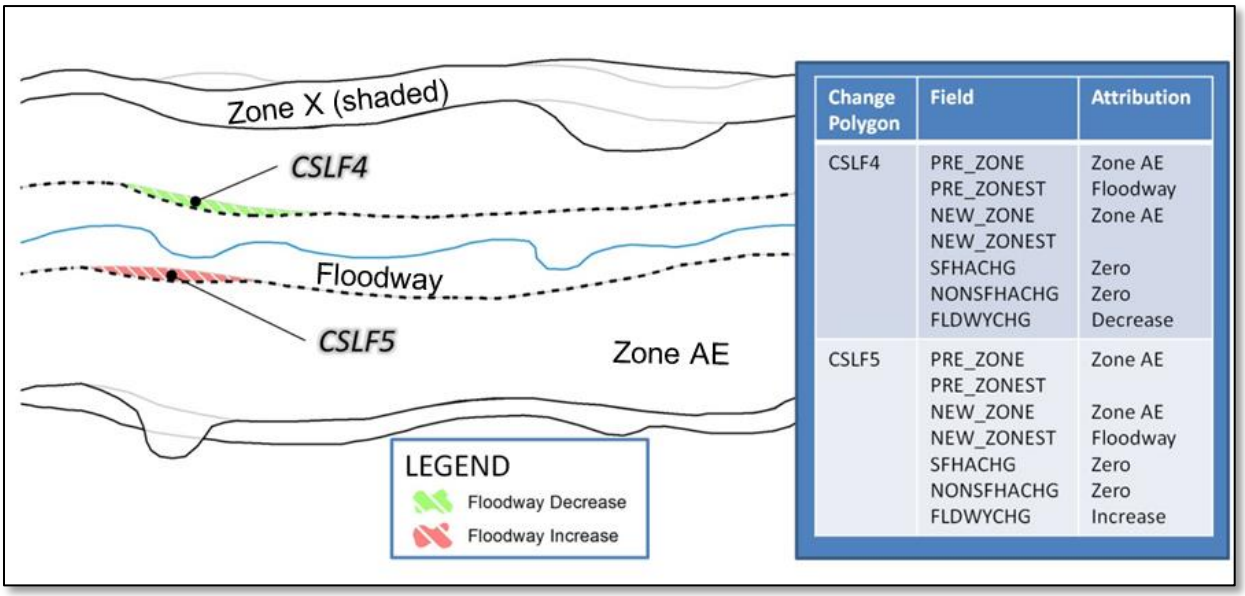
attributes, the Mapping Partner should base the attribution of each polygon on a comparison between the flood zone on the previous effective FIRM vs. the new flood zone. Figure 4 and Figure 5 provide examples of proper CSLF attribution using the graphic example from Figure 3.

**Figure 4: CSLF Example (focused on floodplain boundary changes and attribution)**




| Change Polygon | Field | Attribution |
|---|---|---|
| CSLF1 | PRE_ZONE | Shaded X |
| | PRE_ZONEST | 0.2% Chance |
| | NEW_ZONE | Zone AE |
| | NEW_ZONEST | |
| | SFHACHG | Increase |
| | NONSFHACHG | Decrease |
| | FLDWYCHG | Zero |
| CSLF2 | PRE_ZONE | Unshaded X |
| | PRE_ZONEST | |
| | NEW_ZONE | Zone AE |
| | NEW_ZONEST | |
| | SFHACHG | Increase |
| | NONSFHACHG | Zero |
| | FLDWYCHG | Zero |
| CSLF3 | PRE_ZONE | Zone AE |
| | PRE_ZONEST | |
| | NEW_ZONE | Shaded X |
| | NEW_ZONEST | 0.2% Chance |
| | SFHACHG | Decrease |
| | NONSFHACHG | Increase |
| | FLDWYCHG | Zero |

**Figure 5: CSLF Example (focused on floodway boundary changes and attribution)**




| Change Polygon | Field | Attribution |
|---|---|---|
| CSLF4 | PRE_ZONE | Zone AE |
| | PRE_ZONEST | Floodway |
| | NEW_ZONE | Zone AE |
| | NEW_ZONEST | |
| | SFHACHG | Zero |
| | NONSFHACHG | Zero |
| | FLDWYCHG | Decrease |
| CSLF5 | PRE_ZONE | Zone AE |
| | PRE_ZONEST | |
| | NEW_ZONE | Zone AE |
| | NEW_ZONEST | Floodway |
| | SFHACHG | Zero |
| | NONSFHACHG | Zero |
| | FLDWYCHG | Increase |

Table 1 summarizes the general rules of attributing the CSLF zone change fields, depending on the previous flood hazard zone vs. the new or updated flood hazard zone for each polygon in the dataset.

