Map MODERNIZATION

Federal Emergency Management Agency

FEMA's Flood Hazard Mapping Program

Guidelines and Specifications for Flood Hazard Mapping Partners

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Volume 1: Flood Studies and Mapping

FEDERAL EMERGENCY MANAGEMENT AGENCY

www.fema.gov/mit/tsd/dl_cgs.htm

FINAL

February 2002

Volume I

Flood Studies and Mapping

1.1 Overview of the Flood Map Project Process

The Federal Emergency Management Agency (FEMA) has specific mandates within the National Flood Insurance Act of 1968, as amended, to identify flood hazards nationwide and publish and update flood hazard information in support of the National Flood Insurance Program (NFIP). FEMA is required to consult with local officials in identifying floodprone areas, and specific procedures are described in the Act for establishing proposed flood elevations.

The NFIP regulations (found at Title 44 of the Code of Federal Regulations, Parts 59-77) were developed as the program evolved. They codify the requirements of the 1968 Act and identify the administrative procedures required to carry out the statutory mandates. Parts 65, 66, 67, 70, and 72 of the NFIP regulations refer to specific procedures to be followed in flood hazard mapping activities.

To fulfill its mandate to identify floodprone areas, FEMA has an ongoing program to (1) develop new Flood Insurance Rate Maps (FIRMs) for floodprone communities without maps and (2) to produce updated FIRMs for communities with maps. This Volume details the processes, guidelines, and specifications by which FEMA develops and updates FIRMs and collateral Flood Insurance Study (FIS) reports.

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Activities for developing a new FIRM and/or updating an existing FIRM (both actions will be referred to hereinafter as "Flood Map Projects") are completed in four phases:

1. Mapping Needs Assessment;
2. Project Scoping;
3. Topographic and Flood Hazard Data Development/Report and Map Production; and
4. Preliminary/Post-Preliminary Processing.

Figure 1-1 depicts the phases of the process, which is applicable to all Flood Map Projects, including those that involve the following:

- Developing new or updated flood hazard data;
- Digitizing floodplain boundaries from the effective FIRMs and fitting them to a digital base map, thus converting the existing manually produced FIRMs to digitally produced FIRMs referred to as DFIRMs; and
- Combinations thereof.

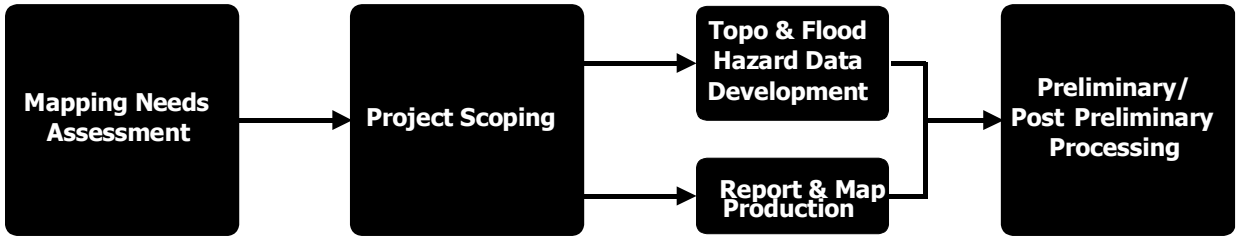

Figure 1-1. Phases of Flood Map Project Process

Subsections 1.1.1 through 1.1.4 summarize the four phases of the Flood Map Project process; greater detail is provided in Sections 1.2 through 1.5. Subsection 1.1.5 describes the roles of the various Mapping Partners in completing the tasks associated with any given Project, and Subsection 1.1.6 describes FEMA's oversight role.

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1.1.1 Mapping Needs Assessment

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For communities with effective FIRMs, the purpose of the Mapping Needs Assessment is to evaluate whether the flood hazard data and other data shown on the FIRM are adequate. If the data on the FIRM are not adequate, the community will identify the specific data elements that need to be updated (e.g., flood hazard data for specific flooding sources, base map information). If a community has an effective Flood Boundary and Floodway Map (FBFM), the community also will evaluate the accuracy of the data on the FBFM.

For communities that do not have effective FIRMs or FBFMs, including those that have Flood Hazard Boundary Maps (FHBMs), the purpose of the Mapping Need Assessment is to determine whether the community is floodprone and whether a FIRM should be produced.

The Mapping Needs Assessment forms the basis for selecting and prioritizing Flood Map Projects to initiate and, for those selected, serves as the "building block" for the Project Scoping phase. The Mapping Needs Assessment process is discussed in detail in Section 1.2.

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1.1.2 Project Scoping

The Project Scoping phase begins after a community's mapping needs have been identified and FEMA and the community have decided to initiate a Flood Map Project to create or update the FIRM. Building on the Mapping Needs Assessment, Project Scoping entails the following:

- Conducting background research and community outreach;
- Determining what flood hazard data (e.g., those data shown in effective FIS reports and on effective FIRMs) can be used in the revised flood hazard analyses and/or transferred without change to the new FIS report and FIRM. That is, for some communities, it may be possible simply to transfer all flooding source data to the new FIS report and FIRM; in others, it may be that only the existing hydrologic data can be used and that new hydraulic analyses need to be performed; in still others, it may be that no existing data can be used);
- Identifying other data needed to complete the Flood Map Project and sources of those data (e.g., base map, topography, cross sections, transects);
- Establishing priority levels for flooding sources to be analyzed and mapped;
- Determining whether the FIRM format should be countywide or community-based, digital or manual, and what tiling scheme should be used;
- Developing schedules and cost estimates for the components of the Flood Map Project; and
- Assigning project tasks to Mapping Partners and developing appropriate contracts or agreements for completion of assigned work.

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All Mapping Partners contributing to the Flood Map Project, including the affected communities, will participate in the Project Scoping phase. The Project Scoping process is discussed in detail in Section 1.3.

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1.1.3 Topographic and Flood Hazard Data Development/Report and Map Production

After the Project Scoping phase has been completed and all contractual orders to initiate work have been issued, the Topographic and Flood Hazard Data Development/Report and Map Production phase of the Flood Map Project begins. This phase may entail the following:

- Developing and/or obtaining topographic and cross-section data needed for engineering analyses and floodplain boundary delineations;
- Performing engineering analyses and delineating floodplain boundaries;
- Obtaining and preparing the base map for FIRM production;
- Digitizing directly from the effective FIRM those floodplain boundaries that are not being updated;
- "Merging" new or updated flood hazard data (for updated portions of flooding sources) with effective data (for non-revised portions of flooding sources) to produce the updated FIRM; and
- Producing or revising the FIS report, including the Flood Profiles and data tables (e.g., Summary of Discharges Table, Floodway Data Table).

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To compress timeframes, many work elements will be completed concurrently and collaboratively by the assigned Mapping Partners. For example, FIRM production may begin with one Mapping Partner conducting engineering analyses for several flooding sources while another acquires base maps and digitizes floodplain boundaries and other flood hazard data that will not be revised as part of the Flood Map Project. Data development and map and report production are discussed in detail in Section 1.4.

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1.1.4 Post-Preliminary Report and Map Processing

Upon completion of the Topographic and Flood Hazard Data development/Report and Map Production phase, FEMA issues the new or updated FIS report and FIRM to officials of the affected communities in “Preliminary” form for review and for distribution to other interested parties in the communities. Through an informal comment period following the issuance of the Preliminary copies and through formal public meetings, FEMA provides the affected communities, their citizens, and other interested parties the opportunity to comment on the FIS report and FIRM. If the informal public review requires making significant changes in base map or flood hazard information, these changes are incorporated and “Revised Preliminary” copies of the FIS report and FIRM are issued.

When required, FEMA initiates a statutory 90-day appeal period to provide community officials and citizens a formal opportunity to "appeal" any new or modified 1-percent-annual-chance (100-year) flood elevations, also referred to as Base Flood Elevations (BFEs), or to "protest" other flood hazard data. FEMA will consider and evaluate all comments and data submitted during the 90-day appeal period and resolve all appeals and protests in consultation with the community. The following occurs during the remainder of the post-Preliminary process:

- Providing communities with a 6-month period to make any necessary changes in their floodplain management ordinances;
- Conducting final quality assurance/quality control (QA/QC) reviews to ensure the accuracy of the information presented in the FIS report and on the FIRM, and its compliance with these Guidelines;
- Printing activities performed by the U.S. Government Printing Office (GPO) in coordination with the FEMA Map Service Center (MSC), which is responsible for distribution of the printed copies of the FIS report and FIRM; and
- Printing and distributing the FIS report and FIRM.

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1.1.5 Mapping Partners

As discussed in the Introduction, Section INT.9 of these Guidelines, several Mapping Partners may be involved in a particular Flood Map Project. The Mapping Partners most frequently include FEMA Regional Office (RO) and Headquarters (HQ) staff; communities or regional agencies, including those participating in the FEMA Cooperating Technical Partners (CTP) initiative (hereinafter referred to as CTPs; Study Contractors (SCs) selected by FEMA or the community to perform certain portions of the work; contractors selected by a CTP to perform certain portions of the work; and FEMA's Flood Map Production Coordination Contractors (MCCs). The assignment of project tasks to communities, CTPs, SCs, CTP contractors, and MCCs may vary from project to project. These task assignments are made during the Project Scoping phase to allow FEMA and the Project team to achieve a "best value" for its mapping efforts based on the capabilities and resources of the various Mapping Partners.

The bar graphs in Figure 1-2 demonstrate the flexibility in the assignment of Flood Map Project tasks and illustrate how the assignment of responsibilities can vary.

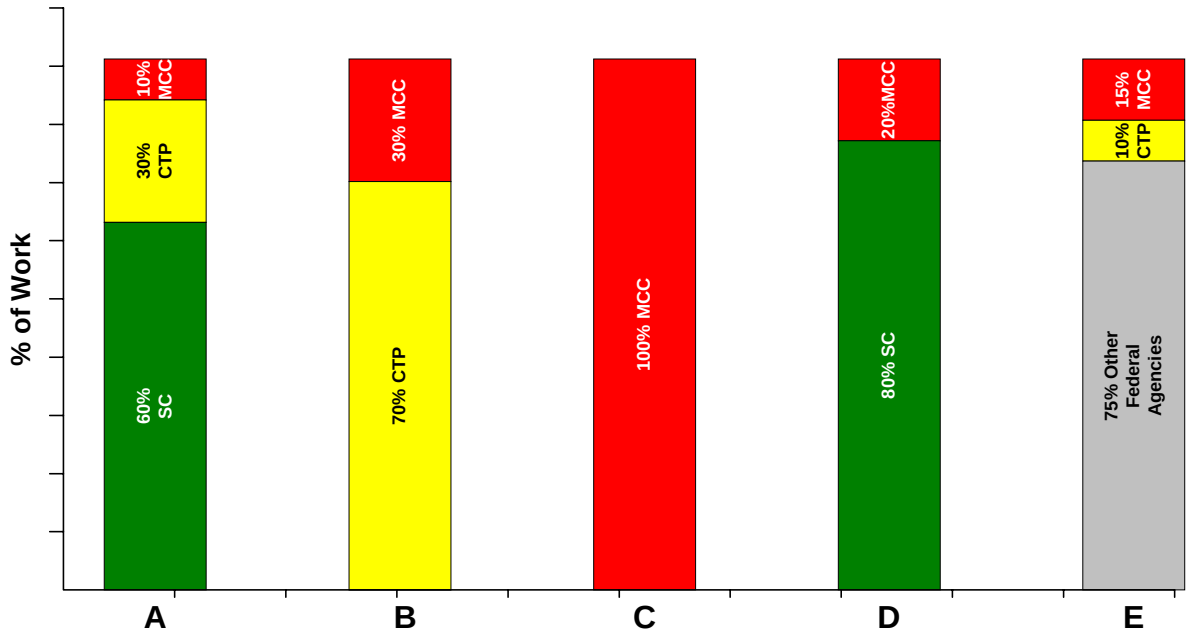

Figure 1-2. Possible Distribution of Task Assignments for Flood Map Projects

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Column A depicts a map update that combines the efforts of the CTP and SC to complete the engineering analyses, floodplain mapping, and digital FIRM production, with support from the MCC for upfront research and post-Preliminary processing. The SC would perform independent QA/QC reviews of the CTP work.

Column B depicts a project with engineering analyses, floodplain mapping, and digital FIRM production by the CTP and upfront research, ongoing coordination, independent QA/QC reviews, and post-Preliminary processing by the MCC.

Column C depicts a digital FIRM conversion prepared by the MCC with no new flood hazard data.

Column D depicts a "traditional" FEMA-contracted study. The SC completes the engineering analyses and floodplain mapping and the MCC performs upfront research, ongoing coordination, independent QA/QC reviews, digital FIRM production, and post-Preliminary processing.

Column E depicts a Flood Map Project completed primarily by another Federal agency. The MCC performs upfront research, ongoing coordination, and post-Preliminary processing. For the Flood Map Project depicted in Column E, the community would be moderately involved, perhaps through sharing of base map data for the production of the digital FIRM.

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1.1.6 Oversight of Flood Map Projects

All Mapping Partners performing work under a contractual or cooperative agreement will perform work under the authority of FEMA Project Officers (POs) and Assistance Officers (AOs). The AOs and POs may not be the same people for different Mapping Partners. For CTPs and SCs, the PO is normally an engineer from the Flood Insurance and Mitigation Division of the appropriate FEMA RO and is referred to hereinafter as the Regional Project Officer (RPO). For MCCs, the PO is the appropriate Studies Team Leader from the Hazards Study Branch of the Hazard Mapping Division, Federal Insurance and Mitigation Administration, and is referred to hereinafter as the PO at FEMA HQ.

The AO for CTPs and SCs is a Contracting or Acquisitions Officer from the appropriate RO and is referred to hereinafter as the AO. For MCCs, the AO is a Contracting Officer (CO) from the Financial and Acquisition Management Division at FEMA HQ and is referred to hereinafter as the CO at FEMA HQ.

The RPO or PO at FEMA HQ is the Mapping Partner's primary contact at FEMA and is responsible for general oversight and coordination of activities performed under the Mapping Partner's contractual or cooperative agreement with FEMA. Responsibilities of the RPO and PO at FEMA HQ include:

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- Facilitating contractual task orders for FEMA contractors;
- Facilitating Partnership Agreements, Mapping Activity Statements (MASs), and Cooperative Agreements with CTPs;
- Coordinating with other FEMA programs (e.g., Community Rating System); and
- Monitoring the Mapping Partner's activities and performance.

The AO or CO is responsible for contractual and financial aspects of contractual and cooperative agreements, including:

- Administering task orders, MASs, and Cooperative Agreements;
- Reviewing and approving technical and cost proposals;
- Overseeing financial reporting requirements;
- Dispersing payments to Mapping Partners; and
- Monitoring financial administration requirements.

Each Flood Map Project performed following the procedures described in this Volume will have a FEMA Lead assigned to manage the Project through its lifecycle, from Project Scoping through distribution of the printed FIS report and FIRM. The FEMA Lead, which will typically be an Engineer from FEMA HQ or the appropriate RO, will oversee the project's scope,

schedule, and budget on a day-to-day basis as well as coordinate the activities of the various Mapping Partners. In particular, the FEMA Lead's responsibilities include determining the scope of a Flood Map Project and assigning roles to the Mapping Partners involved in it.

In general, the FEMA Lead will provide direction to all Mapping Partners in the performance of the Flood Map Project. For Flood Map Projects that involve developing new or updated flood data, the FEMA Lead will typically be a FEMA Regional Engineer. For Flood Map Projects that involve digital conversions with no development of new or updated flood data, the FEMA Lead will either be a FEMA Regional Engineer or a Project Engineer from FEMA HQ. When the FEMA Lead is not the RPO or PO for the Mapping Partner, the FEMA Lead will coordinate with the RPO, PO, or his/her designee, as necessary, on matters related to the project's scope, schedule, budget, or technical issues.

All issues affecting cost or performance period will necessitate a modification of task orders, MASs, or Cooperative Agreements and will be coordinated by the FEMA Lead with the appropriate AO or CO.

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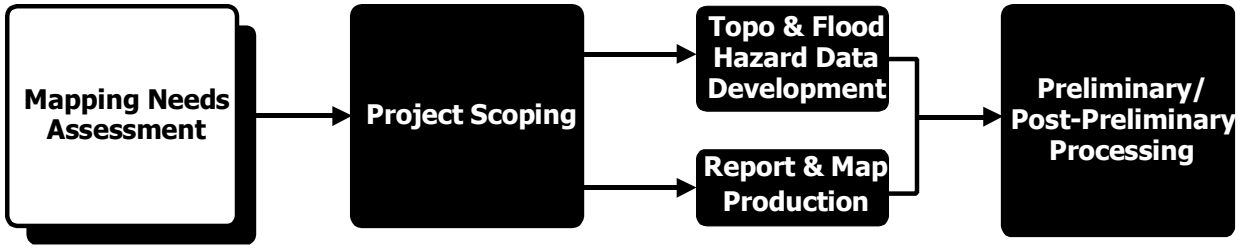
1.2 Mapping Needs Assessment



As discussed in Section 1.1, during the Mapping Needs Assessment phase, the community and FEMA will (1) evaluate of the adequacy of the published Flood Hazard Map and other data, if FEMA has published such a map, or evaluate whether an unmapped community is floodprone; and (2) determine whether a Flood Hazard Map (usually a FIRM) should be published.

The Mapping Needs Assessment forms the basis for selecting Flood Map Projects to initiate and, for those selected, serve as the "building block" for the Project Scoping phase. Further, Section 575 of the National Flood Insurance Reform Act of 1994 mandates that at least once every 5 years FEMA assess the need to revise and update all floodplain areas and flood risk zones identified, delineated, or established under Section 1360 of the National Flood Insurance Act, as amended. Accordingly, FEMA established the Mapping Needs Assessment process under which data on mapping needs are collected and then evaluated for the purpose of identifying and prioritizing potential Flood Map Projects.

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FEMA considers two categories of mapping needs:

1. Flood Data Update Needs – Any need to update existing or develop new flood hazard data (BFEs, floodplain boundaries, and/or regulatory floodway boundaries); and

2. Map Maintenance Update Needs – Any need to change non-engineering reference features that are important for users to locate property on the FIRMs, such as street and road locations and names or corporate boundaries. Map maintenance needs do not require new, updated engineering analyses and do not affect the floodplain delineation.

Mapping Needs Assessment is an ongoing program activity, and FEMA uses a variety of sources for gathering needs data, including CTPs, community surveys, other Federal and State agencies, NFIP State Coordinators, Community Assistance Visits and Calls, and FEMA archives. The mapping needs identified by FEMA and its Mapping Partners are catalogued in the Mapping Needs Update Support System (MNUSS). MNUSS allows FEMA to document and evaluate the mapping needs of each community and assists in prioritizing Flood Map Projects comparatively based on the identified needs, thereby identifying the most cost-beneficial Flood Map Projects to be undertaken. Additional information concerning MNUSS is provided in Volume 3, Subsection 3.8.2 of these Guidelines.

The flowchart in Figure 1-3 shows the conceptual process for the Mapping Needs Assessment.

