



Guidance for Flood Risk Analysis and Mapping

Combined Coastal and Riverine Floodplain

November 2023



FEMA

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

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

Table of Revisions

Affected Section or Subsection	Date	Description
Section 2.2	November 2023	Added clarifying language regarding LiMWA truncation.

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1. Topic Overview

Outlined in this guidance document is the Flood Insurance Rate Map (FIRM) mapping process that Mapping Partners should follow in areas of combined coastal and riverine flooding. Section 2.0 includes the FIRM Panel graphics standards for mapping combined riverine and coastal areas. The combined rate of occurrence (a.k.a., combined probability) calculation procedure in areas affected by coastal and riverine flood sources is provided in Guidance Document No.76: [Guidance for Flood Risk and Analysis Mapping: Coastal Flood Frequency and Extreme Value Analysis](#). Changes to the Flood Insurance Study (FIS) Report, including Floodway Data Tables and Profiles, are provided in the [FIS Report Technical Reference](#) and Guidance Document No. 37: [Guidance for Flood Risk and Analysis Mapping: Flood Insurance Study \(FIS\) Report](#) documents. A summary of the FIRM Database updates is provided in the [FIRM Database Technical Reference](#). For guidance on metadata associated with the Coastal Guidance, please see the metadata section of Guidance Document No. 36: [Guidance for Flood Risk and Analysis Mapping: Flood Insurance Rate Map \(FIRM\) Database](#).

2. Flood Insurance Rate Map (FIRM) Panels

Mapping combined coastal and riverine flood hazards on FIRM Panels must identify the Special Flood Hazard Areas (SFHAs) floodways (where applicable), Base Flood Elevation (BFE) lines, and cross sections or nodes. Standard IDs (SIDs) applicable to this guidance include 106, 282, 297, 322, 334, 338, 340, 342, 343, 345, and 346.

2.1. Mapping of Combined Coastal and Riverine Floodplain

The coastal floodplain, which includes areas that experience wave effects as well as areas that are at risk of stillwater flooding from storm surge and other coastal processes, are mapped as described in Guidance Document No. 39: [Guidance for Flood Risk and Analysis Mapping: Coastal Floodplain Mapping](#). Similarly, mapping of riverine flood hazards is also described in its respective guidance document, Guidance Document No. 60: [Guidance for Flood Risk and Analysis Mapping: Riverine Mapping and Floodplain Boundaries Guidance](#).

The transition area between coastal and riverine floodplains is often analyzed for the effects of the combined rate of occurrence for coastal and riverine flooding on the BFE. The coastal floodplain should be mapped with static BFEs in areas subject to storm surge and/or wave effects, and to the farthest upstream location where the combined rate of occurrence results equal the coastal stillwater elevation, rounded to a tenth of a foot. The combined coastal-riverine floodplain is mapped similar to typical riverine floodplain mapping—as Zone AE with BFE lines, cross sections, nodes, or evaluation lines. The combined rate of occurrence analysis provides the regulatory elevations for BFE lines, cross sections, nodes, or evaluation lines in the combined coastal-riverine floodplain.

A SFHA/Flood Zone Boundary line should be mapped marking the location of the change from coastal floodplain to combined coastal and riverine floodplain, or riverine-only floodplain. The Zone boundary line separates the coastal floodplain with static BFEs from the riverine or combined coastal

and riverine Zone AE with BFE lines. The SFHA Zone boundary is not labeled on the FIRM, but its location should match the flooding type division locations shown on the FIS profile. Unless technically unjustified, an effort should be made to map the SFHA/Flood Zone Boundary approximately parallel to neighboring riverine cross sections or evaluation lines and BFEs so as to avoid intersecting a cross section, evaluation line, or BFE line.

The upstream limit of the combined coastal and riverine section of floodplain is located at the location where the combined rate of occurrence is equal to the riverine water surface elevation for the base flood, rounded to a tenth of a foot. An upstream SFHA/Flood Zone Boundary line can be shown on the FIRM to mark the upstream limit of the combined coastal and riverine floodplain. This line is a source boundary and should be attributed “Other Boundary.” The Zone AE flood hazard area polygon must be attributed based on the flood type (e.g., “Combined Coastal and Riverine” or “Riverine”).