**Table 1: CSLF Zone Change Attribution Matrix**

Legend: ↑ Increase; ↓ Decrease; Z No Change

| Previous Flood Hazard Zone | ZONE SUBTYPE | | New/Updated Flood Hazard Zone: A | AE | AE: Floodway | AO, AH, AR, & A99 | V & VE | X: Shaded | X: Unshaded | OW & ANI | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | Z | Z | ↑ |
| | | SFHACHG | Z | Z | Z | Z | Z | ↓ | ↓ | ↓ | ↓ |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |
| AE | | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | Z | Z | ↑ |
| | | SFHACHG | Z | Z | Z | Z | Z | ↓ | ↓ | ↓ | ↓ |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |
| | Floodway | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | Z | Z | ↑ |
| | | SFHACHG | Z | Z | Z | Z | Z | ↓ | ↓ | ↓ | ↓ |
| | | FLDWYCHG | ↓ | ↓ | Z | ↓ | ↓* | ↓ | ↓ | ↓ | ↓ |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |
| AO, AH, AR, & A99 | | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | Z | Z | ↑ |
| | | SFHACHG | Z | Z | Z | Z | Z | ↓ | ↓ | ↓ | ↓ |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |
| V & VE | | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | Z | Z | ↑ |
| | | SFHACHG | Z | Z | Z | Z | Z | ↓ | ↓ | ↓ | ↓ |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | ↓ | ↓ | ↓ | ↓ | Z | ↓ | ↓ | ↓ | ↓ |
| X | Shaded | NONSFHACHG | ↓ | ↓ | ↓ | ↓ | ↓ | Z | ↓ | ↓ | ↓ |
| | | SFHACHG | ↑ | ↑ | ↑ | ↑ | ↑ | Z | Z | Z | Z |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |
| | Unshaded | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | N/A | Z | ↑ |
| | | SFHACHG | ↑ | ↑ | ↑ | ↑ | ↑ | Z | N/A | Z | Z |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | N/A | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | N/A | Z | Z |
| OW & ANI | | NONSFHACHG | Z | Z | Z | Z | Z | ↑ | Z | Z | ↑ |
| | | SFHACHG | ↑ | ↑ | ↑ | ↑ | ↑ | Z | Z | Z | Z |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |
| D | | NONSFHACHG | ↓ | ↓ | ↓ | ↓ | ↓ | Z | ↓ | ↓ | Z |
| | | SFHACHG | ↑ | ↑ | ↑ | ↑ | ↑ | Z | Z | Z | Z |
| | | FLDWYCHG | Z | Z | ↑ | Z | Z | Z | Z | Z | Z |
| | | CHHACHG | Z | Z | Z | Z | ↑ | Z | Z | Z | Z |

* If the floodway remains on the FIRMs and in the FIRM Database for administrative purposes, this value would be "Z"

To reiterate, the "NONSFHACHG" field is used to capture increases or decreases in the Shaded Zone X, not the Unshaded Zone X. Therefore, the NONSFHACHG field for a particular CSLF polygon would only reflect an increase or decrease if either its previous zone (PRE_ZONE) or new zone (NEW_ZONE) was a shaded X (as the CSLF1 and CSLF3 polygons show in Figure 4). NONSFHACHG is set to zero for situations like the CSLF2 polygon shows in Figure 4, since neither its previous nor new zone is a shaded Zone X.

### 2.2.2 S_CSLF_Ar – Contributing Engineering Factor Attributes (Enhanced)

The attributes of the CSLF dataset that provide insight into the reason for the changes to the floodplain, floodway, and/or the flood zones are considered the "contributing engineering factors". Items that fall into this category include factors that are considered to have actively influenced the floodplain change, such as the use of a new hydrologic model, the addition of a hydraulic structure, or the introduction of new terrain data. The decision on whether, and to what extent, to populate the contributing engineering factors will depend on the benefit to the project and how it may improve the ability to communicate the reasons for change to the

communities affected. Flexibility exists such that the contributing engineering factors can be filled out for all the flooding sources within the project area, for only the flooding sources where questions from the community are most likely anticipated to arise, or for no flooding sources at all.

In some circumstances, Coordinated Needs Management Strategy (CNMS) data may also be able to be leveraged as a source to use to help inform the attribution of the CSLF contributing engineering factors. CNMS may be consulted to help determine potential changes within the project area that were identified during Discovery or that were noted during the Hydrologic and Hydraulic flood hazard analysis.

For example, CNMS elements S4 and C6 indicate whether there have been changes to the number of hydraulic structures along the reach of stream being studied. Element S4 indicates if there have been between one and four new or removed structures since the date of the effective study. Element C6 indicates if there are five or more new/removed structures since the effective study was completed. The use of this information would help inform the population of the Hydraulic Structure Change (HYDSTRCHG) contributing engineering factor attribute within the CSLF dataset. Many of the other CNMS elements can similarly help in the attribution of the other CSLF contributing engineering factors. The *CNMS Technical Reference* provides additional detail with regards to these other elements.