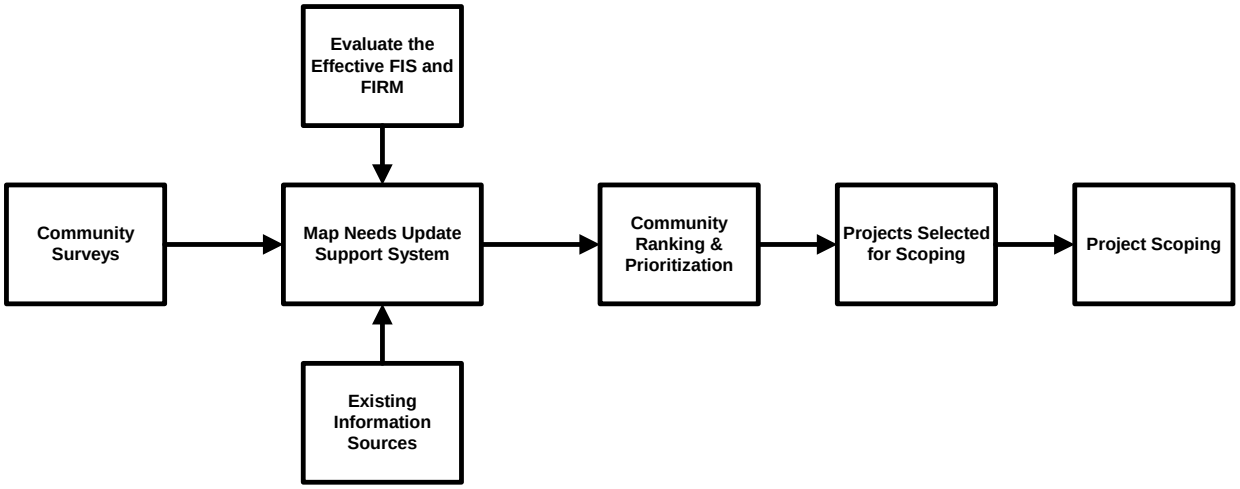

Figure 1-3. Mapping Needs Assessment Process

FEMA encourages each community to assess its mapping needs on an ongoing basis and to keep FEMA informed of any changes. A detailed Mapping Needs Assessment is essential to scope a Flood Map Project properly. Therefore, if a detailed Mapping Needs Assessment has not been completed before a Flood Map Project is initiated, that assessment should be done during the initial scoping phases of the project as discussed in Section 1.3.

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FEMA will frequently assign a Mapping Partner to conduct the Mapping Needs Assessment for a particular community or a logical grouping of communities. This section provides guidance on conducting a detailed Mapping Needs Assessment. Some of the methods of compiling mapping needs data may not apply to every community or group of communities.

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1.2.1 Existing Information Sources

To conduct a thorough Mapping Needs Assessment, the Mapping Partner that performs the assessment shall consider all potential existing information sources, including:

- FEMA archives;
- Community Assistance Visits (CAVs);
- Community Assistance Calls (CACs);
- Planning reports prepared by other agencies;
- Community floodplain managers or administrators;
- State NFIP Coordinators; and
- NFIP Biennial Reports.

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1.2.1.1 FEMA Archives

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The MCCs assist FEMA in reviewing and preparing FIS reports and FIRMs and maintaining archives for each community participating in the NFIP regarding production of these documents. Frequently, community mapping needs are maintained in these archives. The Mapping Partner that is performing the Mapping Needs Assessment may obtain information on how to obtain data from the FEMA archives through the FEMA Flood Hazard Mapping website (http://www.fema.gov/mit/tsd/st_order.htm).

Additionally, the Mapping Partner that is performing the Mapping Needs Assessment may find it useful to obtain and review a MNUSS Needs Summary report for the community. The summary report identifies the existing mapping needs information on file for the community and the source of the data. If a Mapping Partner is conducting a Mapping Needs Assessment and does not have access to MNUSS, a Needs Summary may be obtained through the FEMA Lead.

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1.2.1.2 Community Assistance Visits and Calls

FEMA created the Community Assistance Program (CAP) to provide outreach and technical support to communities participating in the NFIP. The CAP is an integral part of the administration of the NFIP at the regional, state, and local level.

Under the CAP, both Community Assistance Visits (CAVs) and Community Assistance Calls (CACs) are used to obtain input and share information. A CAV is a visit by FEMA regional staff or the State NFIP Coordinator to a community to assess whether the community's

floodplain management program meets NFIP participation requirements. Frequently, the RO will use a CAC, which is simply a telephone call to the community, to supplement or replace a CAV.

Although it is not the primary purpose of the CAV and CAC, the FEMA RO staff usually ask a community official about the overall satisfaction with the depiction of flood hazards on the Flood Hazard Map. Therefore, a review of CAV and CAC files may be a valuable source of information about the community's map update needs. These files are kept in the FEMA RO and/or State NFIP Coordinator's office.

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1.2.1.3 Planning Reports Prepared by Other Agencies

Some State and local floodplain management agencies and planning organizations are undertaking special efforts to identify mapping needs for areas with a history of recurring flooding. For example, the district offices of the U.S. Army Corps of Engineers (USACE) as well as other Federal, State and regional planning agencies have mandates to provide various forms of nonstructural and structural flood protection and floodplain management planning. Before undertaking such projects, these agencies typically prepare a planning or reconnaissance report, flood damage assessment, or some other type of pre-project planning report. A review of such reports on a regional or state-by-state basis may be helpful in identifying map update needs.

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1.2.1.4 Community Floodplain Manager or Administrator

One of the best sources of information regarding the community's map update needs is the floodplain manager or administrator for the community. Mapping Partners that perform a Mapping Needs Assessments shall consult with the community floodplain manager or administrator for information regarding map update needs.

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1.2.1.5 State Coordinators

State NFIP Coordinators may have valuable information regarding community map update needs. Specifically, they may be able to provide input on needs of multiple communities within a specific area or watershed and can be especially helpful when examining the needs of a large potential project area. Mapping Partners that perform Mapping Needs Assessments shall consult with the State NFIP Coordinator for information regarding map update needs.

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1.2.1.6 Biennial Reports

The NFIP Biennial Reports are prepared from information provided by community officials. Based on community responses to standard questionnaires, these reports include information about changes to flood hazards, projects that have been constructed, recent flooding events, and annexations that have been undertaken. These reports, which can be obtained through the FEMA Lead, may provide information that is useful for assessing map update needs.

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1.2.2 Community Surveys

A Mapping Partner may be tasked by FEMA to develop a community survey or questionnaire and/or to conduct such a survey or questionnaire to a specific NFIP community.

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1.2.3 Evaluating Effective Flood Insurance Study Report and Flood Insurance Rate Map

In addition to gathering information from the sources of mapping needs identified in Subsection 1.2.1, it is crucial that the Mapping Partner performing the Mapping Needs Assessment evaluate the effective FIS report and FIRM to obtain a complete picture of all the map update needs for a given community. One significant factor affecting the need for updating the FIS report and FIRM for the community is the nature of the natural or manmade changes that have occurred in the community and surrounding areas since these documents were prepared, and the extent to which these changes affect potential flooding. Another factor affecting the need to update an FIS report and FIRM is the level of detail and quality of the existing data and underlying analyses.

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The recommended approach to evaluating the FIS report and FIRM to determine whether the information contained in these documents is accurate and up to date is discussed in Subsection 1.2.3.1 for flood data update needs and in Subsection 1.2.3.2 for map maintenance update needs.

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1.2.3.1 Flood Data Update Needs

A flood data update need is simply any need to update flood hazard data (e.g., discharges, BFEs, floodplain boundaries, or regulatory floodway boundaries). The FIS report and FIRM are based on riverine and/or coastal hazard analyses. To assess the community's flood data update needs, Mapping Partners that perform Mapping Needs Assessments shall evaluate any changes in flooding conditions (e.g., changes to the discharges for a particular stream, changes to a beach profile in a coastal area) since previous analyses in support of FIS report and FIRM were performed.

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Determining Age of Analyses

A critical first step in the Mapping Needs Assessment process is to determine when the most recent riverine and coastal analyses were conducted. This information is generally specified in Section 3.0 of the FIS report (refer to Appendix J of these Guidelines for further information regarding FIS reports).

The dates of the effective FIS report and FIRM panels are generally not reliable indicators of when the riverine and coastal analyses were conducted because not all flooding sources, or all portions of particular flooding sources, are revised when an FIS report and FIRM are revised. In other words, a FIRM panel may be revised based on new analyses of only a single flooding source on that panel, while new analyses were not performed for all other flooding sources on that panel. For those unrevised flooding sources, the new effective date of the FIRM panel has no bearing on the date the underlying analyses were conducted. Similarly, not all components of the analysis of a particular flooding source are necessarily revised. For instance, flood elevations may be revised based on a new hydraulic analysis, even if the underlying hydrologic analysis was not revised.

The methodology of coastal analyses has changed substantially since the 1980s. For instance, wave heights were not properly considered until after a 1977 National Academy of Sciences report discussed them; neither were the effects of erosion on the beach and dune profiles properly considered prior to 1989. Mapping Partners that perform Mapping Needs Assessments shall review coastal analyses carefully to determine whether all factors that are currently considered in determining flood hazards have been considered.

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Taking into account the multiple variables that can affect alluvial fans and their flooding characteristics—including climate, fan history, vegetation, and land use—FEMA recently developed an approach to identify and map flood hazards on alluvial fans that accounts for site-specific conditions. The approach, documented originally in *Guidelines for Determining Flood Hazards on Alluvial Fans* (FEMA, 1999) and detailed in Appendix G of these Guidelines, addresses recommendations in a 1996 report prepared by the National Research Council Committee on Alluvial Fan Flooding (National Research Council, 1996). For alluvial fan areas that were identified and mapped before FEMA issued *Guidelines for Determining Flood Hazards on Alluvial Fans,* Mapping Partners may want to consider an approach to evaluating alluvial fan hazards other than the one used for the effective FIRM.

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Comparing Recent Flooding Events to Effective Flood Insurance Rate Map

As part of determining flood data update needs, the Mapping Partner shall compare the flood hazards shown on the existing FIRM to any documented out-of-bank flooding that has been estimated by the community or a State or Federal agency to be approximately equal to the 1-percent-annual-chance flood. However, the Mapping Partner shall exercise care not to assume that a mapping error exists on the FIRM on the basis of historical flood events. The return frequency of flooding can vary greatly from stream to stream or from one part of a stream to

another, depending on the distribution of rainfall over the drainage basin(s). For example, if precipitation is localized, flooding on a small tributary may approach the 1-percent-annual-chance event, but the flooding on the larger receiving stream may be a much smaller magnitude event. Conversely, the main stream could be experiencing flooding from rainfall in the upper watershed that does not affect the lower tributaries, causing less severe flooding on the tributaries than the main stream.

The Mapping Partner may find that documentation of observed rainfall amounts and high-water marks, including any photographs of flooding events within the community, may be useful information to review. Anecdotal information on flooding is not considered reliable unless it is combined with surveyed high-water marks and includes the date and time of the high-water mark observation. The Mapping Partner also may find that information about the performance of bridges and culverts during the flood event is useful, particularly whether the carrying capacity of the bridge openings or culverts were adequate or were exceeded or whether any bridge openings or culverts were clogged with debris or ice. Photographs of bridges and culverts during flooding also may be useful.

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Assessing Factors that Affect Hydrologic Analyses

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One of the primary components in riverine flooding analyses is the hydrologic analysis. The methodology for hydrologic analyses is discussed in Section 3.0 of the FIS report (refer to Appendix J of these Guidelines for further information regarding FIS reports). Floodplain and watershed conditions can change that would affect these analyses. Factors that affect the hydrologic conditions that should be considered in evaluating the community's need for a flood data update are discussed below.

Changes in Land Use in the Watershed

Significant development or other changes in land use in the watershed (both within the community and in any upstream communities) can significantly change the discharges. Often, the increase in impervious areas associated with urbanization causes an increase in the stream's peak discharge. The Mapping Partner can evaluate the amount of development in a community by reviewing a variety of information, including:

- Community Comprehensive Plan;
- Community zoning maps;
- Site plans for large projects;
- Storm water utility plans; and
- Letters of Map Change (LOMCs) issued by FEMA since the effective FIRM was published.

Mapping Partner should refer to Volume 2 of these Guidelines for more information on LOMCs issued by FEMA, which include Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), and Letters of Map Revision (LOMRs).

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Publication of New Regional Regression Equations

The U.S. Geological Survey (USGS) is responsible for recording, studying, and publishing streamflow data, including the magnitude and frequency of flood peaks. From these data, the USGS develops or revises regional regression equations and publishes them in Water Resources Investigation Reports. If effective base (1-percent-annual-chance) flood discharges were estimated using regression equations and the analyses are more than 10 years old, there is a reasonable chance that the regional regression equations have been revised since those analyses were conducted. The Mapping Partner shall compare the effective base flood discharges to those computed using the most up-to-date regression equations. A significant difference would indicate a need for a flood data update. The Mapping Partner may obtain information on the most current regional regression equations for a particular area from the USGS district office. Although other agencies may publish regression equations for a region, only the USGS regression equations are typically used for NFIP purposes.

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Changes in Design Storm Data

If the effective hydrologic analyses were performed using a rainfall-runoff model (e.g., HEC-1, TR-20), changes in design storms may affect the base flood discharge. Currently, design storm data are obtained from two publications: National Weather Service Technical Paper No. 40, *Rainfall Frequency Atlas of the United States*, and National Oceanic and Atmospheric Administration Atlas 2, *Precipitation-Frequency Atlas of the Western United States*. The revised design storms may cause changes in discharge estimates.

Information on updating design storms can be found on the National Weather Service website at http://www.nws.noaa.gov/oh/hdsc/studies/prcpfreq.html.

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Increase in Length of Stream Gage Record

An increase in the length of a stream gage record may also affect the flood discharge estimate. If the effective discharge was estimated by conducting a frequency analysis of a relatively short record of stream gage data, the base flood discharge estimate may be changed if newly available data are added. If stream gage data with a relatively long record (50 years or more) were used in the effective analyses, however, a few additional years usually will not cause significant changes in the base flood discharge estimate, unless a large-magnitude event occurred since the analyses were conducted. All frequency analyses are to be performed in accordance with the methods specified in Bulletin 17B, *Guidelines for Determining Flood Flow Frequency* (Interagency

Advisory Committee on Water Data, 1982). The effective flood discharge shall be revised only if that discharge is outside the 90-percent confidence interval (higher than 95-percent confidence limit or lower than 5-percent confidence limits) of the newly computed flood discharge.

[February 2002]

Construction of Flood-Control Structures

Certain flood-control structures (e.g., reservoirs and detention ponds) are designed to reduce the peak flood discharges. Therefore, the Mapping Partner shall evaluate carefully any flood-control structures constructed since the effective hydrologic analyses were performed to determine whether the structures have a significant effect on the base flood discharge. However, not all reservoirs are designed to mitigate flooding. Therefore, the Mapping Partner must evaluate the function(s) of a reservoir to determine whether it affects discharges. Flood-control structures may be built by Federal agencies (e.g., the USACE, the Natural Resources Conservation Service (NRCS), or the U.S. Bureau of Reclamation) or local organizations (e.g., water management districts or irrigation districts). The agency or organization that built and/or administers the structure should have the necessary information available.

In addition to evaluating new flood-control structures, the Mapping Partner shall evaluate existing structures to determine whether they continue to operate in the same manner as they did when the hydrologic analyses were conducted. For example, changes in the operating flood stages of a reservoir may affect how flood-waters are routed through the reservoir. Any changes in operating procedures may affect how the structure is considered in future mapping efforts.

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[February 2002]

Assessing Factors That Affect Hydraulic Analyses

Another primary component in riverine flooding analyses is the hydraulic analysis. The methodology for hydraulic analyses is discussed in Section 3.0 of the FIS report, detailed in Appendix J of these Guidelines. Floodplain conditions can change that would affect these analyses. Mapping Partners that perform Mapping Needs Assessments shall consider factors that affect the hydraulic conditions in evaluating the community's flood data update needs as discussed below.

[February 2002]

New Bridges and Culverts

If a discharge exceeds the capacity of a bridge opening or culvert, floodwaters can back up, thereby increasing flood levels upstream. Although most bridge openings and culverts are designed to allow stream flows associated with frequent storm events to pass without such backwater effects, they may not be designed to carry the 1-percent-annual-chance flood discharge. Therefore, the Mapping Partner shall evaluate any bridges or culverts that have been constructed since the effective FIS report and FIRM were completed to determine the potential effect of the bridges and culverts on the 1-percent-annual-chance flood and the associated

regulatory floodway. The Mapping Partner may obtain information regarding the date of construction and other details of roads, bridges, and culverts from the state Department of Transportation or local public works departments.

[February 2002]

Changes in Stream Morphology

Any significant change in the stream channel or floodplain geometry, particularly regrading or the placement of fill, can affect the 1-percent-annual-chance floodplain and the associated regulatory floodway. Another consideration is any change in the stream location, either through natural processes (e.g., stream migration, erosion, or deposition) or through manmade changes (e.g., channelization, stream widening, stream straightening, or dredging). Additionally, any significant change in the vegetation or structural encroachments in the floodplain may affect a stream's hydraulic characteristics. Aerial photographs are useful tools in evaluating changes in stream channels and floodplains. Mapping Partners that perform Mapping Needs Assessments shall evaluate all of these factors that may result in changes in stream morphology.

[February 2002]

Construction of Flood-Control Structures

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Some flood-control structures (e.g., levees, diversion channels) are designed to protect certain areas from inundation or otherwise reduce flood elevations. Therefore, Mapping Partners that perform Mapping Needs Assessments shall evaluate carefully any flood-control structures constructed since the hydraulic analyses were performed to determine whether they have a significant effect on the floodplain boundary delineation and/or flood elevations. Levee systems and diversion channels are typically, but not always, built by the USACE. The agency or organization that built and/or administers the structure should have information about that structure. Specific procedures for evaluating and mapping levees are provided in Appendix H.

[February 2002]

Assessing Factors That Affect Stillwater Analyses

The analyses of coastal flood hazards can be broadly categorized into two components: analyses of the stillwater elevations and analyses of the effects of waves. When determining whether the stillwater conditions in a coastal area require restudy, Mapping Partners that perform Mapping Needs Assessments shall consider (1) whether any major storm events have occurred that may provide data; and (2) increased length of tide gage record.

[February 2002]

Occurrence of Major Storm Events

Surveys of high-water marks taken from the insides of structures can provide data on stillwater elevations for comparison to the stillwater elevations shown in the FIS report. An indicator of

map update needs is when a relatively minor storm event causes stillwater elevations well above those in the published FIS report.

[February 2002]

Increased Length of Tide Gage Record

An increase in the length of a tidal gage record may also affect the stillwater elevation estimate. If the effective stillwater elevation was estimated by conducting a frequency analysis of a relatively short record of tidal gage data, the stillwater elevation estimate may be sensitive to newly added data. If tidal gage data with a relatively long record were used in the effective analyses, however, a few additional years usually will not cause significant changes in the stillwater elevation estimation, unless a large-magnitude event occurred since the analyses were conducted.

[February 2002]

Assessing Factors That Affect Wave Height Analyses

The second broad category of analyses to be considered in coastal areas is the analyses of wave heights, which include the effects of erosion. When determining whether the stillwater conditions in a coastal area require new analyses, the Mapping Partner shall consider the following factors:

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- When the previous wave height analyses were conducted (if they were included in the previous analysis);
- When the previous erosion analyses were conducted (if they were included in the previous analysis);
- Whether any seawalls or other structures have been constructed;
- Whether dunes have been built/rebuilt or otherwise enhanced;
- Whether any major storm events may have changed the beach profile,
- Whether any major storm events may provide data;
- Whether any significant beach or dune erosion has occurred; and
- Whether more detailed topographic data is available for coastal areas.

Each of these factors is discussed below.

[February 2002]

Age of Previous Wave Height Analyses

A critical first step in the Mapping Needs Assessment is to determine when the most recent coastal analyses were conducted. As mentioned in Subsection 1.2.3.1, the methodology for coastal analyses has changed substantially since the 1980s, requiring that the Mapping Partner determine whether all currently accepted methodologies and protocols have been applied.

[February 2002]

Age of Previous Erosion Analyses

The Mapping Partner shall determine when the most recent erosion analyses were conducted and whether the previous analysis is adequate to represent the existing beach profile.

[February 2002]

Construction of Seawalls or Other Structures

Some flood-control structures such as seawalls are designed to protect certain areas from inundation or otherwise reduce flood elevations. Therefore, the Mapping Partner shall evaluate carefully any new coastal flood-control structures determine whether they have a significant effect on the flood hazard delineation and/or flood elevations. The private entity, federal agency or local organization that built and/or administers the structure should have information about that structure.

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[February 2002]

Effects of Major Storm Events on the Beach Profile

The Mapping Partner shall determine whether significant storm events have changed beach profiles enough to alter the flood hazard delineation along the shoreline. If a beach profile has changed, it may have an effect on BFEs and may move the inland limit of the floodplain.