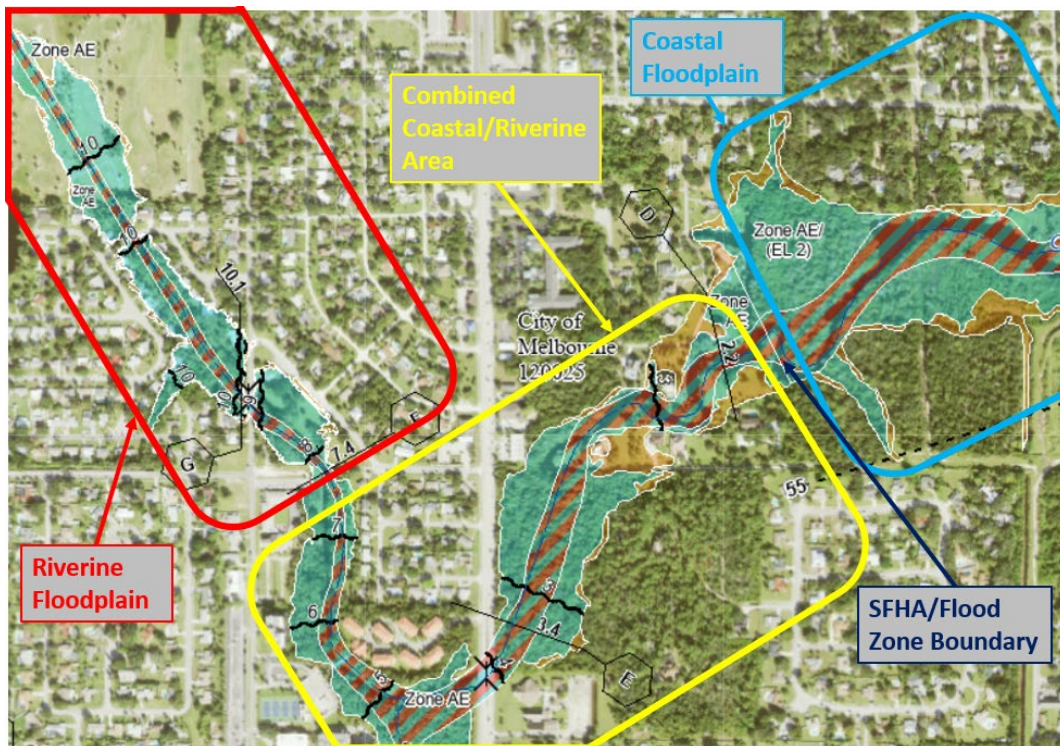


Figure 1. Annotated FIRM showing map features in coastal and combined coastal/riverine floodplains

2.2. Floodways

Floodways are determined through a riverine flood modeling analysis. Floodways are a floodplain management tool for communities to limit development (i.e., place fill) that causes increases to the riverine BFE. Floodway delineation often extends into the coastal floodplain and ties in with the coastal flooding source. For more information on how floodways are determined and mapped see Guidance Document No. 79: [Guidance for Flood Risk and Analysis Mapping: Floodway Analysis and](#)

Mapping and Riverine Mapping and Floodplain Boundaries Guidance. Like floodway development rules, CFR 44 Part 60.3 (e)(6) prevents placing fill for structural support in coastal high hazard areas (Zone VE). To avoid floodplain management confusion, FIRM maps must not show a floodway in a Zone VE. FEMA Working Standard 132 states:

The regulatory floodway must be terminated at the boundary of the VE or V Zone, or where the mean high tide exceeds the 1% annual-chance riverine flood elevation, whichever occurs further upstream.

Every effort should be made to show newly mapped or Legacy floodways in coastal and combined coastal and riverine flood zones upstream of Zone VE. Even if coastal flooding dominates and the regulatory base flood elevations are based on the coastal water level or a combined rate of occurrence analysis with the coastal elevations, the newly mapped or legacy floodway should be shown on the FIRM upstream of Zone VE. The downstream limit of the floodway terminates at the Zone AE/VE boundary (Figure 2) but should be no further downstream than where the mean high tide exceeds the 1% annual-chance riverine flood elevation.