The S_CSLF_Ar attributes that are considered Contributing Engineering Factors are listed below, along with their potential linkage to CNMS. Additional information and descriptions on each of these fields is contained within the *Flood Risk Database Technical Reference*.

#### 2.2.2.1 Spatial Extents for Contributing Engineering Factors

The goal for including the contributing engineering factors is to help flood data users understand the reasons for the changes to the flood zones. Associating these contributing engineering factors to the affected locations is an important part of communicating the cause with the effect. Associating contributing engineering factors with specific CSLF polygons will depend upon the spatial extent that each factor influences. For example, a change in topographic data or hydrologic discharge might apply to an entire project area (e.g. Hydrologic Unit Code-8, or HUC-8, project area) extent, whereas changes resulting from hydraulic structure(s) added or removed since the previous study may be more localized.

Mapping Partners should apply best judgment to define the area of impact and appropriately associate each relevant contributing engineering factor. At a minimum, however, Mapping Partners should associate contributing engineering factors to the model limits for a given stream or coastline. For example, if there were new hydraulic structures added along a given stream since the date of last analysis, it would be acceptable to attribute all the CSLF change polygons along that stream with the appropriate contributing engineering factor that reflects an increase to the number of hydraulic structures. The Mapping Partner is not required to identify the exact CSLF areas that are a result of the additional hydraulic structure(s).

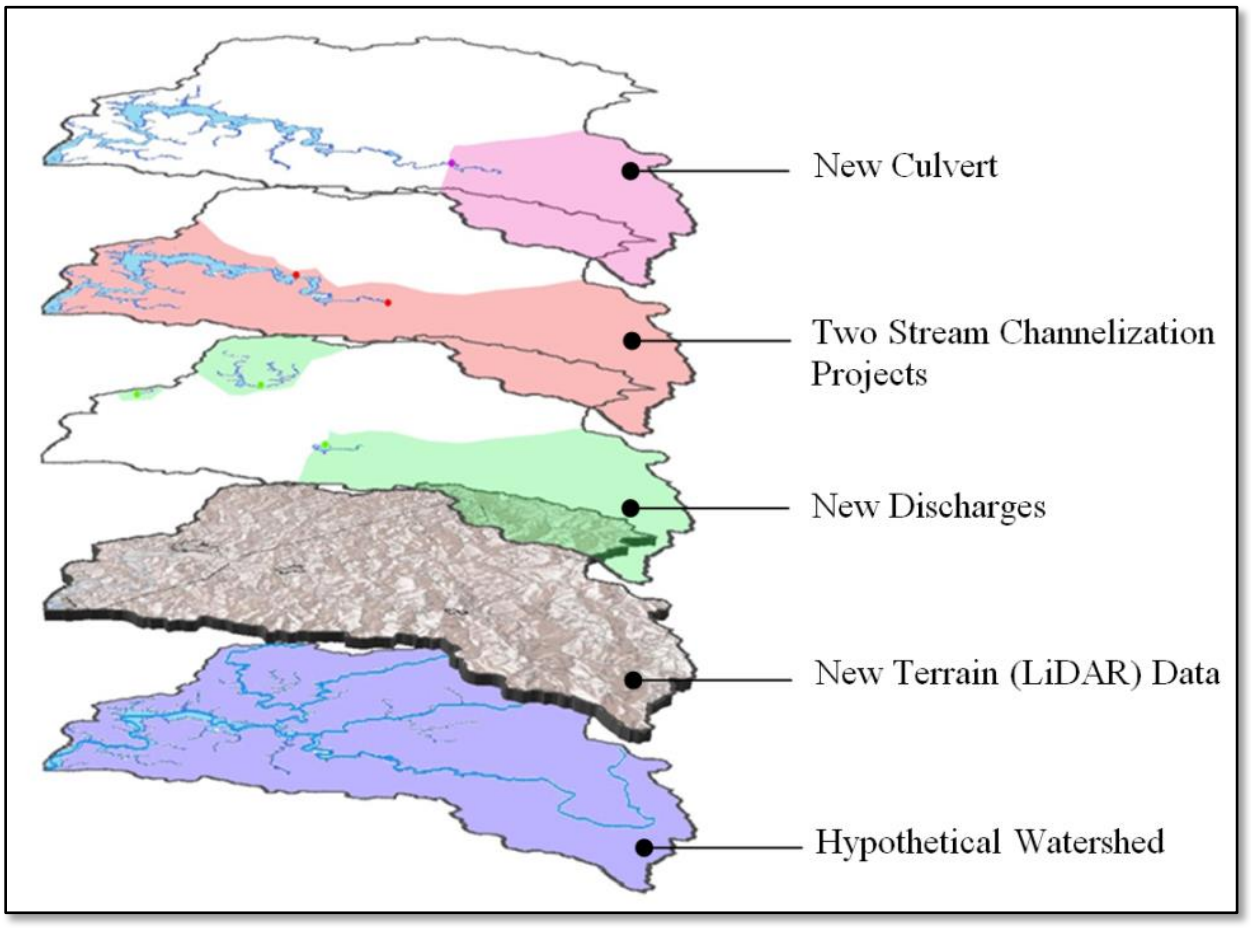
**Table 2: S_CSLF_Ar Contributing Engineering Factors & CNMS Linkages**