[February 2002]

Availability of Data from Major Storm Events

Surveys of high-water marks taken from the outsides of structures can provide data on wave heights for comparison to the elevations shown in the FIS report and on the FIRM. Additionally, surveys of flood inundation limits in the storm impact area, which can be determined by water marks on structures and debris lines, can be compared to the flood zone delineations on the FIRM. An indicator of flood data update needs is when a relatively minor storm event causes flooding and damage well outside the identified flood insurance risk zone on the FIRM or well above the BFEs indicated on the effective FIRM.

[February 2002]

Significant Beach or Dune Erosion

After erosion has occurred, new survey and mapping of the beaches and dunes may indicate a significant lowering of the dune crest elevations, which would result in a greater landward extension of the hazard area than that is shown on the effective FIRM.

[February 2002]

Updated Topographic Data

Many of the coastal high hazard areas were mapped based on wave height studies that relied on USGS 7.5-minute series topographic quadrangle maps, typically with 5-foot contours. If more detailed and/or updated topographic information is available for the community, the better data may provide a refined assessment of the wave elevations, hazard zones, and the primary frontal dune location.

[February 2002]

Presence of Areas Not Studied or Studied by Approximate Methods

Not all floodprone areas in a community may have been studied using detailed methods as part of the effective flood analyses. Areas that were rural and had little development at the time the analyses were conducted may not have been studied or may have been studied using approximate methods and designated Zone A.

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If development has occurred in such areas, detailed-study analyses may be warranted to determine the flood elevations and floodplain boundaries more precisely. Mapping Partners that perform Mapping Needs Assessments shall evaluate the amount of development near all flooding sources in the community that were not studied or were studied by approximate methods.

[February 2002]

1.2.3.2 Map Maintenance Update Needs

Map maintenance needs relate primarily to the non-engineering reference information found on the community base map. The base map, which covers the entire geographical area of the community, depicts certain features and their names (e.g., roads, railroads, streams, bench marks) as well as corporate limits and section lines.

The community base map is the preferred source for the features depicted on the FIRM. These features help map users locate properties relative to the flood insurance risk zones; thus, it is crucial that the features be placed and identified accurately.

To determine whether a map maintenance update is needed, Mapping Partners that perform Mapping Needs Assessments shall examine the features on the FIRM and consider the following questions: Have the corporate boundaries changed? Have new roads been built in or near the 1-percent-annual-chance floodplain?

Another reason for a map maintenance update is the availability of digital base mapping. Minimum criteria for locally produced base maps are provided in Section 1.4.

[February 2002]

1.2.4 Mapping Needs Assessment for Unmapped Communities

Mapping Partners may be tasked by FEMA to assess the mapping needs of communities for which FEMA has not published a Flood Hazard Map. The Mapping Needs Assessment for these "unmapped communities" shall include determining whether the community is floodprone and, if so, identifying whether flood data already exist that can be used to prepare an FIS report and FIRM or whether new flood data will have to be developed.

To determine whether a community is floodprone, Mapping Partners that perform Mapping Needs Assessments shall contact community officials to discuss whether the community has experienced recent or historical flooding problems, particularly focusing on areas of existing or anticipated development. In coordination with local officials, the Mapping Partner shall try to ascertain whether the community's flooding experiences relate to "general" conditions of flooding (as defined in Section 59.1 of the NFIP regulations) or to local storm water drainage problems.

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Mapping Partners that perform Mapping Needs Assessments also shall review, at a minimum, the effective NFIP maps of the contiguous communities, including the county, to determine whether flooding sources with identified flood hazards may affect the subject community. The Mapping Partner shall review the USGS topographic maps covering the subject community to determine, based on contours and drainage patterns, whether flooding is likely to affect the community. As a general rule, FEMA is concerned primarily with flooding sources that have a drainage area of 1 square mile or more.

Mapping Partners that perform Mapping Needs Assessments shall contact other potential data sources such as the USACE, the NRCS, the USGS, and the State NFIP Coordinator to determine (1) whether they know of any historical flooding problems occurring within the community and (2) whether they are aware of existing studies or mapping (e.g., Floodplain Information Reports or Flood Hazard Analyses Reports) that provide flood data for the community.

Upon completion of the Mapping Needs Assessment for an unmapped community, the assigned Mapping Partner shall submit the following documentation to FEMA:

- Written recommendation as to whether the community should be considered floodprone, with a brief description and any calculations or mapping that support that determination;

- Communication records or meeting minutes documenting coordination with community officials, the State NFIP Coordinator, and other agencies contacted during the Mapping Needs Assessment;

- A list of flooding sources in the community that should be mapped if the community is to be considered floodprone;
- If the community is to be considered floodprone, a summary of existing flood studies or mapping that could be used to create a FIRM. Copies should be provided, or sufficient information should be provided on how FEMA can obtain the existing studies or mapping; and
- Any other pertinent data or information obtained during the needs assessment that may assist FEMA in determining whether to initiate a Flood Map Project for the community.

[February 2002]

1.2.5 Mapping Needs Update Support System

As discussed earlier, MNUSS is a web-based database that is used by FEMA to catalogue and inventory mapping needs. Upon completion of a Mapping Needs Assessment, FEMA may request that Mapping Partners that perform Mapping Needs Assessments enter information directly into the MNUSS or provide a summary of the information in a spreadsheet format for entry into MNUSS by another Mapping Partner.

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If the first option is used, the Mapping Partner shall enter the data in accordance with FEMA guidance for collecting and inputting mapping needs into MNUSS." If the second option is used, the FEMA Lead will provide a spreadsheet template to be completed by the assigned Mapping Partner.

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[February 2002]

1.2.6 Community Ranking and Prioritization

MNUSS includes a ranking mechanism and a project cost estimate for map updates. Once the MNUSS database is updated to include the latest needs assessment information, communities are ranked. FEMA uses the MNUSS ranking to help prioritize flood map update projects for funding allocation.

[February 2002]

1.2.7 Project Selected for Scoping

Flood Map Projects may be funded through a variety of mechanisms and combinations of mechanisms:

- FEMA's annual Flood Hazard Mapping Program budget;
- Disaster Relief Funding; and

- Cooperative Agreements under the CTP initiative.

Based on the Mapping Needs Assessment, subsequent ranking and prioritization, and available funding, FEMA will select Flood Map Projects for scoping. The Project Scoping phase is described in Section 1.3.

[February 2002]

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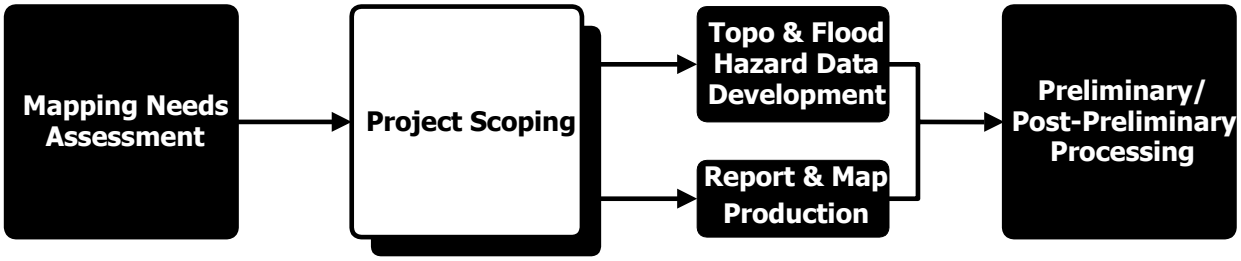
1.3 Project Scoping



Once FEMA has decided to initiate a Flood Map Project, the following steps are undertaken during the Project Scoping phase:

- Conducting background research and community outreach;
- Determining what effective data can be used in the analyses and/or transferred to the new FIS report and FIRM;
- Identifying other data needed to complete the Flood Map Project and sources of those data (e.g., base map, topography, cross sections, or transects);
- Establishing priority levels for flooding sources to be analyzed and mapped;
- Making FIRM format decisions (e.g., countywide or community-based, digital or manual);
- Developing schedules and cost estimates of the components of the Flood Map Project; and
- Assigning project tasks to Mapping Partners and developing appropriate contracts or agreements for completion of assigned work.

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As described in Subsection 1.1.6, each Flood Map Project will have a FEMA Lead assigned to manage the project through its entire lifecycle. The FEMA Lead will oversee the project's scope, schedule, and budget and coordinate the activities of the various Mapping Partners. In particular, the FEMA Lead's responsibilities include determining the scope of a Flood Map Project and assigning roles to the FEMA Mapping Partners involved in the project.

At the direction of the FEMA Lead, Mapping Partners will typically provide support in researching the information necessary to make scoping decisions, developing scoping documents, and managing the scoping process. For each project, the FEMA Lead will determine the specific level of participation for each Mapping Partner in the scoping process.

Through the CTP initiative, FEMA works cooperatively with communities that are able to participate actively in flood hazard mapping tasks within the community. The community's

interest in participating as a CTP should be determined before the detailed scoping phase so that the community's participation in the map update can be included in the project plan that is developed. CTPs work very closely with the FEMA Lead to make scoping decisions and share responsibilities for decision-making and management of the project. The specific role and responsibility of each CTP shall be determined individually in cooperation with the FEMA Lead.

If a CTP or other Mapping Partner wishes to deviate from the standards and requirements detailed in these Guidelines, they must negotiate these deviations during the Project Scoping phase. In addition, all deviations must be documented in the appropriate contracts or agreements for completion of assigned work.

The Project Scoping phase is intended to enable FEMA and its Mapping Partners to achieve a "best value" for completing any Flood Map Project by prioritizing and addressing a community's mapping needs and distributing the work based on the strengths and capabilities of all available Mapping Partners. Comprehensive Project Scoping ensures that the plan for a Flood Map Project considers all factors and takes advantage of each Mapping Partner's capabilities.

The guidance for the Project Scoping phase is applicable to different types of Flood Map Projects, including:

- Countywide, community-based, and watershed-based studies;
- Flood data updates involving field reconnaissance, new engineering analyses, more detailed topographic data, or floodplain mapping;
- Digital conversions; and
- Any combination thereof.

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Project Scoping activities are grouped into Pre-Scoping Meeting, Scoping Meeting, and Post-Scoping Meeting activities. Many of the tasks within each group can take place concurrently and are not contingent on the completion of previous tasks. In addition, the FEMA Lead has the flexibility to tailor the scoping process to fit the needs of the project. For example, for smaller Flood Map Projects, the FEMA Lead may wish to combine, scale back, or eliminate certain activities.

Subsections 1.3.1, 1.3.2, and 1.3.3 provide guidance for completing the pre-Scoping Meeting, Scoping Meeting, and Post-Scoping Meeting activities, respectively. The plan for the Flood Map Project developed during Project Scoping phase must be compatible with the procedures and technical requirements for conducting any required engineering analyses and preparing the maps as described throughout these Guidelines. The FEMA Lead shall choose the specific scoping activities to undertake for each particular Flood Map Project. Appendix I of these Guidelines provide a "toolbox" with templates, tools, and forms for the scoping activities described herein.

[February 2002]

1.3.1 Pre-Scoping Meeting Activities

The following activities must be conducted before the Scoping Meeting:

- Form a Project Management Team;
- Make the initial contact with the community;
- Prepare the preliminary Project Management Plan;
- Hold an initial project teleconference call with the community;
- Form the Project Team;
- Perform required research;
- Identify potential obstacles;
- Draft a project scope;
- Identify other potential resources;
- Hold a teleconference call to discuss the draft of the project scope;
- Draft a revised scope of work; and
- Distribute background information.

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[February 2002]

1.3.1.1 Formation of Project Management Team

FEMA RO and/or HQ staff will select the FEMA Lead depending on the type of Flood Map Project being undertaken. In general, the appropriate FEMA Regional Engineer will be the FEMA Lead for Flood Mapping Projects that will involve development of new or updated flood hazard data. For digital conversions with no new or updated flood hazard development, a FEMA HQ Project Engineer will be the FEMA Lead. If the community selected for update will participate as a CTP, the FEMA Lead will work in close cooperation with the community Project Manager.

The FEMA Lead will form a Project Management Team as soon as the community is selected by FEMA for a map update and the Flood Map Project is initiated. The Project Management Team will manage the project for its entire lifecycle.

The Project Management Team may be comprised of several Mapping Partners, including:

- FEMA RO Regional Engineer;
- AO;
- FEMA HQ Project Engineer;
- CO;
- Other FEMA team members;
- CTP or other community representative;
- MCC representative;
- SC representative (optional); and
- State NFIP Coordinator representative (optional).

The roles of each team member are discussed below.

[February 2002]

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FEMA Lead

The FEMA Lead shall provide monitoring and oversight of the budget, schedules, and scope of the project.

[February 2002]

FEMA Assistance Officer

The FEMA AO or CO shall oversee and administer contract documents and agreements related to the project.

[February 2002]

Other FEMA Team Members

Other FEMA team members shall make decisions when the FEMA Lead is unavailable and provide technical and programmatic support, as needed.

[February 2002]

Flood Map Production Coordination Contractor Representative

The MCC representative shall assist in the resolution of technical issues and provide technical and Project Management support.

[February 2002]

Community Representative

The community representative, particularly a CTP, shall work closely with the FEMA Lead to manage the scoping process and define a Flood Map Project agreeable to FEMA and the community.

[February 2002]

Study Contractor and State Coordinator Representatives

The SC representative and the State NFIP Coordinator representative shall assist in the resolution of technical issues and provide technical support.

[February 2002]

1.3.1.2 Initial Community Contact

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The FEMA Lead will call the community (or communities) as soon as possible after initiation of a Flood Map Project to provide notification that FEMA has selected the community for a possible map update and will be working with the community to develop the project scope. In the case of a CTP project, the community may already be coordinating with the FEMA Lead. For some projects, especially large countywide or basinwide studies, the FEMA Lead may choose to delegate the scope development (or a portion thereof).

The following topics will be covered during the initial telephone call:

- Purpose of the Flood Map Project (i.e., the update needs that have prompted the map update);
- The community's perception of its mapping needs;
- Target schedule for completing the project;
- Possibility of the community contributing as a CTP; and
- The community's engineering, planning, and Geographic Information System (GIS) capabilities (to determine how advanced its capabilities are and in which community department or agency these activities are undertaken).

A sample form for planning and recording this telephone call is provided in Appendix I as the Initial Community Contact—Record of Communication template.

Usually, the FEMA Lead and the community are the only participants in the initial call. If the FEMA Lead determines that the community has a significant interest in participating as a CTP, the scoping process may be delayed while FEMA and the community discuss potential CTP activities. It is desirable for FEMA and the community to agree on the general outline of the community's participation in the Flood Map Project and to sign a Partnership Agreement before proceeding with additional scoping activities.

[February 2002]

1.3.1.3 Preliminary Project Management Plan

The Project Management Team shall prepare a preliminary Project Management Plan. This plan establishes certain coordination protocols and management objectives for the entire Project. Each plan shall contain the following items:

- A description of the Flood Map Project;
- The Project Management Team members;
- A description of the Project Team (list of the primary Mapping Partners and their roles; discuss whether CTPs are an option; note that the Project Management Team is a subset of the Project Team);
- Communication protocols between Project Team members (e.g., Monitoring Information on Contracted Studies, e-mail, a Project-specific website);
- Major milestones and intermediate reporting requirements;
- An Outreach strategy (e.g., press releases, briefings for congressional staff, "Letters to the Editor" from FEMA Director, Project-specific updates on the FEMA website);
- Other ongoing activities and related projects;
- QA/QC review requirements;
- Retention and maintenance of records; and
- Project completion activities.

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The Project Management Plan template is provided in Appendix I, Subsection I.1.2 of these Guidelines.

Once the Project Team is formed (see Subsection 1.3.1.5), each team member will be provided with a copy of the preliminary Project Management Plan. The Project Management Plan is a "living" document that may be updated as the Project progresses.

[February 2002]

1.3.1.4 Initial Project Team Conference Call

Once the preliminary Project Management Plan has been prepared, the FEMA Lead will arrange an initial Project Management Team conference call that includes all Project Management Team members and the appropriate community representative. If more than one community is involved in a Flood Map Project, the FEMA Lead will decide whether to conduct a separate call for each community or a combined conference call.

During the call, the following issues as well as any others identified by the Project Management Team, will be discussed with the community:

- Community's assessment of its flood mapping needs;
- Data available from other sources, such as digital base maps or ongoing studies;
- Involvement of other key players, such as regional or State agencies; and
- Community potential as a CTP (if the FEMA Lead is aware of local technical capabilities or the community otherwise indicates its interest in a CTP arrangement during the initial community contact).

The Initial Project Conference Call Agenda/Meeting Minutes form is provided in Appendix I, Subsection I.1.3 of these Guidelines.

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[February 2002]

1.3.1.5 Project Team Formation

The FEMA Lead will determine which Mapping Partners will participate on the Project Team. If a CTP is involved, the CTP Lead will work closely with the FEMA Lead to identify the team members. The Project Team should include Mapping Partners and NFIP stakeholders whose collective capabilities provide all the necessary resources to complete the Flood Map Project. The Project Team will include:

- All members of the Project Management Team;
- Other contractor representatives (if not already a part of the Project Management Team);
- Community/CTP representative(s);
- State representative (the State NFIP Coordinator or a representative from an agency such as the State Department of Natural Resources); and
- Others, such as regional planning agencies and water management districts, as necessary.

The FEMA Lead will coordinate the formation of the Project Team based on the needs of the project. It is important to note that while various Mapping Partners will normally be included on the Project Team, they will not necessarily fill "traditional" or predetermined roles. Rather, each Mapping Partner's level and extent of involvement will be tailored by the FEMA Lead based on the needs of the specific project to allow FEMA to achieve a "best value."

Mapping Partners with task order-based contracts will be issued a scoping task order to participate in the project through completion of Project Scoping. Work assignments for the Map Production component of the project will be issued through follow-on task orders.

[February 2002]

1.3.1.6 Preliminary Research Activities

The FEMA Lead will assign preliminary research to Project Team members, usually FEMA contractors. These activities can be separated into two categories—researching effective information and researching available data for the Flood Map Project. The specific activities in each category are summarized below.

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Researching Effective Information

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The assigned Mapping Partner shall complete the following tasks:

- Inventory the FEMA library for effective FIRM panels, FIS reports, and other flood hazard data or existing study data;
- Summarize the information in MNUSS;
- Summarize contiguous community agreement checks;
- Review CAV and CAC files;
- Conduct a thorough Map Needs Assessment (unless one has already been conducted) as described in Section 1.2; and
- Develop a "scoping map" and an overview of the results of the research.

An Effective FIRM Summary template is provided in Appendix I, Subsection I.1.4 of these Guidelines.

[February 2002]

Researching Available Data for the Mapping Project

The assigned Mapping Partner shall complete the following tasks:

- Identify available base map information;
- Identify available topographic data;
- Identify available flood hazard data; and
- Identify other available hydrologic and hydraulic information and data.

An Available Data Inventory template is provided in Appendix I, Subsection I.1.5 of these Guidelines.

The research phase of Project Scoping is critical to maximizing the value of the Flood Map Project and minimizing project costs. Topographic data acquisition and field surveys can constitute up to 50 percent of the cost of a map update when all new data must be obtained. If existing information is suitable for the planned update, it is critical that it is identified during this phase and used for the Flood Map Project.

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Applicable data may be available from a variety of sources. If FEMA has previously studied the area, the FEMA archives may have detailed data from the previous study. Often, detailed topographic data, cross-section surveys, and dimensions of hydraulic structures may be partially or entirely applicable to the new Flood Map Project, thereby requiring surveys of new structures or updated topographic information for limited areas where changes have occurred. Moreover, an evaluation of the previous study may also provide a better understanding of the causes for the update need and could possibly assist the Project Management Team in determining that some of the existing work is still applicable.

Similarly, other agencies may also have performed studies that may be relevant to the planned project or have generated data that may be useful. The Mapping Partner performing the research shall also contact the following organizations to determine whether they have data that are suitable for the planned Flood Map Project:

- Federal agencies such as USACE, NRCS, USGS, or Tennessee Valley Authority;
- State and regional agencies (water resource agencies, natural resource agencies, State NFIP Coordinator, flood information repositories); and
- Agencies in the affected communities (city engineers, planning, permitting, and zoning).

If there are ongoing flood hazard studies in nearby communities, the assigned Mapping Partner also shall contact the entities performing the studies to determine whether they have identified data that are applicable to the planned Flood Map Project.