Given that some communities have adopted more stringent building regulations that prevent placement of structural fill within the Coastal A Zones (CAZ), these communities may choose to end mapped floodways at the Limit of Moderate Wave Action (LiMWA). In such cases, communities can make a request to the FEMA regional office that the floodway to be truncated at the LiMWA instead of Zone VE (Figure 3). If the floodway crosses multiple LiMWAs or alternating VE and AE Zones, the floodway should be retained to the farthest downstream LiMWA, if requested or Zone VE/Zone AE boundary following the standard. An “SFHA/Flood Zone Boundary” is used to define the limit of the floodway whether the floodway is truncated at the LiMWA by request or Zone VE. In some cases, the floodway will not extend to either the Zone VE or the LMWA. In such a case the floodway is left as it is presented on the effective FIRM (Figure 4).

Below are some examples of three different floodway limits:

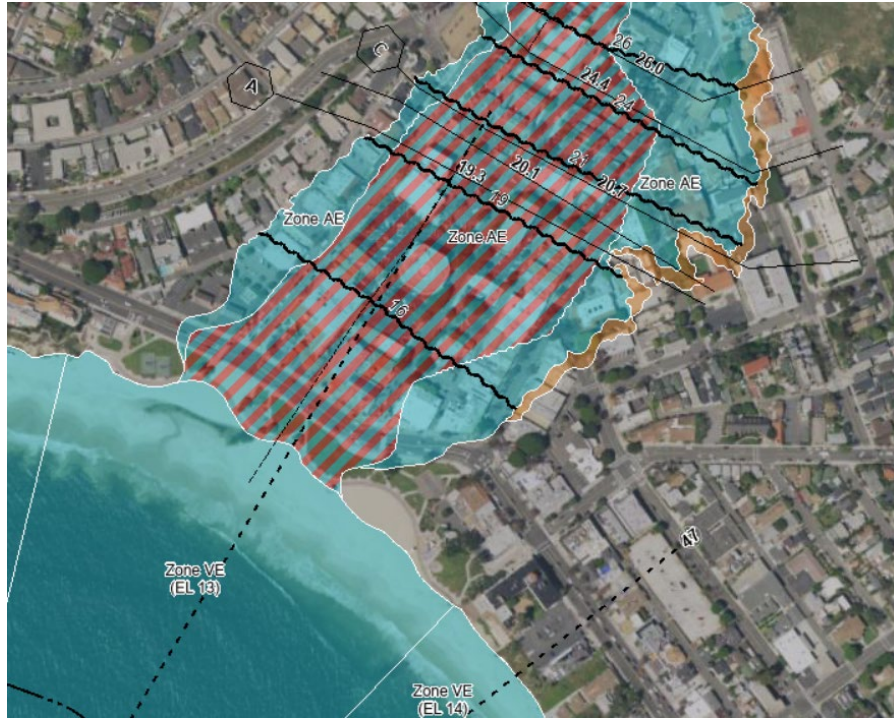


Figure 2: Example of floodway extent at Zone VE



Figure 3: Example of floodway extent at LIMWA

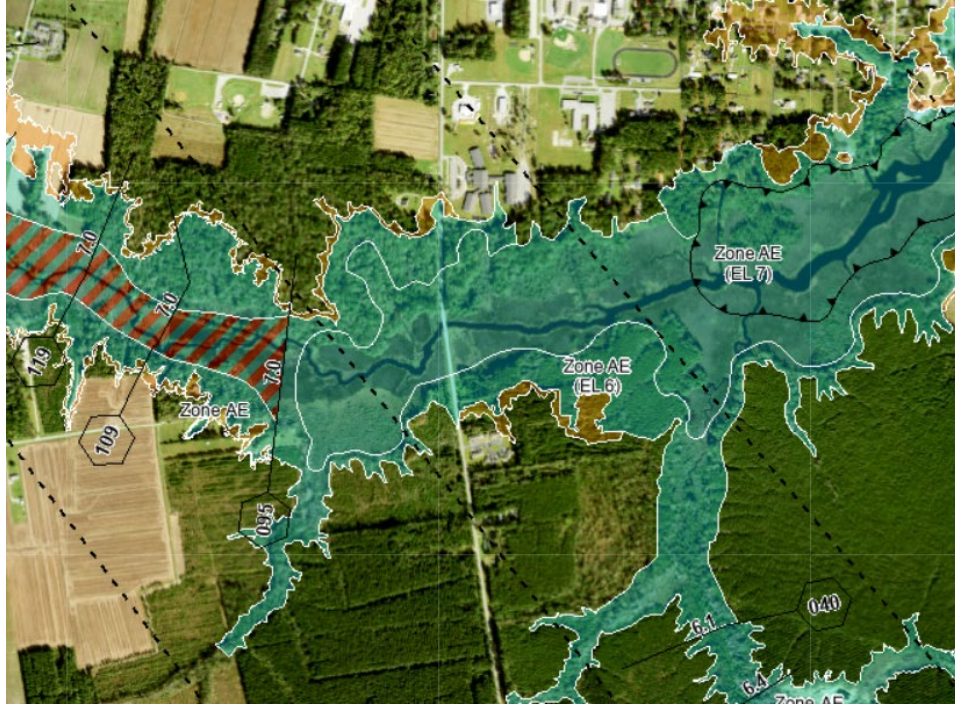


Figure 4: Example of modeled floodway extent ending upstream of Zone VE and LiMWA

For ongoing Flood Risk Projects, community coordination should discuss where the floodway will be truncated in areas subject to flooding from both coastal and riverine sources. The guidance above should be followed to determine the farthest downstream location to map a floodway. However, only in special circumstances at the community’s request should the floodway be shown in Zone VE or terminated at another location. Communities may also establish new or revised floodways and request that the FIRM be updated by following the due process phases to incorporate the changes at any time. FEMA Regional preferences or State preferences on how far downstream to map the floodway may also exist, therefore mapping partners and revision requestors should check with the FEMA Region the stream resides within.

In some cases, legacy riverine modeling data necessary to perform a combined rate of occurrence calculation (including floodway information and flood elevation data) may not be available. This is often the case of decades-old riverine studies for which digital or hard copy data are missing. There may also be legacy floodways created to administer floodplains that are not based on riverine modeling output. When no riverine modeling or floodway elevation information is available a combined coastal and riverine analysis and associated mapping cannot be performed. In this case, the coastal floodplain is mapped to its inland extent and the floodway remains as mapped on previous FIRMs.