| S_CSLF_Ar Attribute | Description | Potential CNMS Linkage |
|---|---|---|
| PEAKDSCHG | This field is used to indicate a change to the study's peak discharges that may have impacted the analysis | • CNMS elements C1 and C2 indicate issues with discharges used for effective analysis.<br>• Element C1 attempts to determine if there was a major change in gage record, rainfall record, or other climatological data.<br>• Element C2 assesses whether or not the effective discharges were outside the tolerance level based on the confidence limit criteria listed in Bulletin 17B. |
| MDLMETHODS | This field is used to indicate changes to primary assumptions associated with the updated model methodology | • Element C3 indicates if the model methods used in the effective study are no longer appropriate (not just an older version of a currently accepted model). |
| FLD_CTRLCHG | This field is used to indicate a change to the study's major flood control structure(s) that may have impacted the analysis | • Element C4 indicates if there has been a removal or addition of a major flood control structure on a stream reach. A flood control structure can be a dam, weir, levee, etc. |
| HYDSTRCHG | This field is used to indicate a change to the study's number of hydraulic structures that may have impacted the analysis | • Element S4 indicates if there are one to four new/removed structures.<br>• Element C6 indicates if there are five or more new/removed structures. |
| TOPOCHG | This field is used to indicate a change in the topographic information used in the modeling or used to re-delineate the floodplain boundaries | • Element S6 captures information to indicate if better (not necessarily newer) topographic information that meets FEMA minimum standards is available. |
| SEDCHG | This field is used to indicate significant changes to channel sedimentation | • Element C7 captures information about the presence of significant changes to channel sedimentation due to bridge scour since the last study.<br>• Evaluation of this element during CNMS Phase 3 analysis relied upon a certain level of community outreach. In instances where this element indicates significant channel fill this can be used as evidence of sedimentation change. However in instances where this element does not indicate fill, further investigation will be necessary to confirm. |

| S_CSLF_Ar Attribute | Description | Potential CNMS Linkage |
|---|---|---|
| EROSIONCHG | This field is used to indicate significant changes to channel erosion or scour | • Element C7 indicates if there is significant bridge scour on a stream reach.<br>• Evaluation of this element during CNMS Phase 3 analysis relied upon a certain level of community outreach. In instances where this element indicates significant channel scour this can be used as evidence of erosion change. However in instances where this element does not indicate scour, further investigation will be necessary to confirm. |
| CHANNELCHG | This field is used to indicate significant changes to channel geometry | • Element S5 indicates if there have been hydraulically significant channel modifications since the effective study on a given reach.<br>• Element C5 indicates if the channel is outside of the SFHA now; this could be due to poor topographic data used in the effective study or could be due to channel changes. Imagery would need to be checked to determine this.<br>• The addition or removal of structures is represented by CNMS C6 and S4. |
| LEVEECHG | This field is used to indicate a change to the accreditation status of a levee | • N/A: Elements within CNMS which address changes in levee accreditation status cannot be used to inform this attribute in CSLF since those elements also capture other flood control changes without differentiation. |
| RUNOFFCHG | This field is used to indicate changes in stream runoff caused by land use, vegetation or imperviousness changes that impacted the analysis | • Elements S3 and/or S7 indicate if there have been significant changes to land use and/or impervious area that would affect runoff. |
| DUNECHG | This field is used to indicate changes to primary frontal dunes since last the last study | • Element S8 indicates whether or not a primary frontal dune has been identified for a coastal study.<br>• FEMA is reviewing the process for Coastal Study inclusion in CNMS as most of the Nation's coastline is being currently revised. |
| OTHCHG | This field is used to indicate other changes the Mapping Partner believes to have contributed to the results of the analysis | Other Changes may be indicated by the following CNMS elements:<br>• Use of rural regression equations in urbanized areas (S1)<br>• Repetitive losses near but outside of the SFHA (S2)<br>• Significant storms occurred with High Water Marks collected (S9)<br>• Newer regression equations are available since the data of the effective study (S10) |

Figure 6 illustrates how each Contributing Engineering Factor may have different areas of influence within the study watershed or project area. Attribution of the Contributing Engineering Factors within the CSLF polygons can, therefore, be performed at a broad level as the graphic depicts.