The assigned Mapping Partners shall use the Available Data Inventory template in Appendix I to document all research, including the agencies that were contacted, the date, the name of the person contacted, the telephone number, and the results of the research.

[February 2002]

1.3.1.7 Potential Obstacles

The Project Management Team will identify potential obstacles in an effort to learn of any issues that could delay or prohibit the Flood Map Project. Some examples of potential obstacles to completing the project in a timely fashion are:

- Inability to address mapping needs adequately with available funding;
- Difficulty coordinating community funding with FEMA funding;
- Lack of an available base map meeting FEMA minimum specifications (described in Appendix K of these Guidelines);
- Hydrologic and/or hydraulic issues;
- Community concerns;
- Reliance on other studies or data (e.g., topographic mapping) that will not be available within the project's scheduling constraints;
- Needs not being as high a priority as originally identified; and
- Other considerations (Federal/State/non-governmental organizations, programmatic, disaster-related, legal).

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The Project Management Team will explore potential issues on an ongoing basis. If potential obstacles are identified that could halt or significantly hinder the completion of the project, the Project Management Team will evaluate all possible alternatives and develop an appropriate course of action as soon as practicable.

A Potential Obstacle to Project Completion Checklist template is provided in Appendix I, Subsection I.1.6 of these Guidelines. This checklist is a "living" document that should be updated as necessary throughout the lifecycle of the project.

[February 2002]

1.3.1.8 Draft Scope of Project

The draft Scope of Project shall be prepared under the direction of the FEMA Lead. The draft Scope of Project will be based on mapping needs determined during the Mapping Needs Assessment and/or the research portion of Project Scoping.

Developing the draft Scope of Project includes the following activities:

- Conducting background research and community outreach;
- Determining what effective FIS data can be used in the analyses and/or transferred to the new Flood Map Project (i.e., it may be that all data for a flooding source can simply be transferred to the new Flood Map Project, or it may be that only the existing hydrologic data can be used and new hydraulic analyses need to be performed, or it may be that no existing data can be used);
- Identifying other data needed to complete the Flood Map Project and sources of those data (e.g., base map, topography, cross sections, transects);
- Establishing priority levels for flooding sources to be analyzed and mapped;
- Making FIRM format decisions;
- Developing schedules and cost estimates of the components of the Flood Map Project; and
- Assigning project tasks to Mapping Partners and developing contract agreements.

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The Draft Scope of Project form in Appendix I, Subsection I.1.7 of these Guidelines shall be used to document the draft Scope of Project. The draft Scope of Project is a "living" document that will be updated, when necessary.

[February 2002]

Determining Which Flood Data Should Be Used

In determining the flood data to use, the Project Management Team will consider the nature of the map update need and the cost versus benefit of using a particular method of obtaining and/or producing the flood data. The methods of obtaining/producing the flood data are as follows:

- Use of information from effective FIRM;
- Detailed study/analyses;
- Approximate study/analyses; and
- Redelineation of floodplain boundaries based on updated topographic information.

The Flood Map Project may use a combination of these methods. A detailed study is typically the preferred method, but also the most costly. The Flood Map Project may involve only digitizing effective FIRM information (digital conversion).

The selection of the most appropriate method for obtaining/producing the flood data for a specific flooding source is primarily a function of the following:

- The amount of existing or anticipated development potentially affected by the flooding source;
- The flood insurance risk zone designation of the subject area on the effective FIRM;
- The number of actual flooding events that confirm or contradict the mapped flood hazards on the effective FIRM; and
- The cost of performing the Flood Map Project.

Tables 1-1 and 1-2 provide guidance for selecting the method for riverine and coastal environs, respectively, based on the first three criteria listed above. The selected methods may then be changed by the FEMA Lead during the Project Scoping phase based on the cost (for example, a flooding source proposed for a detailed study may be changed to redelineation of floodplain boundaries using updated topographic data if available funding so dictates).

The following subsections briefly describe each of the methods listed in the table for obtaining and/or producing flood hazard data.

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Use Effective Information—Riverine

This is the least expensive method of updating data for riverine areas. No new analyses or floodplain mapping are required; rather, the effective NFIP data are used "as-is." Mapped flood hazard areas on the effective NFIP map that are not being updated through a detailed or approximate study or redelineation are "carried over" to the updated FIRM. For Flood Map Projects that entail converting a manually produced FIRM to a digital FIRM (i.e., digital conversion), the effective information must be digitized and fitted to the selected base map. In some instances, FEMA or the community may identify the need to create a digital FIRM for a jurisdiction where no study is ongoing. This may be to advance FEMA's goal of converting its entire flood map inventory to a digital format, to use a more accurate, up-to-date base map, or to provide the community with the increased capability of GIS digital FIRM data.

[February 2002]

Table 1-1. Selection of Technical Method—Riverine and Lacustrine

	Designation on Effective FIRM			
Technical Method	**Unmapped (Zones D, C, X if flood hazard is identified)**	**Approximate (Zone A)**	**Detailed without Floodway (Zones AE, A1-30, AO, AH)**	**Detailed with Floodway (Zones AE, A1-30)**
Approximate Study	• A reas of moderate development	• Areas of moderate or minimal development and • SFH A seems inaccurate (e.g., flooding losses in Zones B, C, or X; numerous LOMAs; comparison with accurate topographic data)	**OPTION NOT AVAILABLE**	**OPTION NOT AVAILABLE**
Redelineation	**OPTION NOT AVAILABLE**	**OPTION NOT AVAILABLE**	• Effective discharges and BFEs appear accurate, but SFHA seems inaccurate (e.g., flooding losses in Zones B, C, or X; numerous LOMAs; comparison with accurate topographic data)	• Effective discharges and BFEs appear accurate, but SFHA seems inaccurate (e.g., flooding losses in Zones B, C, or X; numerous LOMAs; comparison with accurate topographic data)
Detailed Study (Riverine)	• A reas of dense development	• Areas of dense development	• Flood experience indicates that discharges and BFEs are outdated (e.g., USGS gage information indicates discharges out of date); • watershed development has significantly altered discharges; floodplain projects (e.g., channelization, bridges, etc.) since FIS analysis; • flood control structures since FIS analysis; and/or • community wishes to add regulatory floodway	• Additional years of record available for stream gage analysis resulting in significantly different discharges • Hydrology and/or hydraulic methods outdated • Flood experience indicates that discharges and BFEs are outdated (e.g., USGS gage information indicates discharges out of date); • watershed development has significantly altered discharges; • floodplain projects (channelization, bridges, etc.) since FIS analysis; and/or • flood control structures since FIS analysis

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Use Effective Information	• Areas of no or minimal development	• Effective SFHA appears accurate - area has not experienced flooding	• Effective BFEs and SFHA appear accurate based on past events • Additional years of record available for stream gage analysis that results in significantly different discharges • Hydrology and/or hydraulic methods outdated	• Effective BFEs and SFHA appear accurate based on past events

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Table 1-2. Selection of Technical Method—Coastal

Level of New Study/Restudy	Unmapped (Zones C, X, D)	Approximate (Zone V)	Detailed (Zones A1-A30, AE, V1-V30, VE)
Redelineation	**OPTION NOT AVAILABLE**	**OPTION NOT AVAILABLE**	• Effective stillwater elevations and BFEs appear accurate based on past events, but • SFHA or V zone seems inaccurate (e.g., flooding losses in Zones B, C, or X; evidence of velocity flooding in A zones; numerous LOMAs);or • V zone does not extend to the inland limit of the primary frontal dune
Detailed Coastal	• Areas of moderate or dense development	• Areas of moderate or dense development	• Flood experience indicates that stillwater elevations and/or BFEs are outdated; • Significant changes have occurred to the shoreline and transect profile since effective FIS analysis; • Wave height and/or runup methods not used at all in effective FIS analysis; and/or • Outdated wave height and runup methodologies used for the effective FIS analysis
Use Effective Information	• Areas of minimal or no development	• Areas of minimal or no development	• Effective BFEs, SFHA, and V zones appear accurate based on past events

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Use Effective Information—Coastal

This is the least expensive method of updating data for coastal areas. No new analyses or floodplain mapping are required; rather, the effective NFIP data are used "as-is." Mapped flood hazard areas on the effective NFIP map that are not being updated through a coastal re-analysis or redelineation are "carried over" to the updated FIRM. For Flood Map Projects that entail converting a manually produced FIRM to a digital FIRM, the effective information must be digitized and fitted to the selected base map.

[February 2002]

Detailed Study—Riverine

This data update method entails using topographic data, channel bathymetry, and bridge/culvert opening geometry to conduct detailed hydrologic and hydraulic analyses and floodplain mapping. Detailed-study methods involve the determination and publication of BFEs. Normally, a regulatory floodway will be determined if a flooding source is studied by detailed methods. If a regulatory floodway along a particular flooding source has been developed and is shown on the FIRM, and if the flooding source is being restudied, the new detailed study must include the regulatory floodway. Detailed-study methods may be used regardless of the current flood insurance risk zone designation. They may be used to update a previous detailed study, to upgrade the analysis of an area previously studied using approximate methods, or to map the SFHA in areas that were previously unmapped.

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If these areas are experiencing or expected to experience moderate to dense development, then detailed studies are important to provide BFEs and regulatory floodways to regulate safe construction in these areas. This applies to residential, industrial, or commercial areas where growth is beginning and/or subdivision is underway, and where these trends are likely to continue. They include areas that are likely to be developed within 5 years following the completion of the study.

[February 2002]

Detailed Study—Coastal

This data update method entails using transects and offshore bathymetry to conduct detailed erosion, wave height, and wave runup analyses and prepare floodplain mapping. Detailed coastal methods involve the determination and publication of BFEs and designation of the coastal high hazard areas (V zones). As for detailed riverine study methods, detailed coastal study methods may be used regardless of the current flood insurance risk zone designation. Considerations for the use of detailed coastal study methods are similar to those for detailed riverine study methods.

[February 2002]

Approximate Study—Riverine or Lacustrine

This data update method entails using topographic data, typically without bathymetry or bridge/culvert opening geometry, to conduct approximate hydrologic and hydraulic analyses. An approximate analysis results in the delineation of a 1-percent-annual-chance floodplain but does not include the determination of BFEs or base flood depths. Generally, approximate-study methods are appropriate for areas where no flood hazards have been identified but which are thought to be floodprone. If these areas are experiencing light to moderate development and these trends are expected to continue, then approximate-study methods are appropriate. Likewise, approximate-study methods may be used for areas that were already mapped based on an approximate study and where development is minimal to moderate, but where experience indicates that the current SFHA delineation is inadequate.

[February 2002]

Redelineation—Riverine

This data update method involves no new analyses. This method uses effective information (Flood Profiles and data tables from the FIS report, BFEs from the FIRMs, and supporting engineering analyses) and new topographic data that are more up-to-date and/or detailed than those used to produce the effective FIRM to redelineate the floodplain boundaries. Redelineation of effective 1-percent-annual-chance floodplain boundaries that were based on a detailed study is appropriate when the discharges and BFEs determined by the existing study are appropriate, the delineation of the floodplain boundaries is inadequate, and updated topographic data are available. It is important to verify that the new topographic data source is superior to the existing data and that no changes in the hydraulic characteristics of the floodplain indicate that the existing study is no longer appropriate.

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[February 2002]

Redelineation—Coastal

This data update method involves no new analyses. This method combines effective information from the FIS report and FIRM and the supporting engineering analyses with new, more detailed, or more up-to-date topographic data to redelineate coastal high hazard areas (V zones).

[February 2002]

Identifying Topographic Data Needs and Sources

Topographic data are required for three of the methods of updating flood data: detailed study, approximate study, and redelineation. Detailed study requires topographic mapping of floodplain areas and surveys of bathymetry and structures. Approximate study may or may not require bathymetry or structures. Redelineation requires only topographic mapping of floodplain areas.

Significant cost savings can be realized if existing topographic sources are used because 50 percent of the cost of a map update may be to acquire new topographic data. Possible sources of existing topographic data include local planning departments, GIS Coordinators for community/county, city engineers, Directors of Public Works, FEMA archives (particularly for cross-section data from effective hydrologic and hydraulic models), and State Departments of Transportation (e.g., bridge plans). The Available Data Inventory template provided in Appendix I should be used to summarize the existing topographic data that may be available to the Mapping Partners.

Detailed specifications for topographic data and field surveys are contained in Appendix A. In evaluating the suitability of existing topographic data, the Project Management Team will consider the following factors:

Contour Mapping or Digital Elevation Models

- Contour interval should be 4 feet or less (2 feet in flat terrain).
- Currency of data—whether significant changes (e.g., highways, subdivisions, and mining) have occurred since the data were developed. It may be possible to update only "pockets" of the data. If there is a question about the currency of the data, "spot checks" should be performed to verify the accuracy.

Bathymetric and Bridge/Structure Cross Sections Effective Study or Other Source

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- Currency of data—whether significant changes (e.g., new bridges, culverts, geomorphologic changes) have occurred since the data were developed. If there is a question about the currency of the data, "spot checks" should be performed to verify the accuracy.
- Density of cross sections—whether an adequate number are located in the project area.
- It may be possible to supplement existing cross-section and structural data with additional and/or updated cross sections at selected locations.

The topographic data and the base map data used for the FIRM should be compatible. Like features in both data sources should align. If suitable existing topographic data are not available, it will be necessary to develop new topographic and/or survey data. Appendix A provides the requirements for developing new topographic data and performing cross-section and structure surveys.

[February 2002]

Making Map Product Decisions

FEMA's preference is to produce all new and updated FIRMs in digital format. In some rare instances, it may be cost-prohibitive to convert a manually produced FIRM to digital format. In such cases, the FEMA Lead may decide to produce the updated FIRM using manual cartographic

methods or create a "partial digital" FIRM whereby only the FIRM panels affected by new or updated flood data are produced digitally, leaving the other panels unrevised. The first decision, therefore, is to decide whether to produce an entire FIRM digitally, produce part of the FIRM digitally, or produce the FIRM manually.

[February 2002]

Base Map

All digital FIRM flood map update projects must have a suitable digital base map to compile the results of the study. This step is critical because of the expense involved in acquiring a suitable base map if none is available and because FEMA's primary mission does not include the production of base cartographic data. Lack of a suitable base map will likely prevent the publication of the revised flood data. The Available Data Inventory template provided in Appendix I, Subsection I.1.5 of these Guidelines shall be used to summarize existing base map data that may be available to the Mapping Partners.

If the FIRM will be produced digitally, a community-supplied base map that meets FEMA criteria is the first choice for base map. USGS Digital Orthophoto Quadrangles (DOQs) are the second choice and the default base map if suitable community data are not available. If neither suitable community base map data nor USGS DOQs are available for a FIRM scheduled to be produced digitally, FEMA will provide the community with information on base map sources, including information on partnering with USGS to initiate DOQ production for that community. DOQ production normally takes 12 to 14 months, so coordination with USGS shall be initiated with that timeframe and the new digital FIRM production schedule in mind. FEMA's criteria for base maps are discussed in Section 1.4. Detailed information on FEMA base map standards are provided in Subsection 1.4.3.1.

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[February 2002]

Map Format

FIRMs may be prepared in the community-based (i.e., single-jurisdiction) or Countywide format. These formats are described in Appendix K of these Guidelines. FEMA's preferred FIRM format is Countywide. In some instances, such as when it will be cost-prohibitive to produce a Countywide FIRM (e.g., only a relatively small portion of the county is affected by new flood data, or when a suitable county base map is not available), the FEMA Lead, in consultation with the Project Management Team, may decide to produce the new or updated FIRM in community-based format.

[February 2002]

Graphics

FEMA graphics standards are to be used unless agreed upon with FEMA during the Project Scoping phase. Communities may have some flexibility in the presentation of flood hazard information on the FIRM, particularly with regard to the presentation of flood hazard data based on future-conditions analyses. General guidance regarding the inclusion of future-conditions

flood hazard data on the FIRM and in the FIS report is provided in Appendix C, Subsection C.8 of these Guidelines.

[February 2002]

Database

The FEMA standard digital FIRM spatial database should be produced. Any deviations should be agreed upon with FEMA during the Project Scoping phase. Also, during the Project Scoping phase, to the Project Management Team must decide on the options that will be included in the enhanced database.

The digital FIRM Database product that accompanies new digital FIRMs has the flexibility to incorporate additional data that are not necessarily shown on the FIRM. The enhanced digital FIRM Database provides the capability to add other data to the standard digital FIRM Database. For example, GIS data representing watersheds and sub-basins, stream reach hydrologic network structure, building footprints, land-use classifications, or soil types may be included. Other data sets such as model input and output files, digital elevation certificates, or digital photographs of hydraulic structures could also be included.

Detailed information on the standards for the digital FIRM Database is provided in Appendix L of these Guidelines.

[February 2002]

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Map Scales

Map scales should be selected depending on the density of information, width of floodplains, type of study (i.e., detailed, approximate), and scale of the previously prepared FIRM(s). Subsection 1.4.2.2 describes the map scale selection process.

[February 2002]

Datum

FEMA would prefer to use North American Vertical Datum of 1988 (NAVD88) as the elevation datum, except in certain circumstances such as when a community does not plan to adopt NAVD88 for local vertical control or when the conversion of existing information referenced to another datum is cost prohibitive. Detailed information on the protocol for selecting the vertical datum is provided in Appendix B of these Guidelines.

[February 2002]

Map Layout

A standard coordinate system and horizontal datum for all FIRMs is desirable so that they can be easily referenced to one another. The preferred coordinate system is Universe Transverse Macerator referenced to the North American Datum of 1983. Details of coordinate systems and projections for published FIRMs are discussed in Appendix K.

Digital FIRMs are tiled using a paneling scheme that is based on USGS 7.5-minute series topographic quadrangles or subdivisions thereof, depending on the scale of the digital FIRM. Details of digital FIRM paneling are discussed in Subsection 1.4.3.2.

Coordination of the map layout and paneling scheme between Mapping Partners is important throughout the FIRM production process. A preliminary FIRM layout shall be determined during the Project Scoping phase and shall be used for the work maps and the final FIRM products.

[February 2002]

1.3.1.9 Identification of Other Potential Resources

Through the process of doing the preliminary research, identifying potential obstacles, developing the preliminary Project Management Plan, and drafting the Scope of Project, additional resources for the Flood Map Project may become evident. These could be local, State, or Federal agencies not originally included in the Project Team that may be able to contribute to the project. They may also include local organizations such as universities that have capabilities or resources that would benefit the project. If a recent flood has occurred, valuable data may be obtained from local Engineering or Public Works departments or residents.

The FEMA Lead will assign the appropriate Project Management Team member(s) to contact additional resources to investigate their possible contribution to the project. A concerted effort should be made during the Project Scoping phase to identify these other potential resources, because their contribution might significantly affect the Scope of Project.

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[February 2002]

1.3.1.10 Draft Scope of Project Conference Call

The Project Management Team will hold a conference call once the research has been completed and the draft Scope of Project has been prepared. The FEMA Lead will arrange the call. If more than one community is involved in the Flood Map Project, the FEMA Lead will decide whether to conduct separate calls or a combined conference call; the FEMA Lead may also decide to divide the calls among the Project Management Team members. Before the conference call, the FEMA Lead or CTP Lead will distribute the draft Scope of Project. The purpose of the call is to discuss and refine the draft Scope of Project and to schedule the Scoping Meeting.

A Draft Scope of Project Conference Call Agenda/Meeting Minutes Form is provided in Appendix I, Subsection I.1.8 of these Guidelines.

[February 2002]

1.3.1.11 Revised Draft Scope of Project

Based on the results of the conference call, the Project Management Team will revise the draft Scope of Project for discussion at the Scoping Meeting.

[February 2002]

1.3.1.12 Distribution of Background Information

The FEMA Lead will prepare a detailed meeting agenda for the Scoping Meeting. A Scoping Meeting Agenda/Minutes Form template is provided in Appendix I, Subsection I.2.4 of these Guidelines. The FEMA Lead will distribute the Scoping Meeting agenda, the revised draft Scope of Project, and the preliminary Project Management Plan to all attendees before the Scoping Meeting.

A Document Transmittal Letter template is included in Appendix I, Subsection I.2.2 of these Guidelines. This letter can be used to distribute the background information to all meeting attendees. It also includes a checklist of information that the community should bring to the meeting.

