Technical Requirements of a Letter of Map Revision Request

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AECOM

Agenda

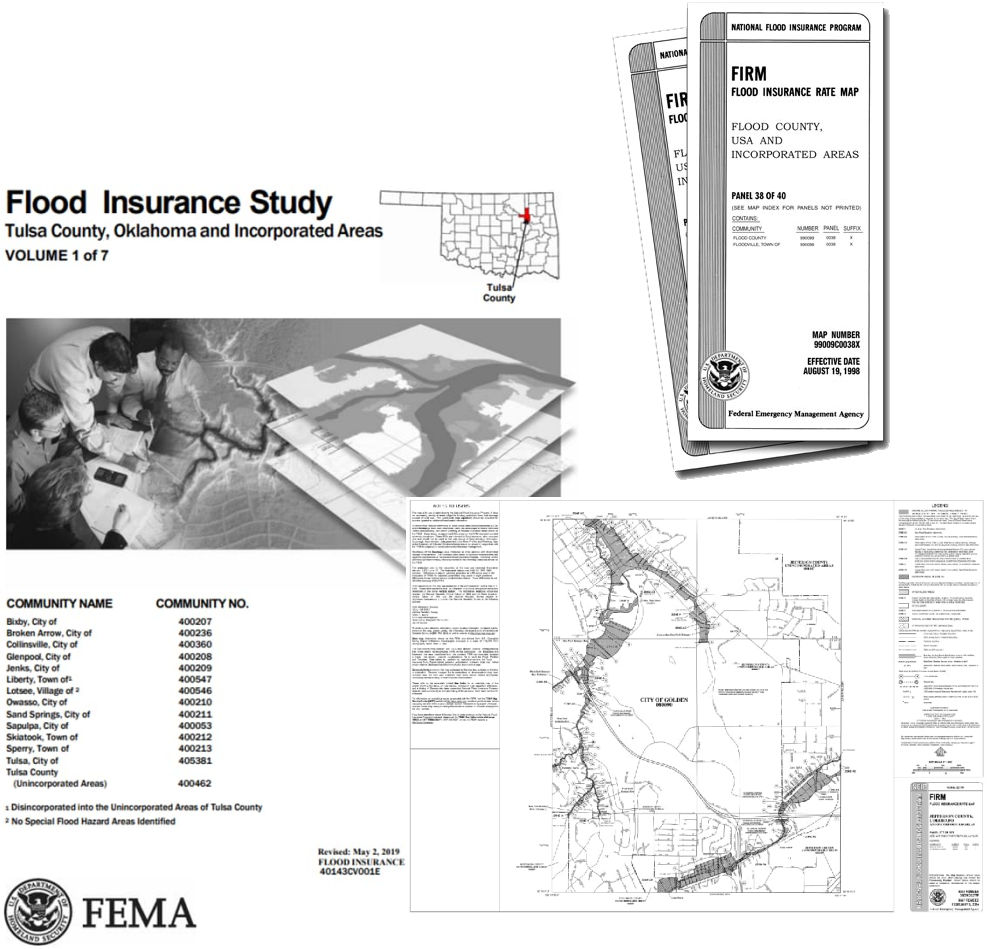
- Definitions/Introduction
  - Letters of Map Change (LOMC) - LOMR & CLOMR
  - MT-2 Submittal & Elements of MT-2 Application
- Technical Data Requirements
  - Hydrologic Analysis
  - Hydraulic Analysis
  - Topographic Workmap & Annotated FIRM
- Other Considerations
- Guidance & Resources
- Questions

Definitions

- MT-2 Forms: FEMA Application forms used for Map Revisions (CLOMR/LOMR)
- Base Flood – 1% Annual chance flood (100-year)
- BFE – Base Flood Elevation
- BLE – Base Level Engineering
- CLOMR – Conditional Letter of Map Revision
- FIS – Flood Insurance Study
- FIRM – Flood Insurance Rate Map
- LOMC – Letter of Map Change
- LOMR – Letter of Map Revision
- PMR – Physical Map Revision
- SFHA – Special Flood Hazard Area
- WSEL – Water Surface Elevation