**Figure 6: Assigning Contributing Engineering Factors**




### 2.2.2.2 Describing the Contributing Engineering Factors

Engineering judgment should be the primary rationale used to determine which of the following categories best describes the amount of change attributable to a particular contributing factor:

- Increase: There was a significant increase to the factor being measured which may have impacted the result.
- Decrease: There was a significant decrease to the factor being measured which may have impacted the result.
- Negligible: There was an increase and/or decrease in the factor being measured, but no measurable impact to the results, or the impact was insignificant.
- None (Zero): There were absolutely no increases or decreases in the factor being measured which impacted the result.

- True/False: The engineering factor either applied or did not apply. An example is for the New Terrain Data attribute. If new terrain data was introduced and that new data caused the floodplain boundaries to change, the attribute would be "True".

- Unknown: The engineering factor was not analyzed, so no determination can be made as to the impact on the result. This attribute may also be used if it cannot reasonably be determined if the engineering factor being analyzed impacted the results. This 'Unknown' option is not meant to be a 'catch-all' and the Mapping Partner should use professional judgment and an appropriate standard of care in making these determinations.

### 2.2.3 L_CSLF_Summary

This table is used to store the summary statistics of the CSLF analysis by community, and at the overall project level. In creating the L_CSLF_Summary table, the Mapping Partner should 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.

Additional information showing how this table is used to populate the tables in the Flood Risk Report (FRR) is contained in the *Flood Risk Report Guidance*.

### 2.2.4 FRD_Model_Info

This table is related to the S_CSLF_Ar table through the *PRE_MODEL* and *NEW_MODEL* attributes of S_CSLF_Ar. This table identifies the previous and 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. Many of the fields in the FRD_Model_Info table can be extracted from the S_Submittal_Info table in the FIRM Database.

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, so that the *EFF_DATE* field in FRD_Model_Info can be populated correctly.

### 2.2.5 Quantification of Affected Structures and Population (Enhanced)

One of the advantages of the CSLF dataset is that it can be used to help identify how the flood hazard zone changes affect specific structures and buildings by overlaying the CSLF outputs on aerial imagery or building footprints. If building footprints are available, they can be attributed to indicate which structures have been added to the SFHA, which have been removed from the SFHA, which have been added into the regulatory floodway, etc. This can provide community officials with the information needed to do targeted outreach, and provides awareness on quantities of structures affected by the changes to the FIRMs.

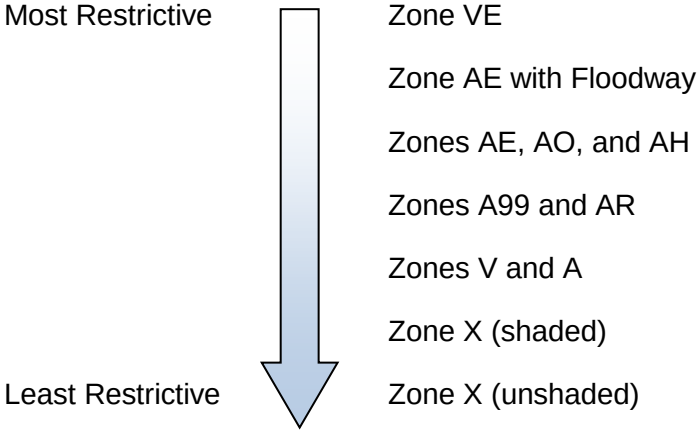
As an enhancement, the CSLF dataset itself can also be used to capture this information within the attributes of each CSLF polygon feature. This is dependent, however, upon receiving high

quality local data reflecting building location and associated population data. Building footprints, centroids, or parcel data are the minimum data requirement for performing this analysis. It is not considered acceptable to use census or general building stock data that comes pre-packaged with Hazus for this analysis due to the higher accuracy requirements/expectations necessary to perform this extremely localized analysis.

When performing this analysis, Mapping Partners should associate structure and population counts to the applicable CSLF polygon feature that best represents the location of the given structure. The intent is to document changes in zone designation for each structure from the prior FIRM to the new/revised FIRM. One potential use of this data will be an analysis of the change in insurance rating caused by changes to the floodplain extents. For this reason, it is important (whenever possible) to select a polygon touching the structure that represents both the most restrictive flood zone associated with the structure before the map revision and the most restrictive flood zone affecting the structure as a result of the map revision. See conditions a) through c) below for a potential approach to the development of the flood zone polygon structure change data.

a) If a structure touches only one CLSF polygon (regardless of whether there was a change or not), associate the structure with that CSLF polygon. Structure "A" in Figure 7 demonstrates this condition.

b) If condition a) is not met because the structure touches more than one CSLF polygon, do an assessment of the most restrictive old and most restrictive new flood zone polygon. If one of the CSLF polygons that touches the structure meets both criteria (most restrictive old and most restrictive new flood zone), associate the structure with that CSLF polygon. If more than one CSLF polygon meets both criteria, then select the largest qualifying polygon. Structures B through F in Figure 7 demonstrate this condition.




c) If condition b) is not met, select the most restrictive CSLF polygon as shown in structure G. In this condition, even though the structure went from shaded Zone X to AE, there isn't any polygon that meets both criteria, so the most restrictive new CSLF polygon is selected. This condition acknowledges that there is no way to always know the most restrictive old and the most restrictive new flood zone by selecting only one CSLF polygon; therefore the selection defaults to the most restrictive flood zone that now affects the structure. If more than one polygon meets this condition, then the largest should be selected.