In most situations the legacy floodway should be retained on the FIRM within the area of coastal floodplain up to the Zone VE/AE boundary or LiMWA, on request. The revised coastal BFE, Zone VE/AE boundary extent, and the LiMWA extent in some situations can decrease compared with previous studies where the floodway would need to be extended downstream. When the modeling

backup data are not available, the legacy floodway could also be removed; however, removal of a floodway requires due process by regulations. A mapping partner or community request to remove a floodway from the FIRM must provide justification for doing so. Documentation should describe the condition of the floodway and background data and reasons why the floodway is to be removed.

2.3. Mapping of Cross Sections, Evaluation Lines, and Nodes

Riverine mapped cross sections, evaluation lines, and nodes are shown on the FIRM in coastal floodplains, however how they are attributed and if they are labeled with a BFE depends on whether they are in the combined coastal and riverine mapped area or in the coastal only mapped floodplain. All cross sections, evaluation lines, and nodes should be retained within the FIRM database S_XS or S_NODES feature classes, regardless of the flood zone they are located in. In the combined coastal and riverine floodplain, the cross sections and BFE lines are labeled with the combined analysis BFE and no static coastal BFEs are shown. The selection of “lettered” cross sections or evaluation lines in the combined coastal and riverine floodplain should be based on the same decision criteria used in the riverine-only portion of the floodplain. Additionally, FIRM maps should avoid cross-sections or evaluation lines that intersect coastal transects. Whether a cross section or evaluation line is shown on the map is controlled by the XS_LN_TYP attribute of the S_XS layer in the FIRM database. Mapped cross sections or evaluation lines located in the coastal floodplain should remain mapped providing they do not overcrowd the FIRM panel. If necessary, to avoid overcrowding the FIRM panel, mapped cross sections or evaluation lines may be changed to “not mapped” in the coastal-only floodplain. Nodes do not have the option to be “not mapped.” Lettered, mapped and not lettered, mapped cross sections, or evaluation lines in the coastal only floodplain should not be labeled with the regulatory WSEL value and should receive the appropriate -8888 attribute in the WSEL_REG field of S_XS.