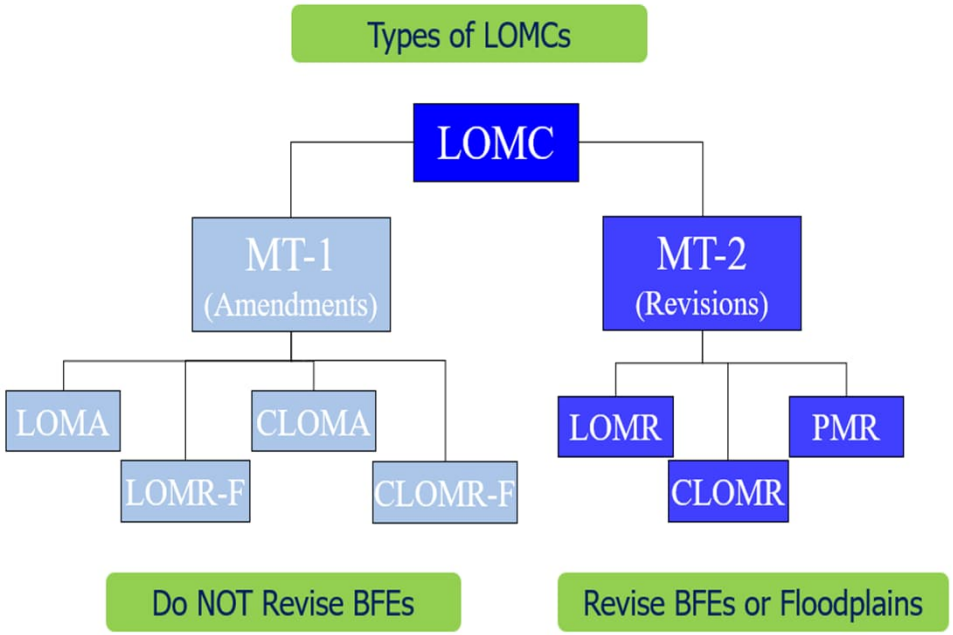
Introduction

- The FIS and FIRMs are prepared with rigorous technical standards
- Why FIRM need to be changed?
  - Improved techniques
  - Physical changes – both natural and man-made
  - New Data
  - Limitations of Map Production Scale
- LOMC processes provides a mechanism to amend or revise the FIRM and FIS.



Letter of Map Change (LOMC)

- Amendments
  - Requires submittal of MT-1 Forms
  - Structures or legally defined parcels
  - Does not typically involve an engineering analysis
  - Does not involve changes in BFE
  - Can not be used for properties in some flood areas (alluvial fan)
- Revisions
  - Requires submittal of MT-2 Forms
  - More complex map changes
  - Not usually lot or structure specific
  - Typically involves H&H analysis

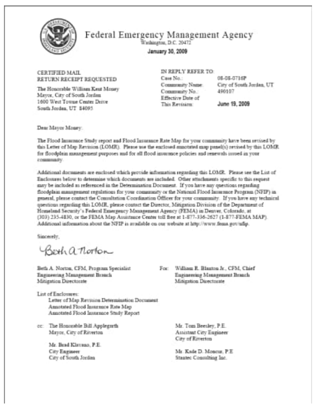


Letter of Map Revision (LOMR)

- A LOMR revises the effective FIRM and FIS report to show changes in BFEs, SFHAs, and regulatory floodways
- The FIRM and FIS report are not republished, but annotated FIRMs, profiles, and tables are attached to a determination letter
- Can only be based on as-built or existing conditions

- When can a LOMR be submitted?
  - New or more detailed analyses
    - Updated hydrology
    - Additional hydraulic information
    - New topographic information
    - No previous study (Zone A)
  - Physical changes resulting in floodplain modifications
    - Projects (bridge/culvert, channelization, etc.)
    - Physical changes (fill, grading, etc.)
    - Natural Changes (erosion, subsidence, bridge/culvert removal, etc.)
  - Error corrections

Letter of Map Revision (LOMR)

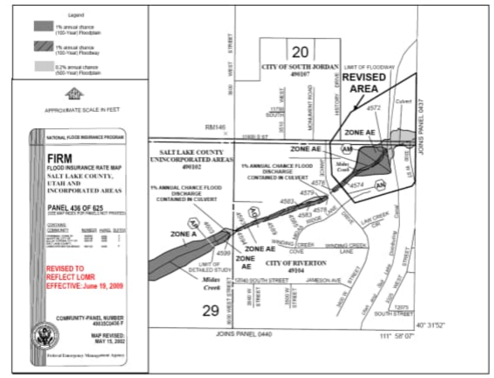

Federal Emergency Management Agency

Cover Letter

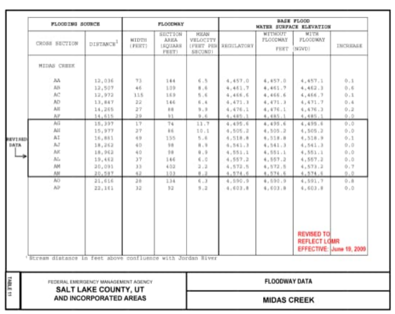

Federal Emergency Management Agency

LETTER OF MAP REVISION
DETERMINATION DOCUMENT

Determination Document



Annotated FIRM


SALT LAKE COUNTY, UT
AND INCORPORATED AREAS

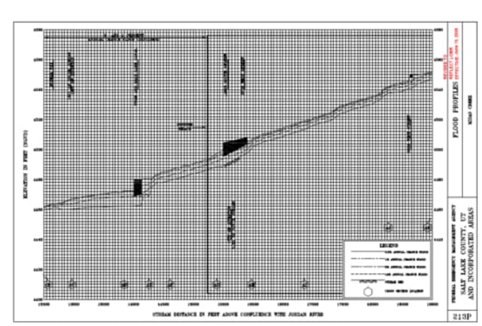
FLOODWAY DATA

MIDAS CREEK

Annotated FIS Tables

Important!