Figure 7 and Table 3 below use the same graphic example from Figure 3 and provide examples of how the rules are applied relative to conditions a), b), and c) above.

**Figure 7: Associating Structures with CSLF Polygons**

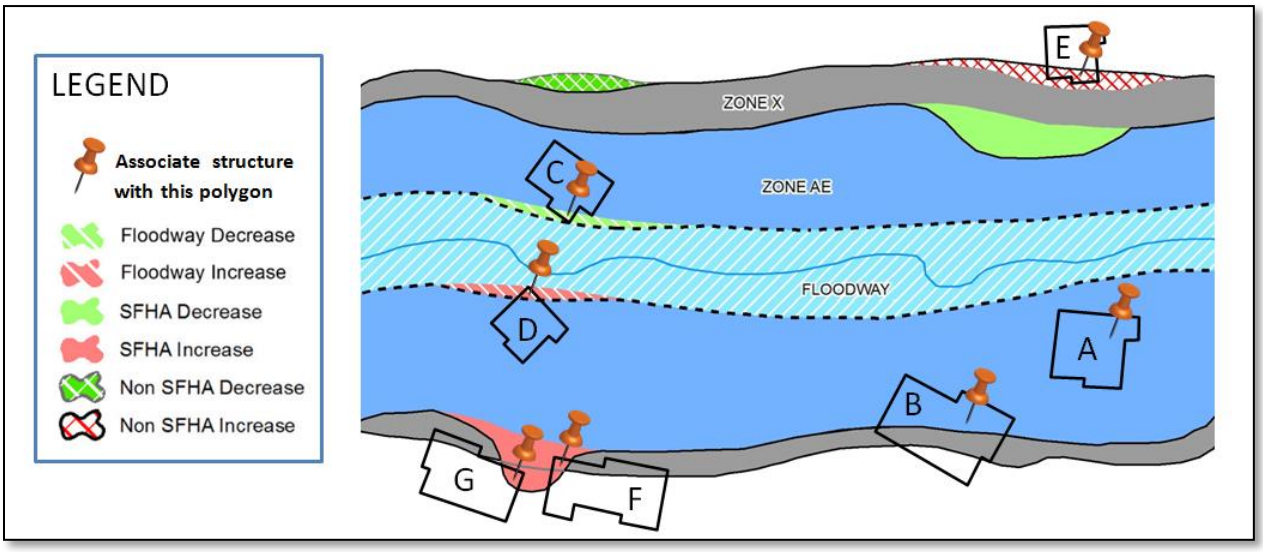



**Table 3: Associating Structures with CSLF Polygons**

| Structure | Description | Previous Most Restrictive Zone | New Most Restrictive Zone | Conditions |
|---|---|---|---|---|
| A | Structure was and is now entirely in Zone AE | AE | AE | a |
| B | Structure was and is now partially in Zone AE | AE | AE | b |
| C | Structure was partially in the floodway but is now out of the floodway and entirely within Zone AE | AE Floodway | AE | b |
| D | Structure was totally in Zone AE but is now also partially in the floodway | AE | AE Floodway | b |
| E | Structure was entirely in unshaded Zone X before but is now also partially in shaded Zone X | X (unshaded) | X (shaded) | b |
| F | Structure was partially in shaded Zone X before but is now also partially in Zone AE | X (shaded) | AE | b |
| G | Structure was partially in shaded Zone X before but is now also partially in Zone AE | X (shaded) | AE | c |

In addition to procuring geocoded structure footprint data during Discovery, a Mapping Partner may also procure data reflecting the population associated with each structure affected by a floodplain or floodway boundary change. In the absence of actual population data associated

with each structure, the affected population count attribute may be determined by calculating the average population per structure and using that data to associate population to CSLF change polygons. In order to determine the average population per structure, the census population data for each census block can be divided by the number of residential structures located in that census block and then attributed to the CSLF structure data record accordingly. If either the structure or population counts are stored within the CSLF attributes, the source of the structure and population data used should be documented within the metadata.