[February 2002]

1.3.2 Scoping Meeting Activities

This subsection provides general guidance for topics to be discussed and agreed upon during the Scoping Meeting. In previous FEMA documentation, this meeting has been referred to as the "Time and Cost meeting" and/or "Initial Consultation Coordination Officer meeting." The structure of the meeting will vary depending on the anticipated scope. A Flood Map Project that involves an entire county may require more than one Scoping Meeting and coordination between many community officials to prioritize needs. The FEMA Lead will decide the best approach and structure for the Scoping Meeting.

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The purpose of the Scoping Meeting is to bring all interested parties together to finalize the Scope of Project (including the areas to be studied) and the task assignments. The FEMA Lead will determine the attendees, which will include the following:

- FEMA Lead;
- Project Management Team members (as needed);
- Contractor representative(s);
- State representative(s); and
- Community representative(s).

The FEMA Lead also will invite those organizations or agencies that might have relevant information or can assist with the project (e.g., the USACE, the USGS, local surveyor) to attend the Scoping Meeting.

Before the Scoping Meeting, Project Team members may perform informal field reconnaissance (sometimes called a "windshield survey") to become familiar with possible study areas. This effort may be coordinated with local community officials and will facilitate discussion in the Scoping Meeting for those not familiar with the area.

A list of items to bring to the Scoping Meeting, known as the Scoping Meeting Item Checklist, is provided in Appendix I, Subsection I.2.1 of these Guidelines; a Scoping Meeting Attendance Sheet template is included in Appendix I, Subsection I.2.3. The Scoping Meeting Agenda/Minutes form template provides a mechanism for the Project Management Team to document the topics to be discussed during the meeting. The FEMA Lead will identify someone from the Project Management Team to complete the checklist, attendance sheet, and agenda/minutes form. The topics to be covered in the Scoping Meeting are discussed below.

[February 2002]

1.3.2.1 National Flood Insurance Program Overview

The FEMA Lead will briefly discuss the NFIP and FEMA's role and responsibilities. The community's floodplain administrator will briefly discuss the community's floodplain management ordinances. The FEMA Lead will then briefly describe the mapping process, with an approximate project timeline for the entire project, up through the distribution of effective FIS.

[February 2002]

1.3.2.2 Mapping Needs List Prioritization and Finalization

The FEMA Lead or CTP Lead will present and review the initial mapping needs list, present an overview of the initial research findings, and make initial selection of proposed methods for obtaining/producing flood data. Any additions or changes to the needs list will be discussed. All the listed needs will also be ranked in priority. The scoping maps (i.e., maps that define the scope, such as the effective FIRM or USGS maps) prepared during the pre-Scoping Meeting activities may be used to assist in discussing and ranking these needs.

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As discussed previously, it may be that the costs of using the technical methods initially selected to obtain/produce flood data will exceed the available funding for the Flood Map Project. Thus, the update needs for each flooding source within the project area must be weighed against the update needs for other flooding sources within the project area. In such instances, the FEMA Lead, in consultation with the Project Management Team and the community, will prioritize the map update needs to ensure that the areas of greatest need can be addressed with the available funding. In general, highest priority will be given to the following areas:

- Areas of dense existing or anticipated development, including areas where new road crossings have been constructed over the subject stream(s);
- Areas affected by flood-control structures and/or channelization;
- Areas where natural physical changes in the floodplain have been significant (due to subsidence or extreme erosion, for example);
- Areas that were studied by approximate methods and unmapped areas, especially those with development pressure;

- Areas where the community has experienced flooding outside mapped floodplains, with severe damage to buildings and/or infrastructure;
- Areas where mapped flood hazards do not match those shown on contiguous FIRMs (unless those FIRMs are not considered to be accurate); and
- Areas where flood data (BFEs, floodplains, and regulatory floodways) are likely to be changed the most by a restudy.

[February 2002]

1.3.2.3 Refinements to Draft Scope of Project

The FEMA Lead will present the draft Scope of Project. Each section will be reviewed and refined during the meeting, as discussed below.

[February 2002]

Review and Refinement of Project Area

Based on the discussion of mapping needs, the Project Team will finalize the areas to be included in the project. Areas to be studied by detailed and approximate methods will be identified, including areas not previously studied that are known by community officials to be floodprone. The scoping maps can be helpful in these efforts.

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[February 2002]

Review and Refinement of Flood Hazard Identification Methodologies

The Project Team will discuss the extent of riverine or coastal modeling required for the project. The research completed during the pre-Scoping Meeting phase will be reviewed to determine the extent and applicability of previous modeling. The community and others, when appropriate, will provide any models or computations they have prepared that could be used in the project. The technical methodologies presented in the draft Scope of Project will be reviewed. Issues to be discussed include the following:

- Models to be used from FEMA's approved models list;
- Requirements for tie-ins to adjacent NFIP maps;
- Areas where complex models might be required (to reflect shallow flooding, alluvial fan flooding, or ice-jam flooding); and
- Coordination on coastal issues.

[February 2002]

Review and Refinement of Data Collection Needs and Methods

The FEMA Lead will discuss the availability and accuracy of existing topographic data, which will be provided during the Scoping Meeting, if possible. The vertical and horizontal datums will be included in these discussions. If existing topographic data are not sufficient, options for aerial data collection will be discussed, including traditional aerial photogrammetry and new remote-sensing technologies, such as Light Detection and Ranging (LIDAR) systems.

Options for field survey efforts will also be discussed, including surveys of bridges, culverts, levees, dams, etc.; channel cross sections or lake/ocean transects surveys; and other data surveys, as needed.

The Project Team might also decide that further research of existing data is required. If so, a Project Team member will be assigned this task. The community will point out any major site developments or land use changes that could happen in the near future. These changes will be discussed with respect to timing any survey or data collection efforts for the project.

[February 2002]

Review of Proposed Paneling Scheme

The scoping map will be used to review the proposed paneling and scale scheme.

[February 2002]

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Review and Refinement of Base and Topographic Map Sources

The FEMA Lead will discuss FEMA's base map specifications. The discussion will include the following topics:

- Base map source (i.e., locally developed data or DOQs meeting FEMA's minimum specifications) to be used for the project;
- Topographic and planimetric data sources;
- Coordination of countywide issues, if necessary;
- Horizontal and vertical datums; and
- Acquisition of the base map, if the Project Team does not already have the digital files.

[February 2002]

Finalization of Map Production and Database Options

The proposed FIRM format and optional features and data for the enhanced digital FIRM Database (e.g., GIS data for watershed boundaries, stream reach hydrologic network structure, land use data, soil data, digital elevation certificates, photographs of structures) from the draft Scope of Project will be reviewed, refined, and finalized.

[February 2002]

1.3.2.4 Assignment of Project Team Member Tasks

Based on the Scope of Project, the FEMA Lead will make preliminary task assignments to Project Team members. In addition to assigning tasks, timeframes will be established and recorded for each task. Also, the role of each Project Team member in providing quality control will be confirmed. Any particular tasks or responsibilities not already discussed as part of the previous agenda will be considered here. The objective is for Project Team members to come away from the meeting with a clear understanding of their roles and responsibilities for the project. Table 1-3 shows the available resources for completing Flood Map Projects.

Table 1-3. Available Resources for Completing Flood Map Projects

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Project Element		CTP	MCC	SC
Field Surveys of Structures and Cross Sections		x	x	x
Elevation Data/Topographic Mapping		x	x	x
Detailed Riverine	Hydrologic Analyses	x	x	x
	Hydraulic Analyses	x	x	x
	Floodplain Mapping	x	x	x
Detailed Coastal	Engineering Analyses	x	x	x
	Floodplain Mapping	x	x	x
Detailed Alluvial Fan	Engineering Analyses	x	x	x
	Floodplain Mapping	x	x	x
Approximate Analyses		x	x	x
Redelineation of Floodplain Boundaries		x	x	x
Base Map Acquisition		x	x	x
Base Map Preparation		x	x	x
DFIRM Production		x	x	x
QA/QC Review of Topographic Data			x	
QA/QC review of Flood Hazard Data (Engineering Analyses and Mapping)			x	
QA/QC Review of Digital FIRM			x	
Preliminary/Post-Preliminary Processing			x	

Note: Shaded project elements are required for all CTP projects; non-shaded project elements are optional depending on the scope of the specific CTP project.

The Project Team members responsible for obtaining/developing topographic data and/or conducting field reconnaissance and surveys shall coordinate any subcontracting efforts. The responsibilities include determining several sources for scope and cost estimates and obtaining input from communities on local surveyors.

The Task Assignment and Scheduling Worksheet in Appendix I, Subsection I.2.5 can be used to make assignments and develop a schedule for the project. The Flood Mapping Project Process Flowchart, which is included in Appendix I, Subsection I.2.6 may also be useful.

[February 2002]

1.3.2.5 Community Partnership Agreements

If the community will not be participating in the project by contributing work, a Community Partner Memorandum of Agreement (MOA) will be signed by the community and FEMA to document the good faith efforts to collaboratively assess the community's needs, develop an appropriate Scope of Project, and develop and publish the resulting maps. If the community will be participating in the project by contributing work or base map data but has not yet completed an MOA under the CTP initiative, an MOA will be completed and signed by the community, FEMA, and the State, as necessary.

If these agreements cannot be signed at this meeting (for example, if they require city council approval), they are to be processed as soon as possible after the Scoping Meeting. MOA templates are provided in Appendix I, Subsections I.2.7 and I.2.8.

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1.3.3 Post-Scoping Meeting Activities

This section provides general guidance for scoping activities that will occur after the Scoping Meeting is held. These activities include documentation of the meeting itself, finalization of task assignments to the Project Team members, development of a Statement of Work (SOW) or Mapping Activity Statement (MAS), and preparation of time and cost estimates. If the community is participating as a CTP, the work will be covered by an MAS. An SOW will cover work performed by a FEMA contractor.

Additional guidance for the FEMA Lead is provided in FEMA Manual 7810.2, *Regional Project Officer Guidance for Flood Insurance Studies* (FEMA, 1990).

[February 2002]

1.3.3.1 Scoping Meeting Documentation

The Project Management Team shall prepare and distribute the meeting minutes, which shall include a list of all the participants and their respective assignments for the project, as well as the overall schedule for the project as discussed at the Scoping Meeting. The overall project schedule will establish the basis for each Project Team member's assignment(s). Project Team members shall review their task assignments and provide feedback or comments to the Project

Management Team. All changes to the proposed scope, schedule, and task assignments shall be coordinated with the FEMA Lead and, if necessary, communicated to the other team members.

[February 2002]

1.3.3.2 Statement of Work or Mapping Activity Statement Preparation

The FEMA Lead shall develop an SOW or, working with the CTP, shall develop an MAS based on task assignments made during the Scoping Meeting and any subsequent changes. The FEMA AO in the FEMA RO and/or the FEMA CO at FEMA HQ shall review and approve the SOW or MAS before the FEMA Lead distributes it to the Project Team members. A template SOW is provided in Appendix I, Subsection I.3.1 of these Guidelines. Whenever possible, the FEMA Lead shall ensure that one SOW will be prepared for the entire Flood Map Project with the Mapping Partner responsible for each task clearly identified. Similarly, the FEMA Lead shall ensure that a single MAS is prepared for each Flood Map Project whenever possible.

Once the SOW or MAS has been drafted, the FEMA Lead shall prepare a Government Estimate for the proposed work and submit it to the FEMA AO and/or CO for review and approval. If a contractor for a CTP is participating in the scoping, the CTP shall be responsible for developing, reviewing, and distributing time and cost estimates for an SOW for this contractor in conjunction with the CTP responsibilities outlined in the MAS.

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1.3.3.3 Distribution of Statement of Work and Mapping Activity Statements

The FEMA AO or CO shall distribute the draft SOW and/or MAS to the Project Team. This will confirm assignments to Project Team members and also will allow the community and others to have final input into the SOW and/or MAS.

[February 2002]

1.3.3.4 Time and Cost Estimate Preparation

Based on the SOW or MAS, each Mapping Partner participating in the Flood Map Project shall develop a time and cost estimate for assigned tasks. As part of these estimates, Project Team members also shall establish a schedule for their portion of the work within the schedule from the Scoping Meeting. The Project Team members shall submit their estimates to the AO and/or CO within a mutually agreed timeframe. A template for preparing time and cost estimates is provided in Appendix I, Subsection I.3.2 of these Guidelines.

[February 2002]

1.3.3.5 Evaluation of Time and Cost Estimates

The FEMA AO and/or CO, in consultation with the FEMA Lead, shall evaluate the time and cost estimates submitted by each Project Team member and shall compare the aggregate cost values to the budgeted funds for the Flood Map Project. For a CTP-funded project, the CTP shall work with FEMA to evaluate the costs. The Project Management Team also shall check the Project

Team members' schedules to ensure they are consistent with the overall project schedule agreed upon at the Scoping Meeting.

If the aggregate costs exceed the target project budget, the AO and/or CO shall determine whether to reduce the scope of the project, increase the project budget, or negotiate with Project Team members on certain elements of the project. The AO and/or CO and the FEMA Lead shall consult with community officials and the Project Management Team regarding any changes in the project scope.

Similarly, if the aggregate costs are significantly less than the target project budget, the AO and/or CO shall determine whether to expand the scope of the project, allocate the surplus budget for other projects, or hold the surplus budget in reserve for addressing potential problems if they arise. Again, the AO and/or CO and the FEMA Lead shall typically coordinate with the community and the Project Management Team regarding any expansion of the project scope.

[February 2002]

1.3.3.6 Negotiation of Final Time and Cost Figures

If the project scope changes as a result of the evaluation described in Subsection 1.3.3.5, the AO and/or CO, in consultation with the FEMA Lead, shall revise the SOW or MAS accordingly and redistribute it to Project Team members. The Project Team members shall develop and submit revised time and cost estimates in accordance with the revised SOW or MAS. The FEMA Lead also shall revise the Government Estimate, if necessary, and resubmit it to the AO and/or CO.

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As a result of this evaluation, the AO and/or CO may negotiate with specific Project team members regarding certain elements of the time and cost estimates, even if the project scope is not changing. For example, the AO and/or CO may request changes regarding the time or labor categories planned for specific tasks. Additionally, the CTP may choose to do this as well with the contractors for which they are responsible.

The AO and/or CO, in consultation with the FEMA Lead (and possibly CTP), shall evaluate the revised time and cost estimates and negotiate with the Project Team members. This evaluation/negotiation process will be repeated until all parties agreed with the time and cost estimates and the SOW and/or MAS are finalized.

[February 2002]

1.3.3.7 Community Agreement Processing

As discussed previously, if the community is participating as a CTP, the FEMA Lead will work with community officials to sign both a CTP MOA and an MAS for the project. In most situations, the MOA will have already been processed before the Project Scoping phase of the project begins.

If the community will be receiving FEMA funding for the project, the FEMA Lead will coordinate with the FEMA Operations Support Division to provide the community with a Request for Application package so that the community may receive Cooperative Agreement

funding. The FEMA Lead and/or AO shall work with the community to complete the application forms, as needed. After review and acceptance of the application package, the AO shall make the allocation to the community and prepare the appropriate documentation and notification.

The community is encouraged to develop a CTP Agreement with FEMA even if the community is not directly assigned tasks in the SOW through a Community Partner MOA.

[February 2002]

1.3.3.8 Finalization of Project Management Plan

The FEMA Lead, in consultation with the FEMA AO and/or CO, shall incorporate the final SOW or MAS and establish intermediate project reporting and project close-out requirements in the Project Management Plan. The Plan will then be ready for finalization.

[February 2002]

1.3.3.9 Updates to Mapping Needs Update Support System Database

Once the SOW or MAS and the contract requirements are finalized, a Mapping Partner designated by FEMA shall update the MNUSS database to indicate that the needs included in the SOW or MAS are being included in an ongoing Flood Map Project. This ensures that needs being addressed by the project will not be considered during the prioritization of projects for future years. The designated Mapping Partner also shall update MNUSS to add any new needs identified during the scoping activities that will not be addressed by this mapping project, and/or to revise any existing needs to reflect information obtained during the scoping process. Additionally, the designated Mapping Partner shall flag the needs that could not be verified during the research and community coordination activities as "not verified."

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1.3.3.10 Distribution of Final Tasks and Notice to Proceed

The FEMA AO and/or CO shall distribute the final SOW or MAS to the Project Team members and notify them to proceed accordingly. A sample Notice to Proceed letter template is included in Appendix I, Subsection I.3.3 of these Guidelines. Because cost information is proprietary, the AO and/or CO shall distribute the time and cost estimates only to the Project Team members performing the work. The AO, CO, and/or FEMA Lead also shall arrange for an announcement to be published in a prominent local newspaper advising of the planned Flood Map Project and requesting that relevant facts and technical data be submitted for consideration.

[February 2002]

1.3.4 Outreach and Coordination

The outreach activities for a Flood Map Project can best be understood as a process that begins during the Project Scoping phase and continues through the Map Production and Post-preliminary phases. This section will address all but the post-Preliminary activities, which are

addressed in Section 1.5. A regulatory overview of required activities is followed by a description of tools that can be used in working with stakeholders to keep them informed and to solicit their input.

The overarching goal for conducting outreach is to create a climate of understanding and ownership of the mapping process at the State and local levels. Well-planned outreach activities can reduce political stress, confrontation in the media, and public controversy, which can arise from lack of information, misunderstanding, or misinformation. These outreach activities also can assist FEMA and other members of the Project Team in responding to congressional inquiries.

By proactively reaching out to all key stakeholders as early in the Flood Map Project as possible, the maps can be used to their full potential. The likelihood of appeals may also be reduced or eliminated. Specific outreach goals include:

- Establishing two-way communication to inform and obtain feedback from stakeholders;
- Ensuring compliance with due process requirements;
- Interacting with technical representatives to ensure production of accurate and up-to-date maps;
- Identifying and addressing the needs of all affected stakeholders;
- Enhancing ownership by communities; and
- Tracking, monitoring, and evaluating outreach activities and adjusting efforts according to ongoing feedback and evolving project needs.

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[February 2002]

1.3.4.1 Consultation and Coordination

Outreach activities to educate stakeholders about a particular Flood Map Project and the mapping process in general must be planned, tracked, monitored, and evaluated. Outreach activities also must address the legal due-process requirements and other opportunities for public involvement, including the ways in which public input will be used in developing maps. Under Section 66.4 of the NFIP regulations, FEMA is required to designate a Federal employee as the Consultation Coordination Officer (CCO) for each community when an analysis is undertaken to establish or modify flood elevations. When FEMA appoints a CCO, that person becomes responsible for consultation and coordination activities. Mapping Partners involved in a Flood Map Project may be asked to assist the FEMA CCO in consultation and coordination efforts.

[February 2002]

1.3.4.2 Initial Coordination and Outreach

When a Flood Map Project is initiated, FEMA shall contact the local officials and the State NFIP Coordinator and inform them that their community has been selected for a possible study. FEMA shall work with local officials to inform the community and request information through meetings and other consultation activities. The regulations also require FEMA to encourage local dissemination of information and keep local officials apprised of progress. Contractors and other Project Team members may assist in providing this information and informing local officials.

[February 2002]

1.3.4.3 Establishing and Maintaining Community Case Files and Dockets

Other due process and regulatory requirements involve detailed record keeping and documentation requirements. For example, FEMA must establish legal files, referred to as "dockets," that must be maintained and made available to the public. When a community is initially considered for a Flood Map Project involving a new or revised flood hazard analysis, FEMA must establish a community case file.

As work on the Flood Map Project progresses, FEMA or a Mapping Partner designated by FEMA, shall include copies of correspondence, as well as documentation of all actions related to tentatively identifying a community, providing BFEs, and suspending or reinstating a community in the community case file. FEMA must maintain the community cases file even if an NFIP map is administratively rescinded or withdrawn after notice or the community successfully refutes its floodprone designation.

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Designated Mapping Partners will assist FEMA in establishing and maintaining the community case files to ensure accuracy and completeness. These files must include copies of the following:

- All correspondence between FEMA and the community concerning the study, including reports of any meetings among FEMA representatives, property owners, the state NFIP coordinating agency, study contractors, or other stakeholders;
- Relevant publications;
- Completed flood elevation study; and
- Final determination. (See Section 1.5 for more information.)