FIRMs are NOT Updated or Republished



Annotated FIS Profiles

Conditional Letter of Map Revision (CLOMR)

- CLOMRs are for proposed projects, prior to any construction being completed or Floodplain Permit Issuance
- Allows FEMA to comment on the effects that a proposed project would have on the effective FIRM and FIS Report
- Does not revise the FIRM
  - Must be followed by a LOMR request when project completed
- Not A Permit

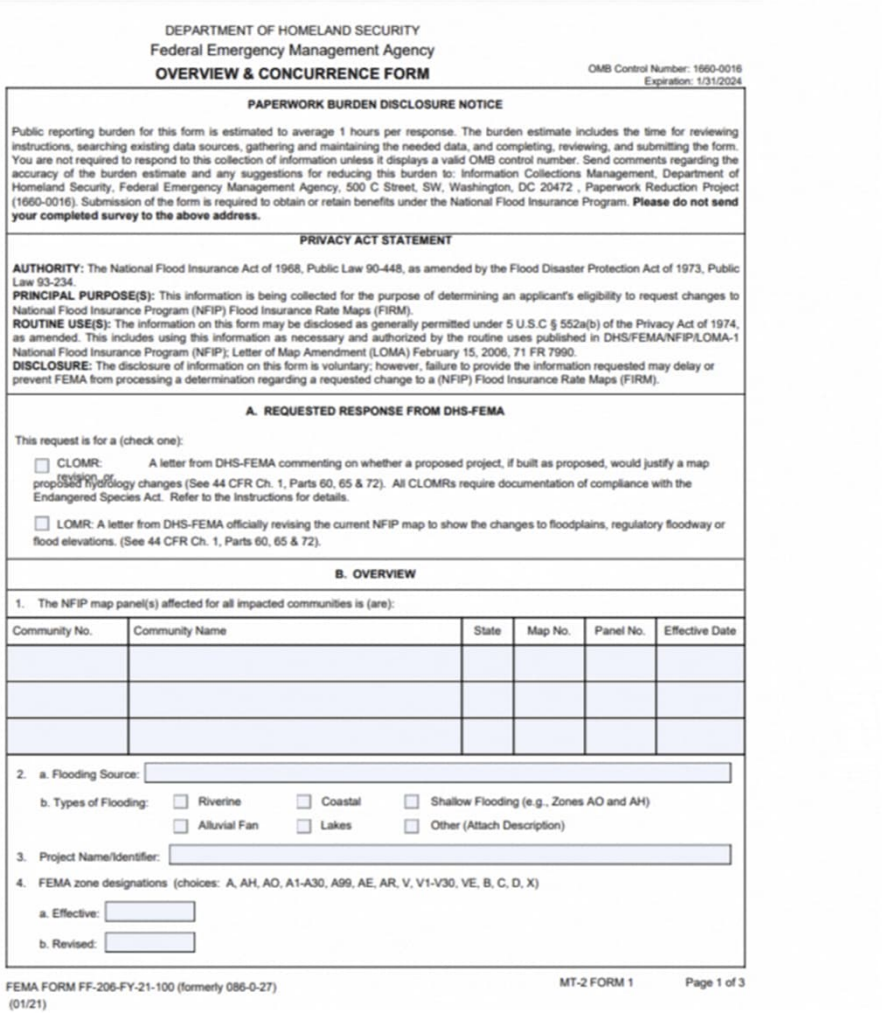
- When a CLOMR is Required?
  - At the request of the community
  - Proposed projects that:
    - 44 CFR 60.3(d)(3): Encroach upon the floodway and cause an increase* > 0.00 ft
    - 44 CFR 60.3(c)(10): Encroach upon a floodplain when a floodway has not been established and cause an increase* of > 1.00 ft

*Increase are determined by comparing pre-project (existing conditions) and post project (proposed conditions) model

MT-2 Submittal

- How to submit an MT-2 application?
  - Online LOMC Portal
    https://hazards.fema.gov/femaportal/onlinelomc/signin
  - Hardcopy (Paper) Submittal
    - Submit a request to the LOMC Clearing House

      LOMC CLEARINGHOUSE
      3601 EISENHOWER AVENUE, SUITE 500
      ALEXANDRIA, VA 22304-6426
  - MT-2 Application Forms & Instructions can be accessed by visiting FEMA website at https://www.fema.gov/flood-maps/change-your-flood-zone/paper-application-forms/mt-2
  - MT-2 Forms
    - Form 1: Overview & Concurrence
    - Form 2: Riverine Hydrology/Hydraulics
    - Form 3: Riverine Structures



DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
OVERVIEW & CONCURRENCE FORM

OMB Control Number: 1660-0016
Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472 , Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.
PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).
ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.
DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72). All CLOMRs require documentation of compliance with the Endangered Species Act. Refer to the Instructions for details.

☐ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72).

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date

2. a. Flooding Source:
   b. Types of Flooding: ☐ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH) ☐ Alluvial Fan ☐ Lakes ☐ Other (Attach Description)
3. Project Name/Identifier:
4. FEMA zone designations (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)
   a. Effective:
   b. Revised:

FEMA FORM FF-206-FY-21-100 (formerly 086-0-27) (01/21)

MT-2 FORM 1 Page 1 of 3

aecom.com

MT-2 Submittal

INSTRUCTIONS FOR COMPLETING THE APPLICATION FORMS FOR CONDITIONAL LETTERS OF MAP REVISION AND LETTERS OF MAP REVISION

CONTENTS

Online Letter of Map Change Tool

The Federal Emergency Management Agency (FEMA) has developed the Online Letter of Map Change (LOMC) Tool to allow applicants to submit their requests electronically. This tool is a convenient way for applicants to upload all information and supporting documentation and check the status of their request online. Users can submit requests through this tool instead of filing the paper form via mail. You can find additional information about FEMA's Online LOMC Tool at https://www.fema.gov/change-flood-zone-designation-online-letter-map-change.