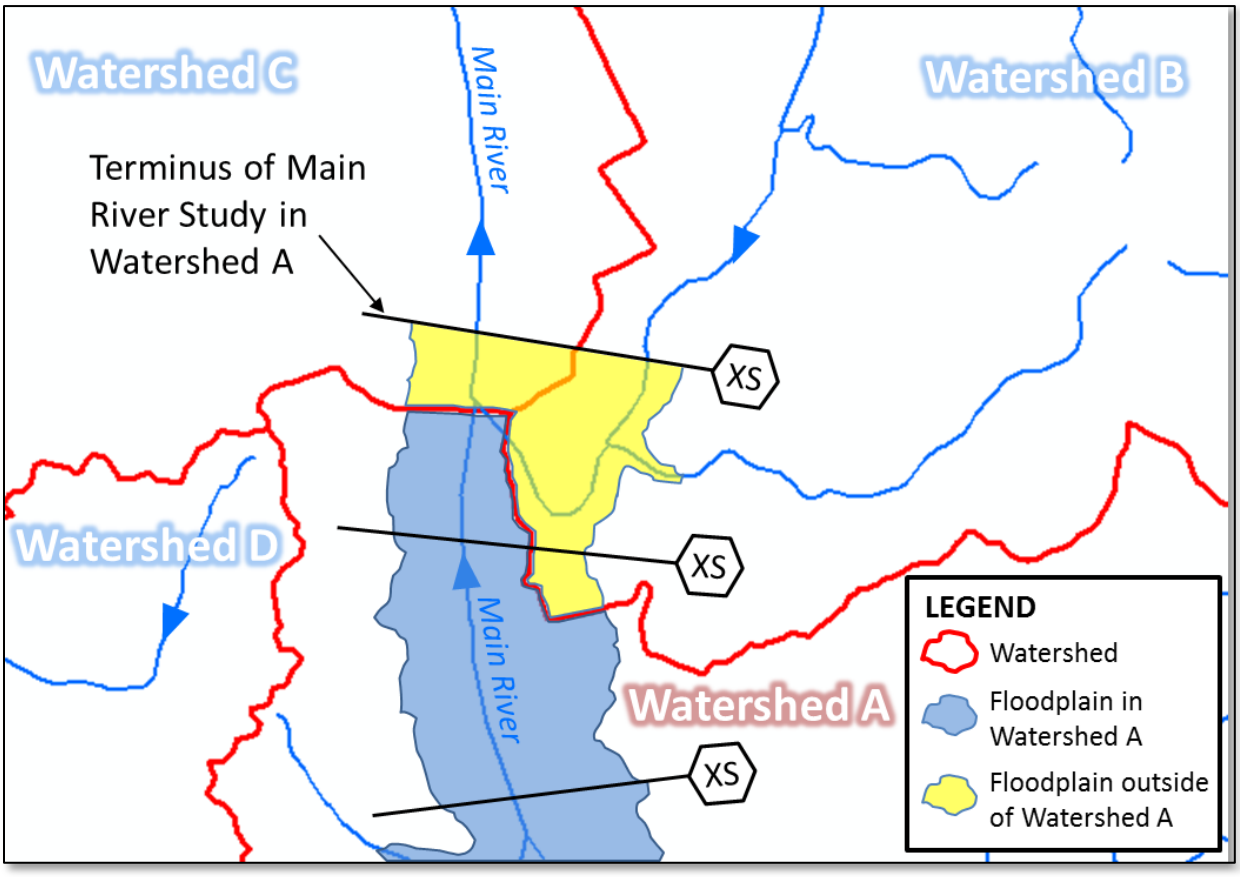
## 3.0 CSLF in the Flood Risk Report

A summary of CSLF results is included within the FRR. The *FRR Guidance* provides additional information related to how this data is reported. Although the spatial data in the FRD is not clipped to the project footprint, the CSLF summary tables in the FRR will only report on the extent of the changes that are within the project area and within each community respectively.