In accordance with Part 67 of the NFIP regulations, FEMA also must establish and maintain a Flood Elevation Determination Docket (FEDD). In the FEDD, discussed in more detail in Section 1.5, FEMA records all matters pertaining to flood elevation determinations, starting with the issuance of the Preliminary versions of the FIS report and FIRM to community officials.

While due process and documentation requirements mandate the minimum regulatory requirements that must be met, additional outreach may be beneficial to all parties involved to

maximize usefulness of the new or updated flood hazard data, to encourage State and local ownership of the maps, and to explain and provide incentives for best practices.

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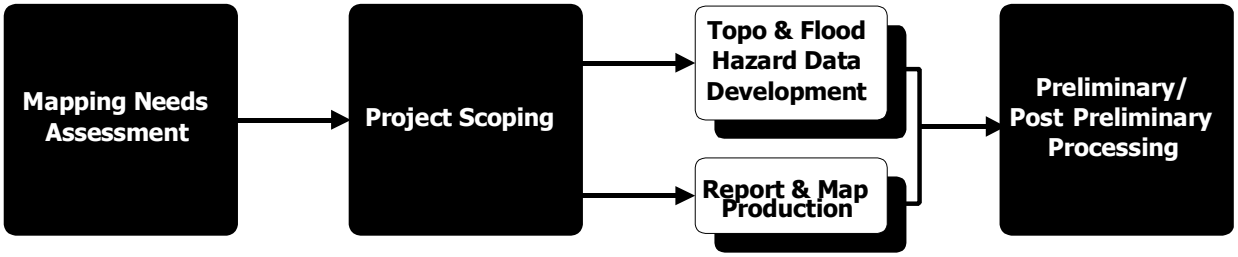
1.4 Data Development/ Report and Map Production



After completion of the Project Scoping phase (covered in Section 1.3 and Appendix I of these Guidelines), including the issuance of the necessary Task Orders and/or MASs, the Data Development/Report and Map Production phase of the Flood Map Project begins. This section overviews the data development and FIRM production process. Note that this section primarily focuses on Flood Map Projects that will result in a new or updated FIRM, produced digitally. As noted in Section 1.3, FEMA will produce all new FIRMs digitally, and prefers to produce updated FIRMs digitally. However, the FEMA Lead may direct that an updated FIRM be produced using manual cartographic techniques when cost constraints or other factors so dictate. This decision will be made during Project Scoping.

A Special Problem Report, or equivalent document providing the same information, is required whenever a significant problem requiring FEMA resolution is encountered or when a significant change in scope, schedule, or budget is necessary. A Special Problem Report must be submitted to the FEMA Lead immediately following the identification of the issue.

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Figure 1-4 shows the process for data development and production of the FIS report and FIRM. As shown, there are two parallel "paths" for completing the topographic and flood hazard data development and the production of the FIS report and FIRM. To complete a Flood Map Project in a timely and cost-effective manner, it is critical that activities be completed simultaneously where possible and that all Project Team members work collaboratively. Figure 1-4 shows that concurrent activities are the foundation of the Flood Map Project process.

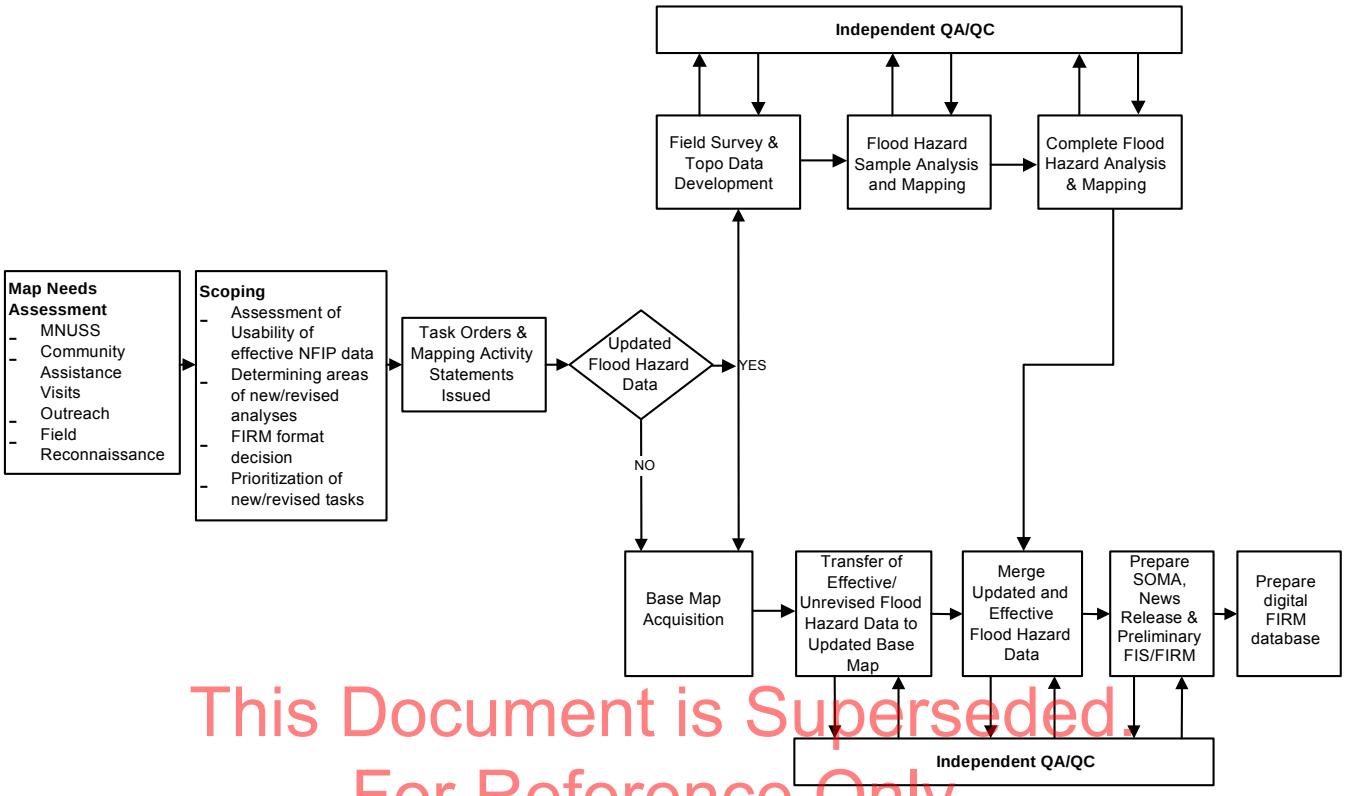

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Figure 1-4. Data Development and Map Production Process

All Flood Map Projects will include a map production component; Flood Map Projects that incorporate new or updated flood hazard data also will include a topographic and flood hazard data development component as well as a provision for independent incremental reviews of these data by a qualified QA/QC reviewer.

[February 2002]

1.4.1 Independent Quality Assurance/Quality Control Review

Each Mapping Partner contributing to a Flood Map Project must ensure that its contributions to the project are in compliance with the standards in these Guidelines as well as any additional standards provided by FEMA in Project-related task orders or MASs. As shown in Figure 1-4, the flood hazard and topographic data development process requires interim reviews of analyses and products. The independent QA/QC review for each analysis and product must be conducted by an entity other than the Mapping Partner that performed the analysis or prepared the product.

An independent QA/QC review of topographic data also may be required, particularly for data collected using new or emerging technologies, such as LIDAR.

The Mapping Partner responsible for the preparation of the Preliminary FIS report and FIRM shall submit for an independent review, the merged flood hazard data and other ancillary products associated with the preparation of the Preliminary FIS report and FIRM.

The FEMA Lead, during Project Scoping, shall determine the scope, protocols and associated details of these independent reviews. The intent of these independent QA/QC reviews is to reasonably verify that the analyses and other activities that are performed and the products that are generated during a Flood Map Project meet the requirements in these Guidelines and in Project-related task orders and MASs. The independent QA/QC reviewer(s) shall provide a summary report to the FEMA Lead and the Mapping Partner that prepared the data, analyses, or mapping.

In addition, the Mapping Partner responsible for the preparation of the Preliminary FIS report and FIRM shall ensure, through an internal QA/QC process, that all components of the study are in compliance with these Guidelines.

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1.4.2 Topographic and Flood Hazard Data Development

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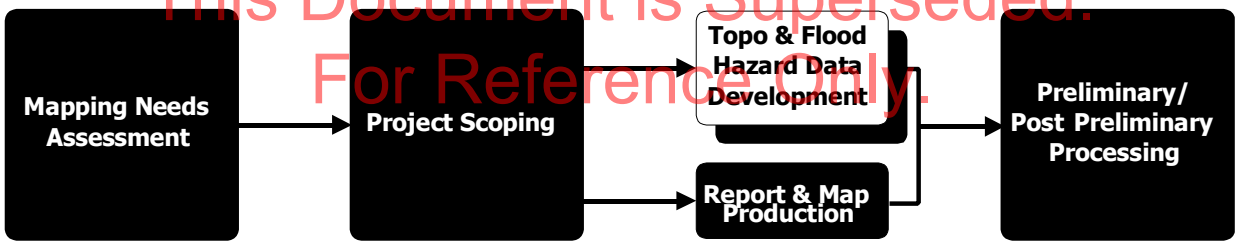

The following activities are completed during the Topographic and Flood Hazard Data Development subphase for a Flood Map Project that will include new or updated flood hazard data:

- Field survey and topographic data development, including aerial topographic surveys, cross-section surveys, hydraulic structure surveys, and establishment of vertical control and location of qualifying bench marks;
- Flood hazard data development, including detailed flood hazard analyses, approximate flood hazard analyses, and redelineations of floodplain boundaries based on updated topographic data); and
- Creation and submittal of draft materials, including floodplain mapping (i.e., work maps), digital files for GIS-based applications, and FIS report components.

The Topographic and Flood Hazard Data Development subphase includes collecting or acquiring the necessary topographic and field data and conducting detailed and/or approximate analyses

and/or performing redelineation of floodplain boundaries using flood elevations from the effective FIS report and FIRM. Thus, this component is required only for Flood Map Project that will include new or updated flood hazard data.

The topographic and flood hazard data development path includes the steps summarized below.

1. Field survey and topographic data development, including:
    - Aerial topographic surveys;
    - Cross section surveys;
    - Hydraulic structure surveys; and
    - Establishment of vertical control and location of qualifying bench marks.
2. Flood hazard data development, including:
    - Generating updated flood hazard data;
    - Redelineation of effective floodplain boundaries based on updated topographic information;
    - Creation of work maps displaying the updated / revised floodplain mapping;
    - Creation of digital files for GIS applications; and
    - Creation of a draft FIS report containing supporting flood hazard data tables and Flood Profiles for flooding sources studied by detailed methods.

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1.4.2.1 Field Survey and Topographic Data Development

Accurate, up-to-date topographic data are needed for flooding sources to be updated through the performance of a detailed or approximate engineering analysis and when redelineating floodplain boundaries using effective flood elevations. Further, survey data for channel cross sections and hydraulic structures (e.g., bridges, culverts, or dams) are required for detailed flood hazard analyses and may be required for some approximate engineering analyses (if so determined during the Project Scoping phase of the Flood Map Project).

Significant cost savings may be realized if existing topographic and cross-section data sources can be used for a Flood Map Project. Accordingly, the Mapping Partner performing the flood hazard analyses shall conduct research to identify existing sources of topographic and field survey data and, if such sources are found, to assess the adequacy of the data for the Project. Section 1.3 of these Guidelines provides guidance on assessing the adequacy of existing topographic and survey data.

The topographic data and the base map data used in preparing the effective FIRM must be compatible; that is, like features in both data sources must align. If the Mapping Partner performing the flood hazard analyses determines that no data exist or that existing data are inadequate or need to be supplemented, then that Mapping Partner shall develop the necessary data following the guidance in Appendix A of these Guidelines"

[February 2002]

Bench Marks

Vertical control monuments (also referred to as bench marks) must be shown on the FIRM to assist map users in establishing vertical control for flood elevation determinations. Bench marks shown on the FIRM must meet a minimum qualifying standard; they must be First or Second Order Vertical and have a stability classification ranking of A, B, or C as defined by the National Geodetic Survey (NGS). All qualifying bench marks within a given jurisdiction that are cataloged by the NGS and entered in the National Spatial Reference System (NSRS) with the aforementioned qualifications shall be shown on the FIRM and identified by their NSRS Permanent Identifier (PID).

When local jurisdictions have established their own vertical monument network, these monuments also may be shown on the FIRM with the appropriate designations. Local monuments shall be placed on the FIRM only if the community has requested that they be included, and if the monuments meet the aforementioned inclusion criteria. Additional information on qualifying criteria is provided below.

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Temporary vertical control monuments—formerly referred to as Elevation Reference Marks (ERMs) on FIRMs—that were established by FEMA study contractors during the performance of a study or restudy shall not be shown on the FIRM unless they meet specific qualifying criteria as indicated below. This standard applies to all FIRMs, regardless of whether they are being created for the first time or being revised. ERMs that appear on FIRM panels being revised must be removed and replaced with qualifying bench marks.

Descriptions of bench marks shall not appear on the FIRM. Map users will be provided with a phone number and an Internet address that allows them to access the NSRS to obtain the most up-to-date information on all vertical control monuments shown on the FIRM.

[February 2002]

Qualifying Criteria for Inclusion of Existing Bench Marks

Bench marks cataloged by the NGS and included in the NSRS vary widely in stability classification and level of precision relative to levels of confidence. The minimum criteria for inclusion of an NSRS bench mark on the FIRM are that the monument be Second Order Vertical and Stability Classification C, or better.

NGS Stability definitions are as follows:

- Stability A Monuments are monuments of the most reliable nature and are expected to hold position/elevation well (e.g., mounted in bedrock).
- Stability B Monuments are monuments that generally hold their position/elevation well (e.g., concrete bridge abutment).
- Stability C Monuments are monuments that may be affected by surface ground movements (e.g., concrete monument below frost line).
- Stability D Monuments are monuments of questionable or unknown stability (e.g., concrete monument above frost line, or steel witness post).

For digital FIRMs, the locations of temporary monuments (i.e., ERMs) shall be recorded in the associated spatial database. For all FIRMs, the Technical Support Data Notebook (TSDN) records the temporary monument elevation and description information.

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Qualifying Criteria for New Vertical Control Monuments

Vertical control monuments established by FEMA study contractors may be added to the FIRM provided they have been classified by, and entered into, the NSRS as indicated above and meet the following criteria:

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- They must be surveyed per NGS-58 guidelines for Secondary Base 5-centimeter monuments relative to existing NSRS monuments.
- They must have stability classifications of A, B, or C.
- Global Positioning System (GPS) files and station descriptions must have been previously submitted and accepted by the NGS for inclusion in the NSRS.

[February 2002]

Portrayal of Bench Marks on Flood Insurance Rate Maps

Appendix K of these Guidelines provides the graphic specifications for the portrayal of bench marks on FIRMs. If the number of qualifying bench marks is small, the Mapping Partner may include bench marks that lie outside the jurisdiction boundaries, but within the neatlines of printed FIRM panels.

[February 2002]

1.4.2.2 Flood Hazard Data Development

As described in Section 1.3, the flood hazard data that shall be used for a Flood Map Project are determined as part of the Project Scoping phase. The basic methods for developing flood hazard data for a Flood Map Project are summarized below.

- Use of flood hazard information from the effective NFIP map without change;
- New or updated flood hazard data (using one or a combination of the following methods):
- Redelineation of effective floodplain boundaries based on updated topographic data
- Detailed coastal and riverine flood hazard analyses; and
- Approximate flood hazard analyses.

The method used for each flooding source identified as a flood hazard will be determined during the Project Scoping phase. (See Section 1.3 for a more detailed discussion of each of these methods.) For most Flood Map Projects, the Mapping Partners involved will use a combination of these methods to produce the new or updated FIRM.

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Use of Effective Flood Hazard Information

Flood hazard information on the effective NFIP map (i.e., FIRM, FBFM, or FHBM) that is not being updated through a separate flood hazard analysis or floodplain boundary redelineation shall be "carried over" to the new or updated FIRM unless information is available that indicates that this data is no longer deemed technically sound or valid.

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New or Updated Flood Hazard Data

The development of flood hazard data by one of the three methods indicated above shall be conducted as a two-step process to ensure an independent review of sample hydrologic and hydraulic analyses and/or floodplain mapping is performed before an entire project is completed. During the Project Scoping phase, the FEMA Lead will specify the scope and extent of analyses and mapping to be included in the sample and will specify the number of required interim review submittals (if any).

For example, for one Flood Map Project, the interim review submittal sample may include complete detailed hydrologic, hydraulic, and coastal analyses and floodplain mapping for a subset of all the flooding sources to be studied as part of the project. For another Flood Map Project, the Mapping Partner may be required to provide only the hydrologic analyses for one watershed, the hydraulic analyses for a portion of the flooding source, and the floodplain mapping in a third area. The FEMA Lead will specify during the Project Scoping phase what the review requirements shall be for interim and/or partial review submissions.

After the interim submittals of analyses and mapping have been independently reviewed and all comments and concerns have been addressed, the assigned Mapping Partner will complete the analyses and prepare updated floodplain mapping for all assigned flooding sources. The assigned Mapping Partner shall then submit the completed draft materials in the TSDN format described in Appendix M of these Guidelines. Additional information on the draft submittal requirements is provided in Subsection 1.4.2.3

[February 2002]

Generating and Updating Flood Hazard Data

As part of a Flood Map Project, a Mapping Partner may be required to perform detailed analyses, approximate analyses, or a combination of both for one or all of the following types of flood hazards:

- Riverine flooding;
- Coastal flooding;
- Shallow flooding;
- Ice-jam flooding; and
- Alluvial fan flooding.

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In performing these analyses, the assigned Mapping Partner also may be required to evaluate levee systems and map the areas affected by those systems.

Table 1-4 summarizes the relevant appendices in these Guidelines that provide the requirements for conducting analyses of riverine, coastal, shallow, ice-jam, and alluvial fan flooding, for evaluating levee systems, and for mapping these hazards and systems. Unless otherwise directed by the FEMA Lead, the assigned Mapping Partner shall follow the guidelines in these appendices when generating or updating data for FEMA.

Table 1-4. Location of Guidance for Performing Flood Hazard Analyses

Type of Flood Hazard	Relevant Appendix
Riverine	Appendix C – Guidance for Riverine Flooding Analyses and Mapping
Coastal	Appendix D – Guidance for Coastal Flooding Analyses and Mapping
Shallow	Appendix E – Guidance for Shallow Flooding Analyses
Ice Jam	Appendix F – Guidance for Ice-Jam Analyses and Mapping
Alluvial Fan	Appendix G - Guidance for Alluvial Fan Flooding Analyses and Mapping
Areas Protected by Levees	Appendix H – Guidance for Evaluating Flood Protection Systems

[February 2002]

Redelineation of Effective Floodplain Boundaries

The other option for updating flood hazard data—redelineation of effective floodplain boundaries using more up to date and/or more detailed topographic mapping or data than that used to prepare the effective FIRM to redraw the floodplain boundaries based on the flood elevations using in preparing the effective FIRM—should primarily be limited to floodplains along flooding sources studied by detailed methods where BFEs or flood depths are designated on the effective FIRM. However, if elevation or depth data have been generated for a flooding source for which only approximate analyses were performed by FEMA, this option may be applied to redelineate the approximate floodplain boundaries as well.

Prior to redelineating effective floodplain boundaries, the assigned Mapping Partner shall perform the following activities to assess the appropriateness of this approach:

- Review the planimetric features surveyed during the topographic data development process to ensure that the horizontal accuracy of the planimetric features is compatible with the selected FIRM base map.

- Review the effective 1- and 0.2-percent-annual-chance flood elevations to ensure that they are valid and usable for the floodplain boundary redelineation process. If conditions have changed such that the Flood Profile included in the effective FIS report no longer represents existing conditions (for example, if bridge or culvert construction has occurred), the Mapping Partner may need to perform updated hydrologic and hydraulic analyses. The assigned Mapping Partner shall obtain the required approval from the FEMA Lead before proceeding with such analyses.