MT-2 REVISION REQUEST SUBMITTAL CHECKLIST

PART A: GENERAL REQUIREMENTS

ELEMENTS	Yes	N/A
NARRATIVE: Please provide a written description of the purpose of the request, the scope of the proposed/as-built project, and the methodology used to analyze the project effects.		
MT-2 APPLICATION FORMS: Please provide completed forms applicable to your request. Ensure that MT-2 Form 1 was signed by the requester, certifying engineer, and each community affected by the revision.		
HYDROLOGIC ANALYSIS: If applicable, please provide a FEMA-acceptable hydrologic analysis in digital format, a drainage area map, and associated backup information (e.g., calculations used to determine lag time, CN, and loss values, as well as land use and soil maps). FEMA-acceptable models can be accessed at https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/numerical-models-meeting-minimum-requirements.		
HYDRAULIC ANALYSIS: Please provide a FEMA-acceptable hydraulic analysis in digital format. Information on FEMA-acceptable models can be accessed at https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/numerical-models-meeting-minimum-requirements.		
CERTIFIED TOPOGRAPHIC WORK MAP: Please provide a certified topographic work map that meets the mapping requirements outlined in MT-2 Form 2. If available, please provide spatially referenced Geographic Information System (GIS) data. If GIS data are not available, you may submit digital Computer-Aided Design (CAD) data.		
ANNOTATED FIRM: Please submit a revised Flood Insurance Rate Map (FIRM), at the scale of the effective FIRM, which shows the revised boundary delineation of the base (1-percent-annual-chance) floodplain, 0.2-percent-annual-chance floodplain, and regulatory floodway and how it ties into the boundary delineation shown on the effective FIRM at the downstream and upstream ends of the revised reach.		
REVIEW FEE PAYMENT: Please include the appropriate review fee payment. The current fee schedule is available on the FEMA website at https://www.fema.gov/flood-map-related-fees.		
MEET 65.10 REQUIREMENT: If you intend to show that a berm/levee/floodwall reduces the flood hazard, please submit all the NFIP data requirements outlined in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR §65.10).		
OPERATION AND MAINTENANCE PLAN: If the request involves a berm, levee, floodwall, dam, and/or detention basin project, please submit an officially adopted operation and maintenance plan.		
PROPOSED/AS-BUILT PLANS: Please submit proposed/as-built plans, certified by a registered Professional Engineer, for all project elements for which this applies.		
FLOODWAY NOTICE: If the revision results in changing or establishing regulatory floodway boundaries, please provide a floodway public notice or a statement by your community that it has notified all affected property owners, in compliance with the National Flood Insurance Program (NFIP) regulations at 44 CFR §65.7(b)(1).		
PROPERTY OWNER NOTIFICATION: If the revision results in any widening/shifting/establishing of a base floodplain and/or any increasing/establishing of Base Flood Elevations (BFEs), please provide copies of the individual legal notices sent to all property owners affected by increased flood hazards.		

Technical Data Requirements

Hydrology

Hydraulics

Mapping

- Work Map
- Annotated FIRM

Hydrologic Analysis

- Objectives
  - To determine flood discharge-frequency relations
  - Discharges to be developed for use by hydraulic models
- New (or revised) hydrologic analysis is required, if
  - No effective flows – Zone A areas or unstudied streams
  - Effective flows are no longer reasonable
    - Changes (natural or manmade) in physical conditions of the watershed and/or the stream
    - Increases in length of stream gaging records
    - Availability of better rainfall data
    - Improved hydrologic methods
    - Correction to the effective studies
- Methods
  - Precipitation/Runoff Model
  - Regional Regression Equations
  - Statistical Analysis of Gage Records

Hydrologic Analysis

Methods

- Precipitation/Runoff Models
  - A FEMA-acceptable hydrologic analysis must be submitted in digital format http://www.fema.gov/flood-maps/products-tools/numerical-models/hydrologic
  - Include back-up documentation to support all model input parameters
    - Drainage area maps
    - Land use and soil maps
    - Calculations used to determine parameters such as lag time and curve number
    - Source of rainfall, including temporal distributions, areal reduction factors, etc.
    - Unit hydrograph method and associated documentation
    - Routing method and associated documentation