## 4.0 Dataset Spatial Extents

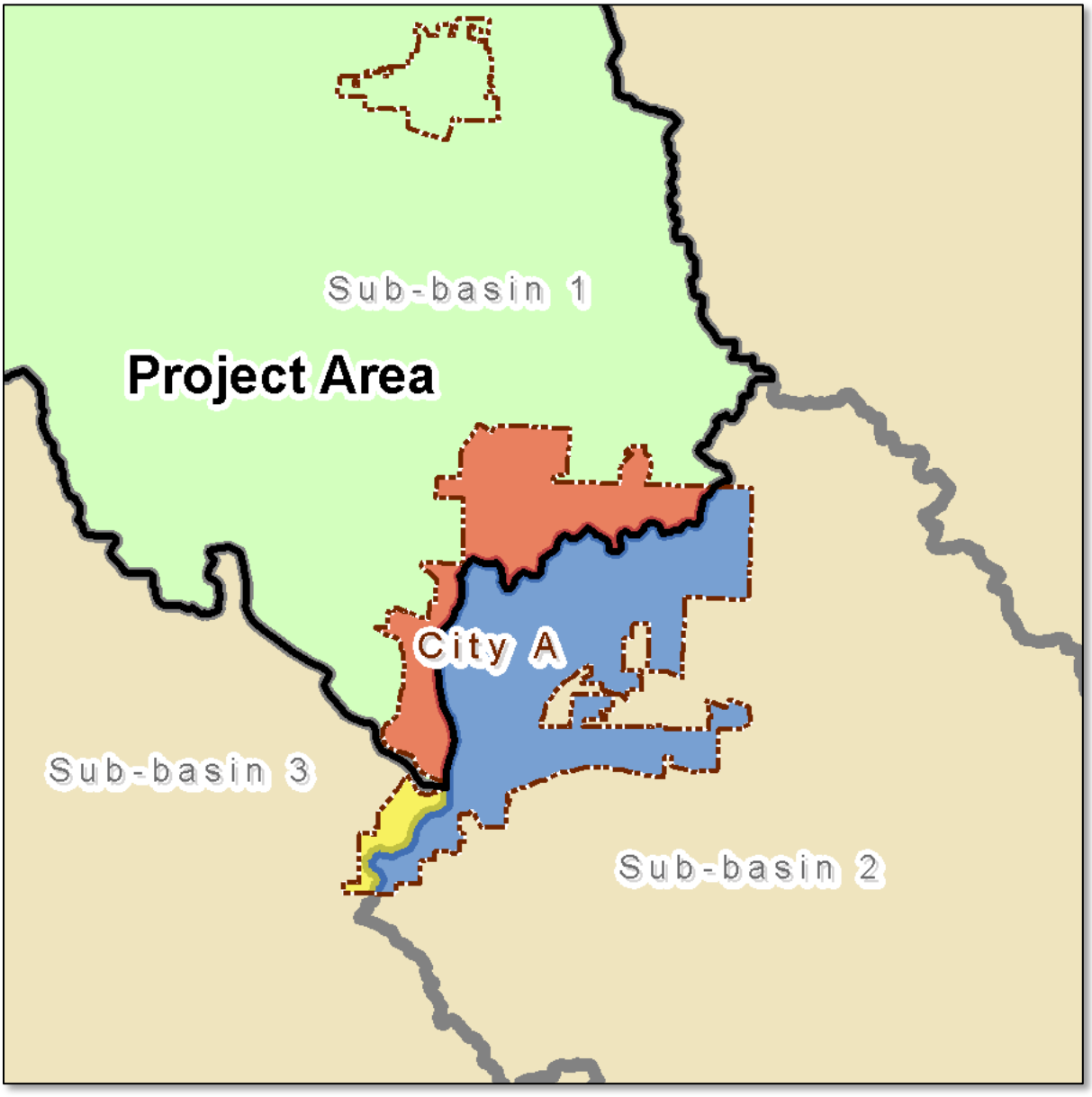
Certain flood risk datasets will naturally extend beyond the limits of the Flood Risk Project footprint. This additional data may be needed to ensure a complete picture of flood risks within the project area. Figure 8 provides an example of a typical scenario that will regularly occur at the outlet of watersheds that are being studied.

**Figure 8: Flood Risk Data Outside of the Project Area**



The Changes Since Last FIRM dataset should include all change polygons that are entirely or partially within the Flood Risk Project area boundary (or project footprint). The spatial data table (S_CSLF_Ar) should be kept in its entirety and should not be clipped to the project footprint. However, the L_CSLF_Summary table that is used to populate the FRR should not reflect data outside of the project footprint. Since each polygon feature within the CSLF dataset should be attributed with the CID as part of the development process, the areas of each unique change type (SFHA, Non-SFHA, Floodway, and CHHA) can be summed up and reported by community. This information is used to populate the L_CSLF_Summary table. Figure 9 shows an example of how a community (City A) is split between three different project areas (watersheds). When City A's information is shown in the FRD and FRR for Sub-basin 1 (the project footprint), only the CSLF results for the portion of the community within Sub-basin 1 would be included (the red portion of City A).

**Figure 9: Example of Community Spanning Multiple Watersheds**



## 5.0 Data Delivery Timeline

The *Flood Risk Database Guidance* provides recommendations as to when the CSLF dataset should generally be provided to communities during the life of a Flood Risk Project, and the conditions under which it should be updated after its initial delivery.

## 6.0 Uses in Outreach, Collaboration, and Flood Risk Communication

The power of this dataset lies in its ability to quickly visualize areas that have been added to, or removed from, the regulatory floodplain. Because of the attributes that are captured within the CSLF dataset, it can be used within a Geographic Information System (GIS) to help identify where significant numbers of households and/or business may be affected, leading to targeted outreach in these areas to raise risk awareness. It is especially valuable to share with communities prior to the preliminary issuance of updated regulatory FIRMs, and prior to the publication of the effective FIRMs. CSLF can also be used at public meetings to help identify the individual impacts to local citizens. These settings provide an excellent opportunity to discuss mitigation and insurance options with those who are being newly added into a regulatory floodplain, and also to communicate to those individuals who have been removed from the regulatory floodplain that their flood risk has not terminated simply because the mandatory purchase requirement for insurance may have.

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