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- Investigate changed planimetric or topographic conditions that indicate the need for updated analyses and may preclude the use of this method. Such situations include significant discrepancies in planimetric features or stream distance between Flood Profiles and topographic mapping. The assigned Mapping Partner shall bring these situations to the attention of the FEMA Lead.

If the redelineation option is chosen, the assigned Mapping Partner shall follow the guidelines in Appendix C, Section C.6 of these Guidelines in preparing the required floodplain mapping.

[February 2002]

1.4.2.3 Draft Materials Submittal

Upon completion of the Flood Map Project, the assigned Mapping Partner shall submit final draft materials, in TSDN format, to the FEMA Lead (or other Project Management Team member identified during the Project Scoping phase) for review and processing. These materials may be submitted by U.S. Mail, by Express Mail Service, or by Internet or other electronic means. The assigned Mapping shall retain copies of support data relating to those analyses.

If the FIRM will be prepared in the FEMA Countywide Format, the assigned Mapping Partner shall submit all date in one TSDN package. If the FIRM will NOT be prepared in the FEMA Countywide Format, the assigned Mapping Partner shall submit a separate TSDN package for

each community for which flood hazard data have been developed. If the flood hazard data developed pertain to more than one community, the assigned Mapping Partner shall submit duplicate copies of those data for the TSDN for each community or shall provide clear, detailed cross-referencing of those data in each TSDN.

[February 2002]

Floodplain Mapping

The assigned Mapping Partner shall provide, in draft format, a neatly compiled "work map" that contains the flood hazard data necessary to produce the Preliminary version of the FIRM. The work map is typically the topographic map used to delineate the updated floodplain boundaries and/or the base map to be used for FIRM production. The assigned Mapping Partner shall submit the work map in digital form unless otherwise approved by the FEMA Lead. The assigned Mapping Partner shall submit the compiled work map (original copy) and/or plots of the digital files as part of the TSDN.

When new photogrammetric mapping and surveying are included in a Flood Map Project, the assigned Mapping Partner shall also use surveying and mapping procedures, within floodplains and adjacent buffer zones, that meet or exceed the National Standard for Spatial Data Accuracy statistical and testing methodology for estimating the positional accuracy of points on maps and in geospatial data, with respect to georeferenced ground positions of higher accuracy, as specified in Appendix A of these Guidelines. The Flood Map Project Scoping process detailed in Section 1.3 and Appendix I of these Guidelines should be carefully reviewed and followed by any Mapping Partner that will be preparing a digital FIRM submission, to clarify the data format requirements and scope of work.

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Whenever possible, the assigned Mapping Partner shall ensure that the work map, which shall be prepared in "FIRM-ready" format whenever possible, complies with the following guidelines:

- Use the same base map that FEMA will use for FIRM production for the base map.
- Use the proposed FIRM panel tiling and numbering scheme. (This tiling applies only to hard copy maps)
- Prepare individual work map panels at the same scale as the FIRM panels.
- Use labels, legends, and notes that are compatible with the FEMA FIRM graphic specifications provided in Appendix K of these Guidelines...
- Submit digital data in a seamless format. (See Appendix L of these Guidelines for details.)
- Where flood hazard data on the existing NFIP map will remain unchanged, the assigned Mapping Partner shall, depending on the assignments made in the Project Scoping document, either (1) incorporate the unrevised flood hazard information in the work map or (2) provide a copy of the effective NFIP map (in lieu of a work map) indicating the unchanged areas.

If the assigned Mapping Partner is not required to prepare the work map in a "FIRM-ready" format, the Mapping Partner may submit the work map as strip maps, covering the revised floodplain areas. At a minimum, the work map must cover all areas with updated flood hazard data. Additionally, planimetric features must be compatible with those shown on the base map to be used for FIRM production.

[February 2002]

Work Map Content

Mapping Partners that prepare work maps shall comply with the following minimum requirements:

- Floodplain and floodway boundaries, cross sections, BFEs, and flood insurance risk zones must be shown. Guidance for BFEs on work maps may be found in Appendix C, Section C.6.3 of these Guidelines. Guidance on developing cross-section data for use on work maps may be found in Appendix A, Section A.4.6 of these Guidelines.

- Planimetric features on the work map must be correctly located with respect to the same features on the base map to be used for FIRM production. The positional differences between the two maps must be within the accuracy specifications for base maps that appear in Subsection 1.4.2.1 and the accuracy specifications for topographic mapping that appear in Appendix A of these Guidelines.

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Mapping Partners shall, at a minimum, show the following information in and near the floodplains on the work map:

- Cross sections used in the hydraulic model;

- Contours showing ground elevations at the contour interval specified in the Project Scoping document;

- Cultural features, such as railroads, airfields, streets, roads, highways, levees, dikes, seawalls, dams and other flood-control structures, and other prominent manmade features and landmarks;

- Up-to-date corporate limits, extraterritorial jurisdiction limits, and boundaries of excluded areas;

- Horizontal reference grid lines (State Plane or Universal Transverse Mercator [UTM]) with appropriate values annotated; and

- Public Land Survey System reference grid (also known as township and range) where present.

Mapping Partners may include, but are not required to show, the following information on the work map:

- Building outlines;
- Topographic spot elevations;
- Property lines; and
- Details of areas outside the corporate boundaries.

Mapping Partners shall ensure that areas shown on the work map that are excluded from the community under study are delineated by a solid line border and labeled "AREA NOT INCLUDED." The name of any excluded areas must also be provided within the appropriate map area. Mapping Partners shall also ensure that the work maps as well as aerial photographs, topographic maps, base maps, community maps, and any other source maps submitted, are properly identified with the following information:

- Title;
- Topographic certification;
- Index of submitted map sheets;
- Community name(s) and state for which the Flood Map Project was performed;
- Six-digit community identification number;
- Date map was prepared and/or published (day, month, year);
- Horizontal datum;
- Vertical datum;
- Control grid (e.g., State Plane or UTM);
- Map scale;
- North arrow;
- Mapping Partner name;
- Name(s) of applicable flooding source(s) covered;
- FIRM panels affected;
- Indication of whether map is one of several maps; and
- Any other relevant information that can assist users in identifying the data.

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Because the work maps will be used to produce the FIRM and will be maintained for future use and reference, the assigned Mapping Partner shall ensure the clarity and durability of the maps.

Mapping Partners shall discard extraneous or duplicate maps; however, if copies are to be retained for record purposes, they must be clearly marked as "void" or "superseded by other material."

[February 2002]

Digital Files of Mapping Information

By structuring and storing its flood hazard data in an intelligent GIS format, FEMA expects to be able to increase the utility and value of these data. Therefore, the Mapping Partner responsible for performing the flood hazard analyses shall submit digital mapping information and supporting data to the FEMA Lead or other Project Team member identified by the FEMA Lead, such as the Mapping Partner responsible for preparing the Preliminary FIS report and FIRM. The draft digital FIS report and FIRM data will support the creation of the preliminary and final digital FIRM GIS database in conjunction with the creation of the Preliminary and final FIS report and FIRM.

To accommodate the large variety of mapping software used by Mapping Partners and the variety of Mapping Partners that draft FIS report and FIRM components, the requirements for producing draft digital FIRM data are flexible. Data may be submitted in a Computer Assisted Drafting and Design data structure or GIS data structure. In addition, a wide variety of data formats are acceptable. However, to facilitate the efficient exchange of digital flood hazard data between FEMA and its Mapping Partners, the submitting Mapping Partner shall ensure that the draft digital FIRM data conform to the specifications in Appendix L of these Guidelines.

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[February 2002]

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Flood Insurance Study Report

Depending on the agreed-upon scope of the Flood Map Project, the Mapping Partner that performs the flood hazard analyses shall prepare and submit a complete draft version of the FIS report reflecting the updated flood hazard data or revised components for inclusion in the existing FIS report. The Mapping Partner shall follow the guidelines provided in the FIS report Data Checklist provided in Appendix J, Section J.1 of these Guidelines. The Mapping Partner that prepares the Preliminary FIS report will use this information.

Material to be submitted shall include Flood Profiles, data tables, and descriptions of the flood hazard analysis methods employed. The draft FIS report submittal shall be prepared in accordance with the format and guidance provided in Appendix J. Flood Profiles are a critical component of the FIS Report; guidance on the production of Flood Profiles is provided in Appendix J, Subsection J.2.3.

[February 2002]

1.4.2.4 Engineering Standards

The following are core engineering standards to be used by all Mapping Partners:

- The 1-percent-annual-chance flood shall be the primary flood event determined and the 1-percent-annual-chance floodplain shall be mapped on a FIRM.

- The flood hazard information shown on a FIRM and in an FIS report, and the hydrologic and hydraulic analyses performed to determine flood hazards, must be based on existing conditions. However, a community may **choose** to include flood hazard information that is based on future conditions on a FIRM and in an FIS report **in addition to** the existing-conditions information. (See Volume C, Section C.8 of these Guidelines for general guidance on the inclusion of future-conditions flood hazard information.)

- The 10-, 2-, and 0.2-percent-annual-chance flood intervals are customary accepted intervals for flood hazard assessments. The 0.2-percent-annual chance floodplain is usually mapped on a FIRM.

- Flood hazard studies must be performed using FEMA accepted computer models. FEMA has approved models for four categories—coastal models, hydrologic models, hydraulic models, and sediment transport models—for nationwide use. A listing of these nationally and locally accepted models is available on the FEMA website at http://www.fema.gov/mit/tsd/en_modl.htm.

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- Locally developed models have been accepted for use within several specific jurisdictions (i.e., Denver's Urban Drainage and Flood Control District). Locally accepted models must meet the requirements of Subparagraph 65.6(a)(6) of the NFIP regulations before they are accepted by FEMA for NFIP purposes. A listing of these nationally and locally accepted models is available on the FEMA website at http://www.fema.gov/mit/tsd/en_modl.htm.

- Calculated discharges for a Flood Map Project (including those determined by regression equations and/or computer models) must be compared to available floodflow-frequency data.

- Regulatory floodways must be developed using standard methodologies.

- Unless otherwise stated during the Project Scoping phase of the mapping process, flood hazards will not be depicted at sites where the drainage area is less than 1 square mile.

- Models must be calibrated to measured profiles, estimated profiles, or reliable high-water marks from observed flood events whenever possible.

- Flood-control structures (e.g., seawalls, levees) must be certified to withstand the designated flood event before they can be credited on the FIRM as providing flood protection. All criteria specified in Section 65.10 of the NFIP regulations and Appendix H of these Guidelines must be satisfied before levees may be credited and mapped as providing protection from the 1-percent-annual-chance flood event.

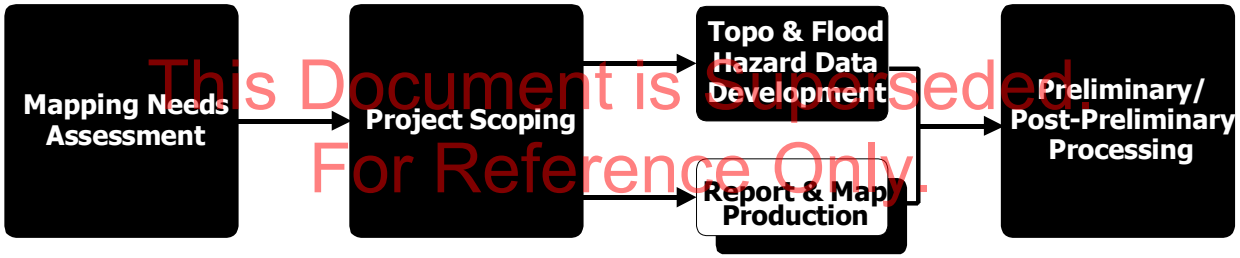
- Cross sections and transects must be reasonably spaced to accurately define the study area.

- Backup material submitted n support of assumptions used in the engineering analyses must be provided with the analyses.

Many of these core standards are detailed throughout these Guidelines. Mapping Partners that wish to deviate from any of these standards and formats must obtain approval from the FEMA Lead.

[February 2002]

1.4.3 Report and Map Production



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The following activities are accomplished during the Report and Map Production subphase of the Flood Map Project.

- Base map acquisition and preparation;

- FIRM compilation, which entails setting up the final FIRM format (scale, orientation, and panel scheme) and compiling existing flood hazard data (in manual or digital form) from the effective NFIP map and fitting it to the new or updated base map to meet current FIRM specifications;

- Merging of revised and effective flood hazard data into a seamless dataset;

- Research and summary regarding LOMCs issued previously for affected FIRM panels;

- Preparation of required news releases and legal notices;

- Preparation of new or revised FIS report, including Flood Profiles and supporting tables;

- Preparation of new or revised FIRM panel(s); and
- Development of digital FIRM database for digital FIRMs.

[February 2002]

1.4.3.1 Base Map Acquisition and Preparation

All Flood Map Projects that will result in a digital FIRM require a digital base map that reflects reference features (roads, streets, hydrographic features, political jurisdiction boundaries) needed by users to locate properties on FIRMs. The Project Scoping process will identify the base map to be used and assign the Mapping Partner responsible for obtaining the base map for use by FEMA for FIRM production.

Early coordination with all communities affected by a Flood Map Project is an important part of the Project Scoping Process described in Section 1.3 of these Guidelines. The Mapping Partner responsible for preparing the Preliminary FIRM shall send a letter to each affected community that:

- Describes the FIRM product;
- Requests pertinent information (pertinent information that is requested includes base map data; a current corporate limits map; elevation data [either electronic or hardcopy] and any engineering information that needs to be updated or added to the FIRM);
- Describes the minimum requirements for the submittal of data to be included in the new FIRM product, and
- Identifies the base map source that will be used if community data are not available or suitable.

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[February 2002]

Base Map Choice Priorities

Base map data to be used in producing a digital FIRM are prioritized as follows:

1. Base map data that are supplied by communities or other non-Federal sources (e.g., State or regional agencies) and meet FEMA criteria are the first choice for digital FIRM production. These files may be in either vector or raster format. If both are available, vector data are preferable due to the ease of their use, their file size, and their lower printing cost. However, community preferences are taken into account when making this choice.
2. USGS DOQs are the second choice and the default base map if suitable community data are not available.

If neither suitable community base map data nor USGS DOQs are available for a county scheduled for digital FIRM production, FEMA will provide the community with information on base map sources, including information on partnering with USGS to initiate DOQ production for that county. DOQ production normally takes 12 to 14 months, so coordination with USGS must be initiated with that time frame and the digital FIRM production schedule in mind.

Digital FIRM road and railroad names are derived from community-supplied files or hardcopy sources, effective FIRM panels, and/or U.S. Bureau of the Census Topologically Integrated Geographic Encoding and Reference System (TIGER) files. Road names are needed regardless of which base map source is chosen for digital FIRM production.

[February 2002]

Minimum Standards for Community-Supplied Data

For FEMA to use community-supplied base map data instead of USGS DOQs for new digital FIRM production, minimum standards for resolution, horizontal accuracy, vertical accuracy, horizontal reference system, data sources, currency, coverage, availability, restrictions on use, required and optional contents, thematic separation of data, file format and transfer media, tiling, data structure, and metadata must be met. These minimum requirements are summarized below.

[February 2002]

Resolution

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The minimum resolution requirement for raster data files is 1-meter ground distance. Higher resolution data are also acceptable.

[February 2002]

Horizontal Accuracy

The National Standard for Spatial Data Accuracy (NSSDA) is used to report the horizontal accuracy of the base map data used by FEMA to produce a FIRM. The NSSDA uses radial accuracy ($Accuracy_r$) to report the radius of a circle of uncertainty, such that the true or theoretical location of a point falls within that circle 95 percent of the time. The minimum horizontal positional accuracy for new FIRM base map data is that of the default base map – the USGS DOQs, which have an NSSDA radial accuracy of 38 feet. Data that meet higher accuracy standards are also acceptable. $Accuracy_z$ of 38 feet is the same as radial root mean square error (RMSEr) of 22 feet.

[February 2002]

Vertical Accuracy

For hilly terrain, where 4-foot contours are considered acceptable for hydraulic modeling, digital elevation data must have vertical accuracy ($Accuracy_z$) of 2.4 feet (i.e., vertical root mean square error (RMSEz) of 1.2 feet). In moderate to flat terrain, where 2-foot contours are required to

accurately determine 1-percent-annual-chance flood elevations and floodplain boundaries, the digital elevation data must have $Accuracy_z$ of 1.2 feet (i.e., RMSEz of 0.6 foot).

According to the NSSDA, which replaced the National Map Accuracy Standards of 1947 for digital mapping products, $Accuracy_z$ defines vertical accuracy at the 95-percent confidence level. This means that the true or theoretical location of a point falls within ± of that linear uncertainty value 95 percent of the time. $Accuracy_z = RMSE_z \times 1.9600$, where $RMSE_z$ is the square root of the mean of the squared errors in elevations of check points used to evaluate the vertical accuracy of a digital dataset.

[February 2002]

Horizontal Reference System

The files must be georeferenced to a known projection and datum and be accompanied by information that describes those parameters.

[February 2002]

Data Sources

Community-supplied data may be in the form of digital orthophotos or vector data files. Locally produced digital orthophotos may be at larger scales and higher resolution than USGS DOQs, but they must meet USGS DOQ standards at a minimum. Aerial images that are not ortho-rectified are not acceptable. Vector files may be photogrammetrically compiled or digitized from orthophotos. Unacceptable vector file sources include TIGER files or other files compiled at scales smaller than 1:20,000.

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[February 2002]

Currency

The data must have been created or reviewed for update needs within the last 7 years.

[February 2002]

Coverage

Complete and integrated data for an entire county are preferred. If only portions of a county are available, FEMA may choose to use the default base map source (USGS DOQs) for the county.

[February 2002]

Availability

The data must be available at the time of the initial coordination contact and must be sent within 30 days of receipt of FEMA's request.

[February 2002]

Restrictions on Use

FEMA must be able to print and distribute an unlimited number of hardcopy maps using the data. FEMA must also be able to distribute the base map data and floodplain information freely to the public. Conversion of vector base map data to a raster format for distribution is an option if this satisfies community concerns over release of proprietary data.

[February 2002]

Required Contents

The files must contain all transportation features (e.g., roads, railroads, and airports) in the community. If DOQs are supplied, these features must be clearly visible. If vector files are supplied, they must also contain transportation features. Roads are considered to be those travelways intended and maintained for use by motorized vehicles. In vector format, roads may be portrayed as road centerlines or edges of pavement.

The USGS DOQs or community-supplied transportation features shall be augmented with the following vector data if available:

- Hydrographic features, including streams, rivers, lakes, and shorelines;
- Current political boundaries, including those that define the county, corporate limits, extraterritorial jurisdictional areas, military lands, and Native American lands;
- Parks or forest lands, if applicable;
- Range, township, and section lines, if applicable; and
- Feature names for all of the above features that have names. These may be provided as annotation/text features or as attributes.

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[February 2002]

Optional Contents

The following features shall be included, if available:

- Bridges;
- Unimproved roads or trails (i.e., those travelways not intended for motorized vehicles or not usually used by motorized vehicles due to width or seasonal conditions);
- Flood-control structures (levees, dams, weirs, floodwalls, or jetties);
- Elevation data in the form of contours and spot elevations, DEM or DTM data, a Triangulated Irregular Network, or mass points and break lines;
- Building footprints;

- Parcel outlines or parcel centroids; and
- Mass points and break lines and the resulting data that are derived from them, if available.

[February 2002]

Thematic Separation of Data

Thematic data must be separated by level, layer, attribute, or file.

[February 2002]

File Format and Transfer Media

The file format and transfer media requirements provided in Appendix L of these Guidelines must be met.

[February 2002]

Tiling

One single file or a series of thematic files that cover the entire geographic area of the community are preferred to individual small tiles that cover limited geographic areas.

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[February 2002]

Data Structure

Vector data files must meet the data structure requirements provided in Appendix L of these Guidelines.

[February 2002]

Metadata

The files must be accompanied by metadata that comply with the Federal Geographic Data Committee metadata standards.

[February 2002]

1.4.3.2 Flood Insurance Rate Map Compilation

The Mapping Partner responsible for the production of the Preliminary FIS report and FIRM shall normally conduct the FIRM compilation process. This process shall normally occur concurrently with the preparation of new or revised flood hazard analyses.