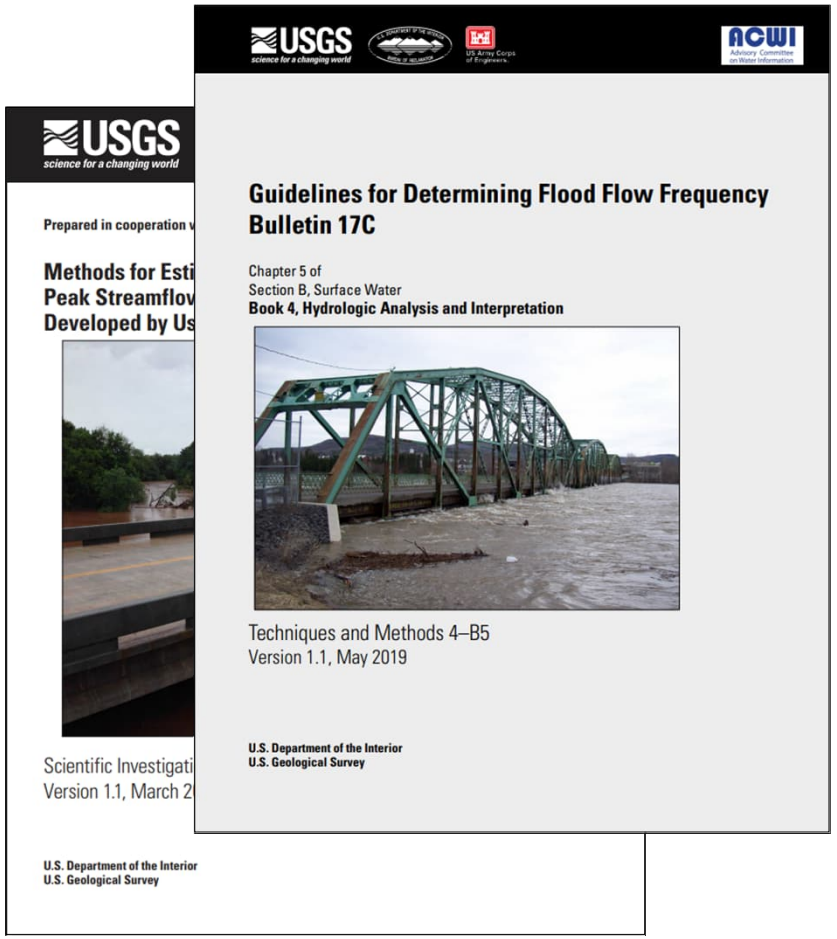
Source: Hydrologic Engineering Center

Hydrologic Analysis

Methods (Continued)

- Regression Equations
  - USGS regression equations are available nationwide and recommended for use https://water.usgs.gov/osw/programs/nss/pubs.html
  - Include documentation to support all the input parameters for the regression equations

- Statistical Analysis of Gage Records
  - Bulletin 17C is the recommended approach for analyzing gage records
  - Guidelines for Determining Flood Frequency https://pubs.usgs.gov/tm/04/b05/tm4b5.pdf



Hydrologic Analysis

- Considerations
  - Revised hydrology method should be as good or better than effective analysis
    - Gage Analysis > Rainfall/Runoff > Regression
  - Based on existing ground conditions
  - For areas with an effective hydrologic analysis, a revised hydrologic analysis must include an evaluation of the same recurrence interval(s) studied in the effective FIS
    - Base 1% (100-year) flood,10% (10-year), 2% (50-year), and 0.2% (500-year) floods
  - Ensure change in hydrology is significant
  - Logical transition between revised and unrevised flows is preferred

Hydrologic Analysis

Tips

- Provide a description in the narrative
  - Reason for new or revised hydrology
  - Hydrology methodology
- Drainage Area Map
  - Contours (with labels), subbasin delineations, flow paths for Tc (if applicable), discharge locations, scale, north arrow, vertical datum, and certified
- Rainfall
  - Current depth-duration-frequency data (NOAA Atlas 14)
- O&M Plans
  - Dams/basins/ponds

Hydraulic Analysis

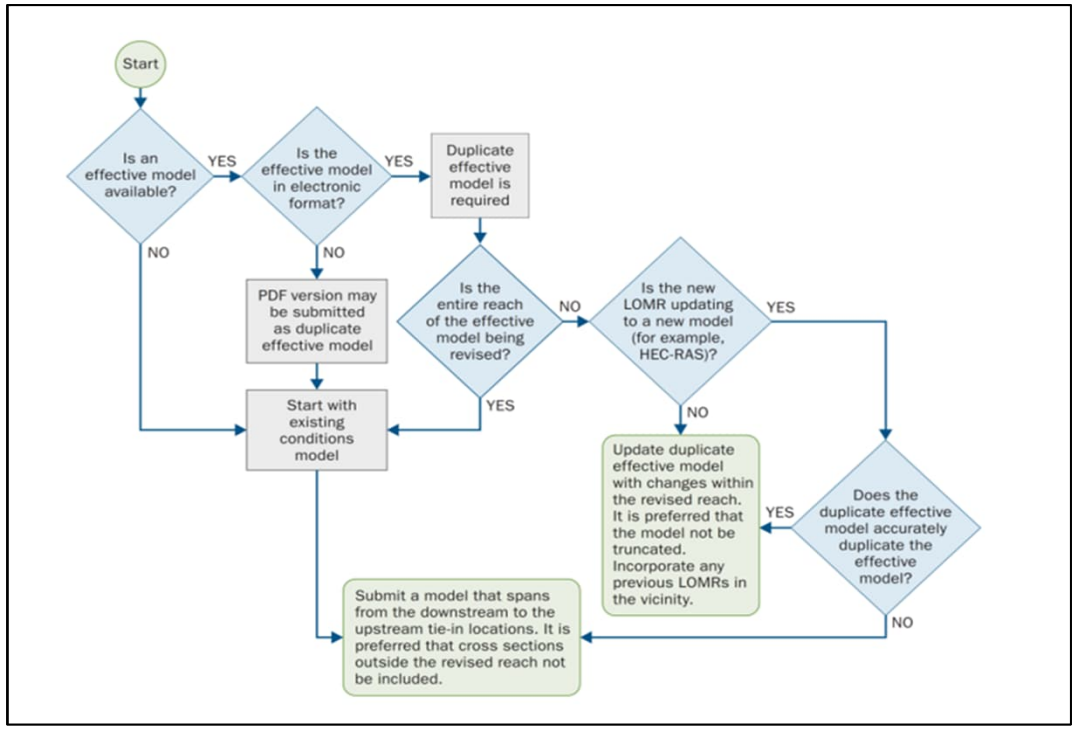
- Objectives
  - To determine the peak water-surface elevations (WSELs) associated with a given flood frequency at specific locations within a floodplain
  - The extent of floodplain is determined by using the WSEL associated with each frequency studied.

- Requirements to submit a hydraulic analysis:
  - Required for most LOMR and CLOMRs
  - Based on hydraulic models identified in FEMA's acceptable models list https://www.fema.gov/flood-maps/products-tools/numerical-models/hydraulic

- Exception:
  - The published regulatory flood hazard information (BFEs, SFHA, floodway) does not accurately reflect the results of the effective hydraulic model.
  - If a LOMR is requested to redelineate the SFHA based on better topographic data used to delineate the effective SFHA
    - The area being redelineated is relatively small and site specific
    - No manmade modification within the vicinity of the project
  - The area being revised is a stillwater area where a hydrologic analysis accounting for the storage and routing of the full hydrograph is used to determine the BFE(s)

Hydraulic Analysis

- Effective Model
  - Model received from FEMA (https://www.fema.gov/sites/default/files/documents/fema_flood-insurance-study-data-request-form.pdf)
- Duplicate Effective Model
  - Copy of the effective model produced in the requester equipment
  - Should be identical to the effective model



Flowchart for determining the need for duplicate effective model

Hydraulic Analysis

- Corrected Effective Model
  - Corrects any errors in the duplicate effective model
  - Must not reflect any manmade modifications that have occurred since the date of the effective published study
- Pre-Project (Existing) Conditions Model
  - Reflects any physical modifications that have occurred since the date of the current effective model
  - Prior to the construction of the project for which the revision is being requested
- Post-Project (Proposed) Conditions Model
  - Pre-project conditions model is modified to reflect revised or post-project conditions

Hydraulic Analysis

Hydraulic Model Requirements

- **Required Flood Frequencies (44 CFR 65.6(a)(8))**
  - Same recurrence interval(s) as in the effective (10-, 50-, 100-, and 500-year, and floodway)
- **Boundary Conditions**
  - Slope area/normal depth (at a confluence or if known WSEL not available)
  - Junction (if tributary and main stream have coincident peaks)
  - Known WSEL (in the middle of a reach with effective BFEs or reliable source)
- **BFE Tie-in (44 CFR 65.6(a)(2))**
  - Revised and unrevised BFEs must match within 0.5 foot at upstream and downstream ends
- **Floodway Analysis**
  - Baseline condition model and floodway model run
  - Surcharge should be between 0.0 and 1.0 feet

Additional Model Parameters

- **Roughness Coefficient**
  - Reasonable Manning's “n” values for the channel and overbank areas
- **Bridge/Culvert/Drop Structure**
  - Sufficient cross sections reasonably located
  - Reasonable loss parameters for structures
- **Transition Coefficient**
  - Appropriate contraction/expansion coefficients
- **Ineffective Flows**
  - Appropriately defined near structures and other applicable locations
- **Water Surface Profiles**
  - Profiles of different flood frequencies do not cross
  - No drawdowns

Hydraulic Analysis

Tips

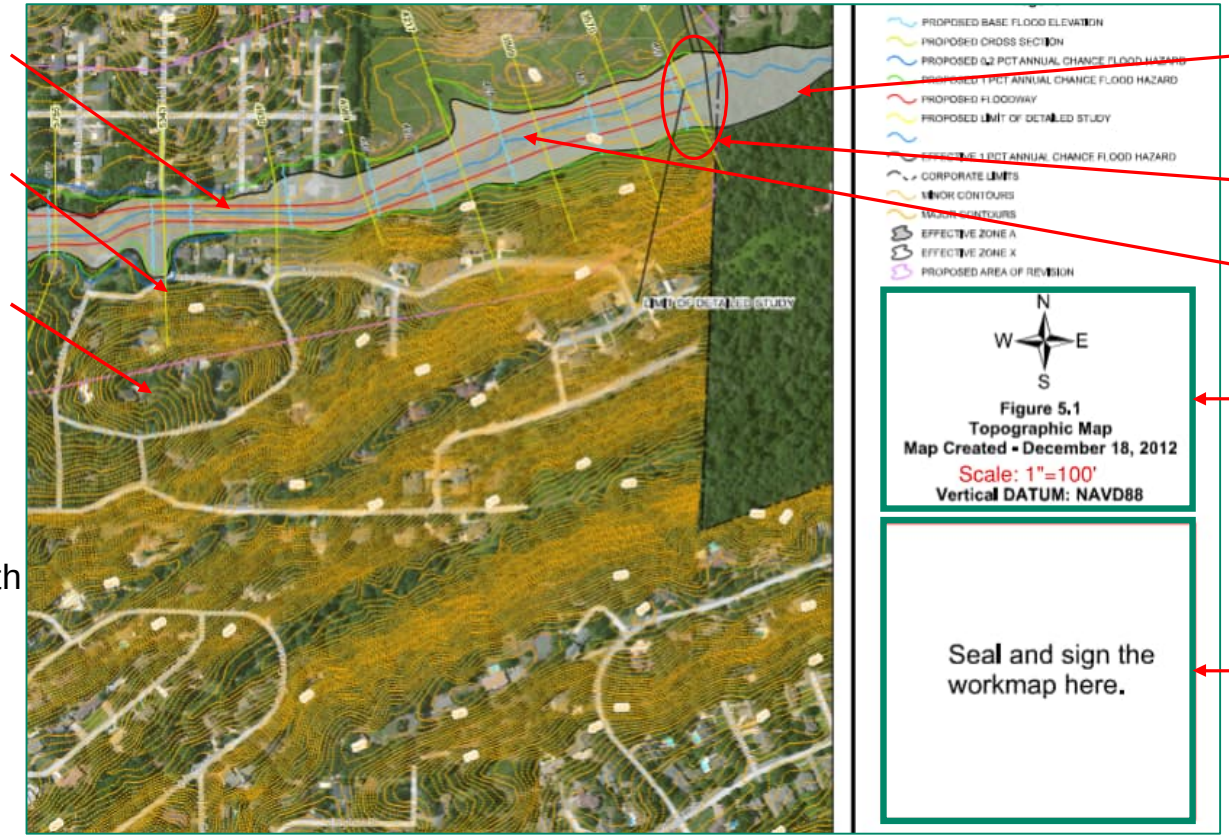
- Review the HEC-RAS models with CHECK-RAS.
- Do not truncate the model (if executable effective model is available)
- Provide a descriptive name to each plan.
- Only submit the plans to be reviewed.
- Submit appropriate as-built/survey plans to verify structures in model (certified & datum listed)

Topographic Workmap

Revised floodplain delineations

Cross sections

Topographic contours



Effective floodplain delineations

Graphical tie-ins

Streamlines

North arrow, scale, and vertical datum

Certified (signed, sealed and dated)

Tips

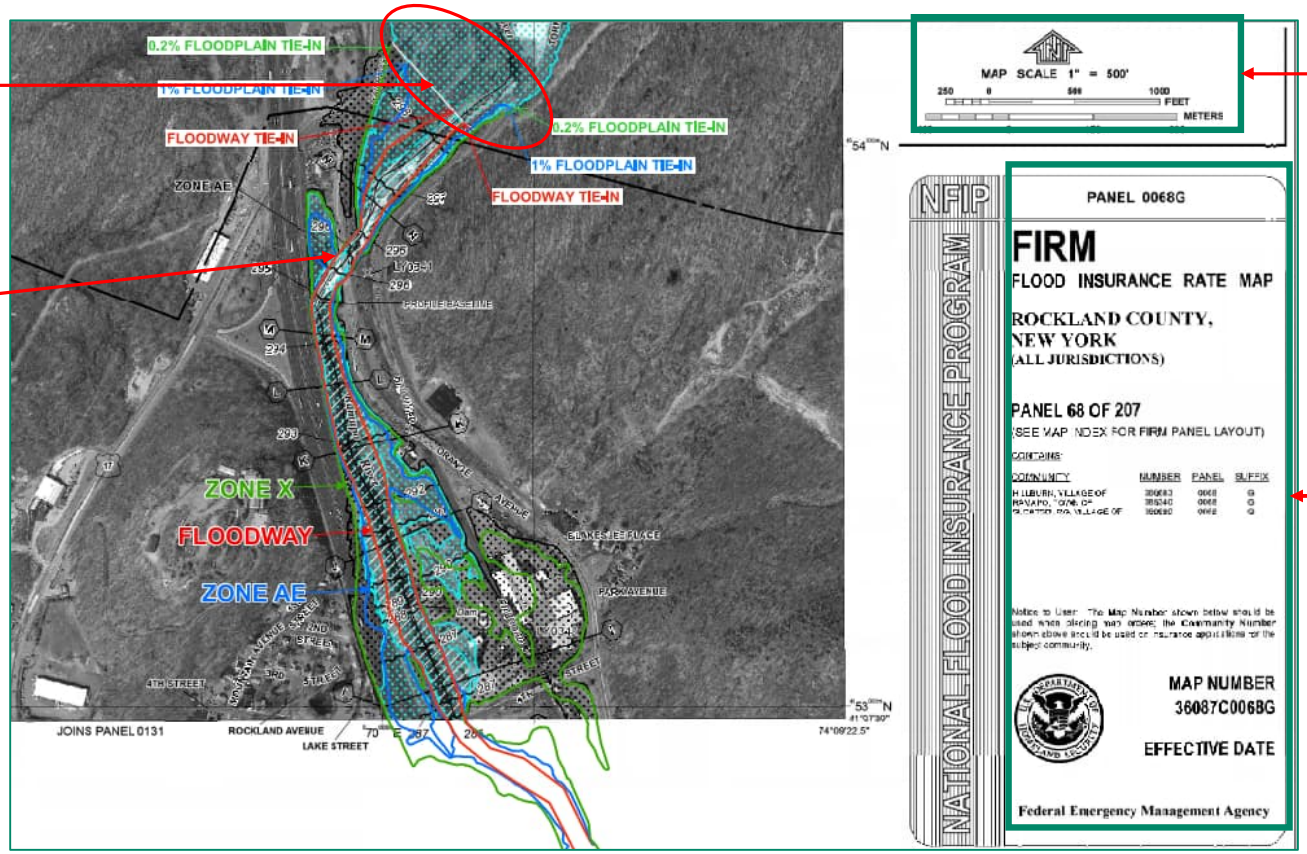
- Submit GIS/CAD data associated with the workmap
- Ensure top width and reach lengths match the models

Annotated FIRM

Annotated FIRM

Graphical tie-ins

Revised floodplain delineations



North arrow and scale

Title block of the effective FIRM

Tips

Submit updated annotated FIRM, based on any changes to the workmap revision

Other Considerations

Physical Map Revision

Preliminary Studies

Unsteady Flow and 2D Modeling

Base Level Engineering

Other Considerations

Physical Map Revision

- Revisions >3 full FIRM Panels monitored as Potential
- Republished FIRM and FIS
- Same data requirements as a regular LOMR
- Requires more extensive due process
- Depends on available funding from FEMA regional office

Preliminary Studies

- **Check Preliminary Data**
  - If the flooding source was not restudied, the effective model will remain effective
  - If restudied, it may be necessary to use both the preliminary and effective models
- Data is subject to change or may be delayed in becoming effective
- LOMRs are not issued to revise preliminary FIRMS
- CLOMRs may be based on the effective data, preliminary data, or both

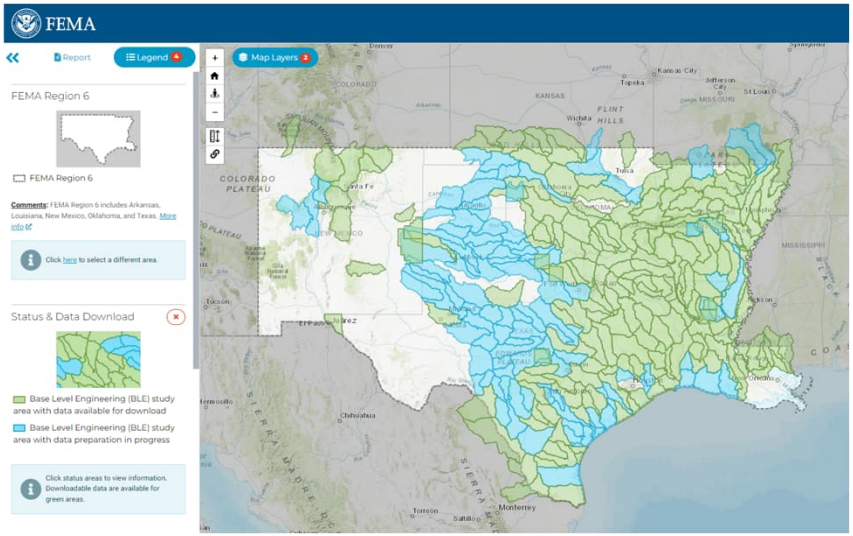
Unsteady Flow and Two-Dimensional (2D) Modeling

- Effective model must be used as the base model unless it is not available, or its use is demonstrated to be inappropriate
- Monitored by FEMA on a case-by-case basis

Other Considerations

Base Level Engineering (BLE)

- Combines high-resolution ground elevation data and latest modeling software to create engineering models and flood hazard data
- Produced at a large scale, watershed level
- In agreement with FEMA's Standards for Flood Risk Projects (Zone A Ready)



Estimated BFE Viewer https://webapps.usgs.gov/infrm/estbfe/

When can BLE data be used to support MT-2?

- **Use BLE as a base model when effective model is not available**
  - If effective Zone AE model is available, that model must be used as a base model
  - If effective Zone A model is available, evaluate case by case to determine which model is "best available data".
- **BLE data must be enhanced to be used for a CLOMR or LOMR**
  - Incorporating better topo
  - Adding cross sections to 1D modeling
  - Modeling hydraulic structures
- **Data will be subject to typical MT-2 review**
  - Requester must certify the data and is responsible for revising data if necessary to address review comments

Guidance & Resources

- MT-2 Application Forms and Instructions
  https://www.fema.gov/flood-maps/change-your-flood-zone/paper-application-forms/mt-2
- MT-2 Guidance
  https://www.fema.gov/sites/default/files/documents/fema_guidance-flood-risk-analysis-mapping_112022.pdf
- Map Service Center
  https://msc.fema.gov/portal
- National Flood Hazard Layer (NFHL) Viewer
  https://msc.fema.gov/nfhl
- Flood Insurance Study (FIS) Data Requests
  https://www.fema.gov/sites/default/files/documents/fema_flood-insurance-study-data-request-form.pdf
- Flood Map Related Fees
  https://www.fema.gov/flood-maps/change-your-flood-zone/status/flood-map-related-fees
- FEMA Mapping and Insurance eXchange (FMIX)
  https://www.floodmaps.fema.gov/fhm/fmx_main.html
- FEMA Accepted Hydrologic Models
  https://www.fema.gov/flood-maps/products-tools/numerical-models/hydrologic
- FEMA Accepted Hydraulic Models
  https://www.fema.gov/flood-maps/products-tools/numerical-models/hydraulic
- FEMA Guidance Document 52
  General Hydraulics Considerations
  https://www.fema.gov/sites/default/files/documents/fema_general-hydraulics-guidance.pdf
- FEMA Guidance Document 71
  General Hydrologic Considerations
  https://www.fema.gov/sites/default/files/2020-02/General_Hydrologic_Considerations_Guidance_Feb_2019.pdf
- FEMA Guidance Document 91
  Hydrology: Rainfall-Runoff Analysis
  https://www.fema.gov/sites/default/files/2020-02/Hydrologic_Rainfall_Runoff_Analysis_Feb_2019.pdf
- Base Level Engineering (BLE) Tools and Resources
  https://www.fema.gov/about/organization/region-6/base-level-engineering-ble-tools-and-resources

Thank You

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AECOM

Delivering a
better world