The compilation process includes determining FIRM scale, layout and paneling scheme, digitizing effective floodplain and regulatory floodway information, and fitting the effective floodplain regulatory floodway information to the new base map.

[February 2002]

Map Scale Selection

The scale to be used for the development of the Preliminary FIS should be coordinated during the Scoping Meeting with the FEMA Lead, FEMA's Mapping Partners, and the community/county prior to compilation of the maps.

Existing FIRM scales should be reviewed and, where appropriate, either the same map scales or a compatible map scale should be used for the Mapping Partner draft work maps. Existing small-scale FIRM panels are often remapped at larger scales to accommodate detailed floodplain mapping with narrow floodplains and/or floodways.

To accomplish this at a reasonable cost, FEMA will photo-enlarge the existing base map artwork to be used as-is for the revised FIRM. For example, one panel of an existing FIRM at a scale of 1" = 1,000' may need to be photo enlarged by the review Mapping Partner 200 percent to create four, 1" = 500' scale panels due to the narrowness of the new floodplain delineations. If the existing FIRM is at the scale of 1" = 1,000', the Mapping Partner should prepare the work maps at 1" = 1,000' (or 1" =5 00' if the floodplains are narrow). If a work map scale of 1" = 400' was used by the Mapping Partner, FEMA would either photo-reduce the work maps to match the existing FIRM base materials or redraft the entire FIRM to match the work map scale. Older, manually produced FIRMs may have been prepared with different map scales (e.g., 1” = 200’, 1” = 400’. 1” = 800’). Manual revisions of those panels may retain their existing scales.

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[February 2002]

Paneling/Tiling Scheme

During the Scoping Meeting for a Flood Map Project, the paneling scheme and scale of mapping used for data capture and work maps shall be determined. The FIRM paneling scheme shall follow that used by USGS for the 7.5-minute quadrangle series, or subdivisions thereof depending on the scale of the FIRM. Map panels shown at 1” = 2,000’ are tiled using the same neatlines as the corresponding USGS 7.5-minute quadrangles. Map panels shown at 1” = 1,000’ are tiled using neatlines that correspond to USGS DOQs or 3.75-minute quarter-quadrangles. Map panels shown at 1” = 500’ are tiled using neatlines that correspond to USGS 1.875-minute quarter-quarter-quadrangles.

The quadrangle tiles shall generated using the horizontal datum of the base map. If the base map is in NAD83, the quad grid shall be generated in NAD83 and projected to match the coordinate system of the base map.

[February 2002]

Guidelines for Conversion to Quad Tiling for Small Communities

When small jurisdictions that were formerly shown on one or a few FIRM panels now fall on significantly more panels as a result of quad-based tiling, the paneling scheme can be modified from strictly quad-based. If conversion to a quad paneling layout would double the panel count,

or if the FIRM was formerly shown as an Only Panel Printed and the quad layout necessitates creation of a FIRM Index, a modified paneling scheme may be used.

[February 2002]

North Orientation

All digital FIRMs must be oriented so that grid north points to the top of the map sheet. Older manual FIRMs may have been prepared with a different north orientation. Manual revisions to those panels may retain their existing north orientation.

[February 2002]

Rotation

The FIRM data do not need to be rotated to align exactly to the map border. The slight tilt inherent in the data as the panels move farther away from the central meridian is acceptable.

[February 2002]

Coordinate System and Horizontal Datum

A standard coordinate system and horizontal datum for all FIRMs is preferred so that they can be easily referenced to each other. Additionally, FEMA's goal is to maintain nationwide FIRM datasets in a central online repository and maintenance of the digital FIRMs in a common coordinate system and horizontal datum facilitates this as well.

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The preferred coordinate system for FIRMs is UTM referenced to NAD83. This coordinate system and horizontal datum are most commonly used by USGS for DOQs. FIRMs may be prepared in other coordinate systems and horizontal datums if necessary. This situation primarily applies to studies that use a raster base map supplied in a coordinate system other than UTM NAD83. Raster base map data are not reprojected if at all possible, since this operation is so time consuming. The FIRM vectors are projected to fit the raster base map data.

[February 2002]

Map Insets

All geographic areas shown on FIRMs must be created and maintained in real-world coordinates. Map insets a generally shall not be used in preparing FIRMs because of this requirement. Narrow, extensive areas around the perimeter of a jurisdiction may be added to existing, adjacent map sheets as overedge areas, if space permits. Larger areas may require a separate map panel.

[February 2002]

Panel Numbering

After the map scale(s) and layout for a community have been established, the map panels are numbered. FIRMs use a panel numbering sequence that relates panel number to map scale.

Panels shown at 1” = 500’ use numbers divisible by 1; panels at 1” = 1,000’ use numbers divisible by 5 (excluding those divisible by 25) and panels at 1” = 2,000’ use numbers divisible by 25. Table 1-5 further illustrates the numbering sequence corresponding to the various map scales.

Table 1-5. Panel Numbering Sequence

Map Scale	Panel Numbers
1” = 500’	1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, etc.
1” = 1,000’	5, 10, 15, 20, 30, 35, 40, 45, 55, 60, 65, 70, etc.
1” = 2,000’	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, etc.

[February 2002]

Single-Scale Flood Insurance Rate Maps

Single-scale FIRMs are those in which all panels within the community or county are printed at the same scale. The panel numbering follows sequentially from left to right and from top to bottom according to the scale. Figure 1-5 contains an example of a FIRM with all panels shown at a scale of 1” = 500’.

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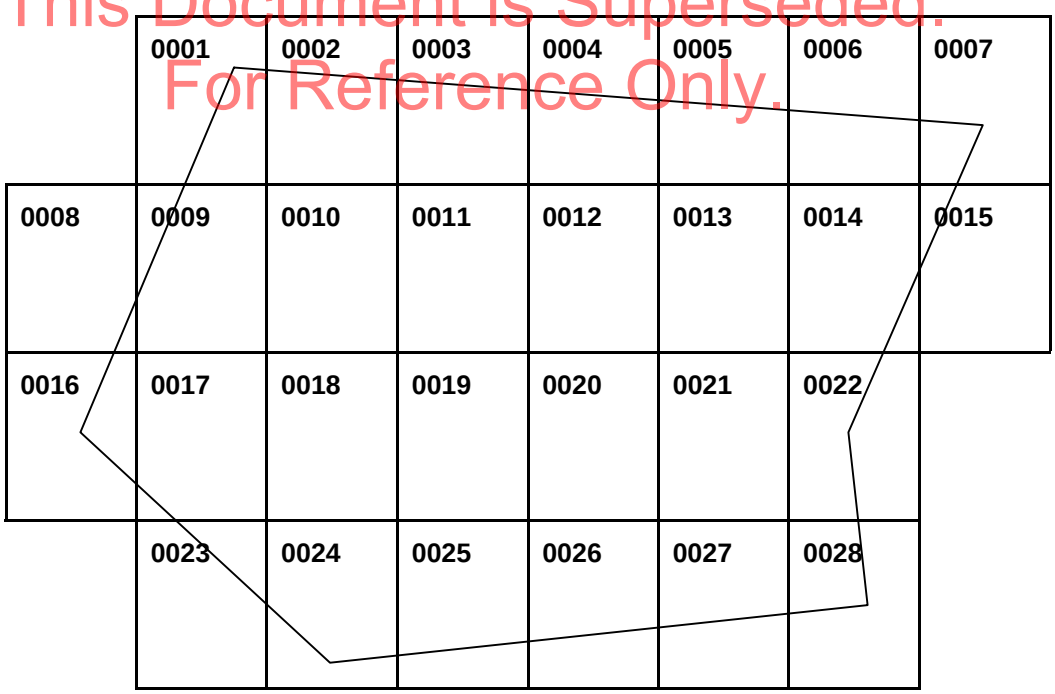

Figure 1-5. Single-Scale Panel Numbering Scheme (1” = 500’)

[February 2002]

Multiple-Scale Flood Insurance Rate Maps

Multiple-scale FIRMs are to be numbered based on a logical breakdown of USGS 7.5-minute series quadrangle sheets. To accomplish this, the Mapping Partner may envision a USGS quadrangle as having 16 possible subdivisions, with the smallest block being a 1” = 500’ scale segment and the largest block being the entire quadrangle at a scale of 1” = 2000’.

Beginning with the first small-scale map panel, the four large-scale map panels that lie within the grid layout of the larger “parent” panel are numbered sequentially from left to right and top to bottom. The associated small-scale map panel is numbered sequentially after the four large-scale panels the area of which it duplicates (i.e., panel 0025 covers the same geographical area as panels 0005, 0010, 0015, and 0020 combined). This numbering system is continued in a similar manner to the numbering system for single-scale maps; that is, the next number series would be 0030, 0035, 0040, and 0045 for the larger-scale panels, followed by 0050 for the smaller-scale panel. Figure 1-6 illustrates this system. Figure 1-7 contains an example of a FIRM with panels shown at different scales.

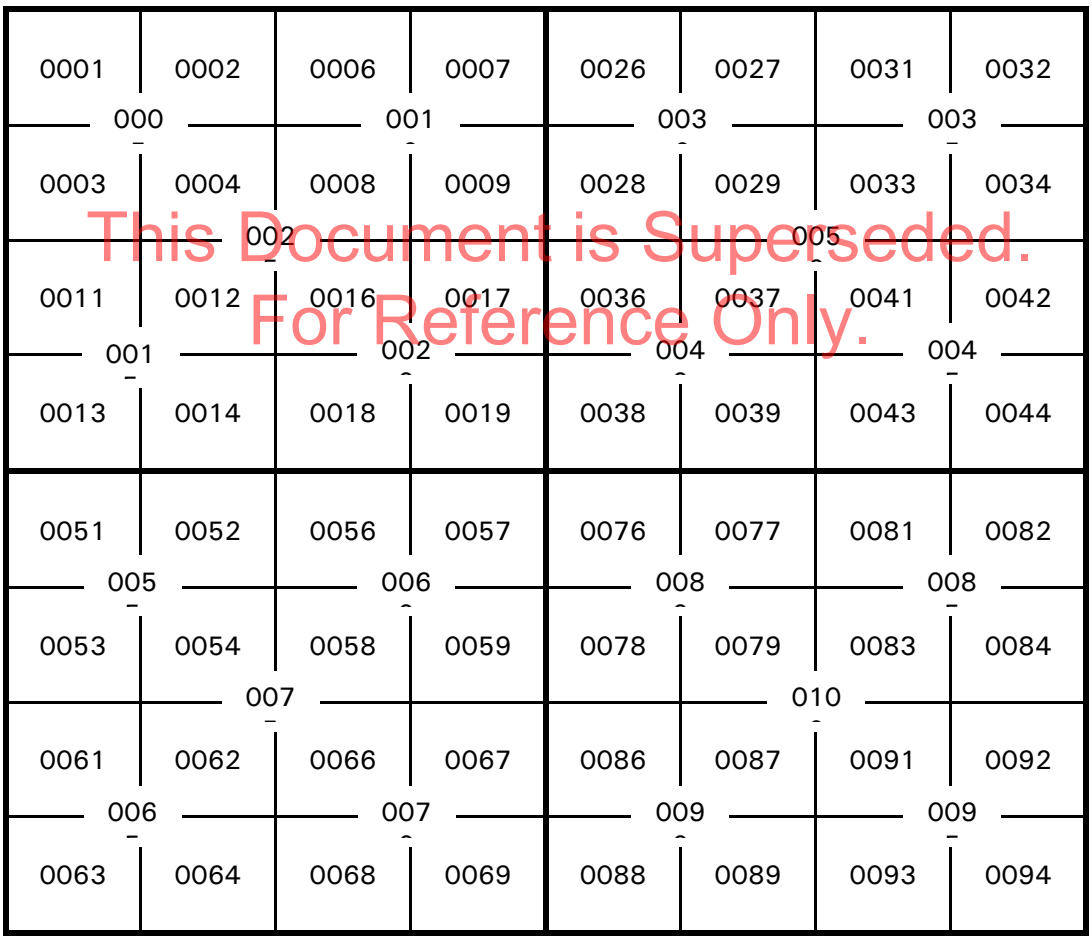

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Figure 1-6. Multiple-Scale Panel Numbering Scheme

(Heavy lines indicate USGS 7.5-minute quadrangle neatlines)

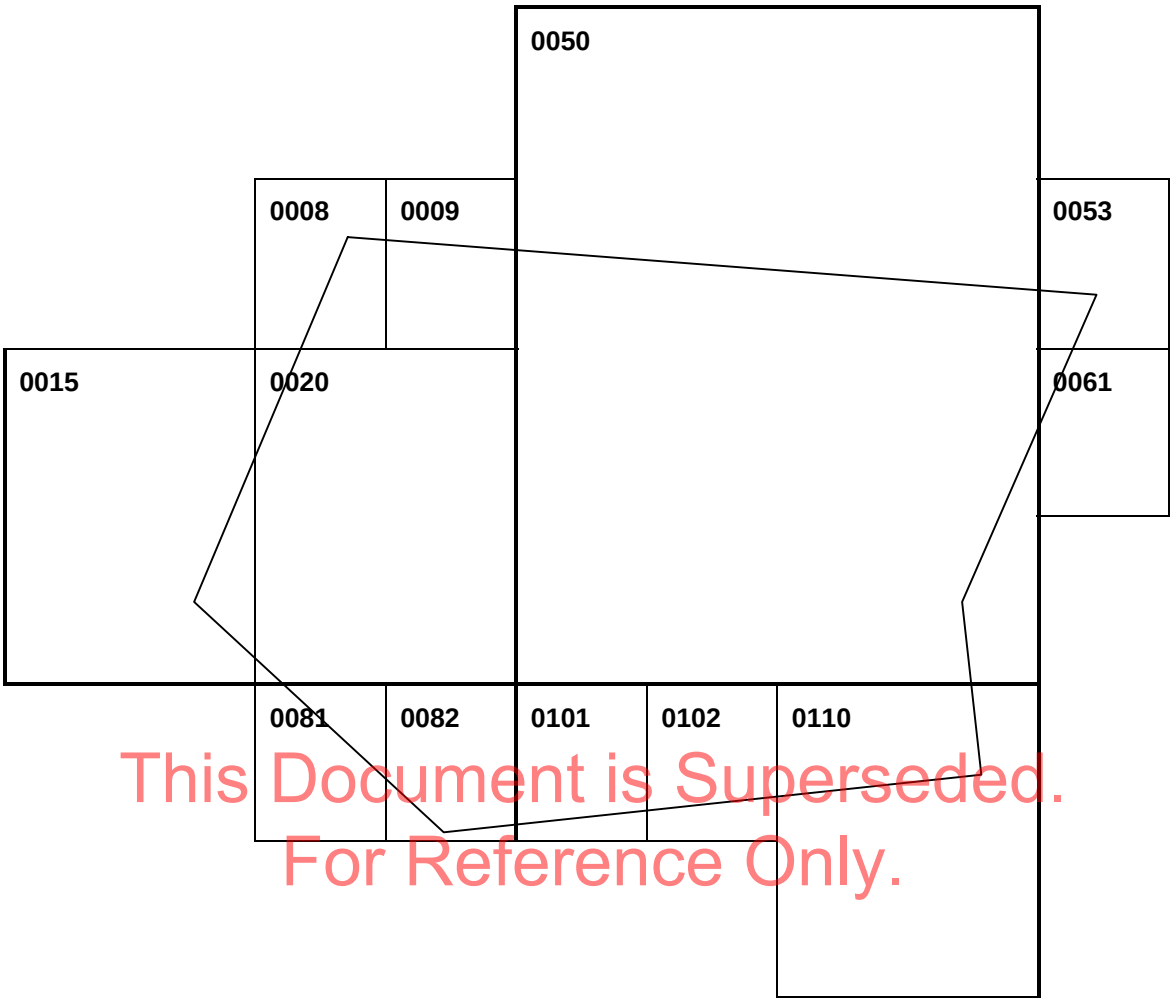

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Figure 1-7. Multiple-Scale Panel Numbering Scheme

(Heavy lines indicate USGS 7.5-minute quadrangle neatlines)

[February 2002]

Digitization and/or Enhancement of Effective Floodplain Boundaries

This phase of the FIRM production process focuses on digitizing and/or enhancing the effective, unrevised flood hazard information to meet FEMA's mapping specifications. This stage in the development of the Preliminary FIRM is often where existing flood hazard information that is not being restudied is transferred from the effective FIRM (and, in some cases, FBFM) onto a newer and/or community base map. This process does not require new or updated flood hazard analyses or topographic information for the identified flooding sources on the effective FIRM. Appendix C, Subsection C.6.1 of these Guidelines provides details on the protocol for the transfer of effective flood hazard data onto a new or updated base map source.

[February 2002]

1.4.3.3 Merging Revised and Effective Flood Hazard Data

The focus of this stage of map production is to merge the revised flood hazard information together with the effective flood hazard information to construct the Preliminary FIRM. All supporting information in the effective FIS report also must be merged with the new/revised flood hazard data resulting from the Flood Map Project.

[February 2002]

Seamless Data

The designated Mapping Partner shall ensure that the effective and new or revised flood hazard data are compiled into a seamless data with no discontinuities. All inconsistencies between new/revised flood hazard data and unrevised/effective flood hazard data must be identified during the Project Scoping phase and resolved as appropriate in consultation with the FEMA Lead before work commences. The Mapping Partner responsible for the flood hazard data development shall ensure that revised flood hazard data ties in reasonably well to the effective floodplain data. The potential mismatches should have been identified during the scoping phase and addressed at that time. Any problematic residual tie-in issues shall be brought to the attention of the FEMA RPO and/or PO.

[February 2002]

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Countywide Format Issues

During the initial creation of a countywide FIS report and FIRM, the Mapping Partner that creates the Preliminary FIS report and FIRM shall ensure that flood hazard data originating from formerly community-based FIRMs are properly merged. This will require the following:

- Flood Profiles for streams crossing corporate limits shall be combined into one seamless set. Any identified discontinuities shall be addressed and resolved. Accordingly, data tables in the FIS report shall reflect a continuous dataset for each detailed flooding source.
    - Cross sections shall be re-lettered as appropriate to ensure continuity from the downstream beginning of the detailed study to the upstream limit of detailed study.
    - Differences in stream names crossing through different communities shall be addressed and resolved.
    - Differences in flood hazard data across corporate limits of adjacent jurisdictions shall be identified and resolved.
    - Gaps or overlaps in aerial coverage shall be identified and resolved.

[February 2002]

Areas Not Included

The following is a brief summary of the protocol to follow when the designated Mapping Partner encounters an "Area Not Included" during the preparation of the Preliminary FIRM; additional guidance is provided in Appendix K of these Guidelines.

An Area Not Included is defined as an area excluded from the mapping of the subject community because (1) it is under the jurisdiction of another community and is mapped on the FIRM for that community, or (2) access to the area is limited due to security reasons (e.g., military installations). The assigned Mapping Partner shall submit any available flood information within these areas. The decision for depicting the information on the FIRM is the responsibility of the FEMA Lead.

Areas subject to Federal or State jurisdiction (e.g., parks, national forests, game reserves, certain military bases) shall normally be included on the FIRM. When the assigned Mapping Partner encounters an area such as these, the FEMA Lead shall be consulted for guidance. The Mapping Partner may be requested to assess and delineate SFHAs in these areas using available source maps, such as USGS floodprone area quads. Where existing SFHA delineations on an effective FIRM are terminated at the boundary of an improperly excluded area, the FEMA Lead may request that the Mapping Partner responsible for the flood hazard analyses use detailed topographic mapping to extrapolate floodplain boundaries through the subject area.

[February 2002]

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1.4.3.4 Summary of Map Action Preparation

To assist communities in maintaining the NFIP maps, particularly the FIRM, the Mapping Partner responsible for preparing the Preliminary FIS report and FIRM shall prepare summaries of the LOMAs, LOMR-Fs, and LOMRs that will be superseded when the revised FIRM panels become effective. FEMA provides these Summaries of Map Actions (SOMAs) to the communities at significant milestones during the processing of a Flood Map Project that results in a physical update to the FIRM to make the affected communities aware of the effect the revised FIRM panels will have on previously issued LOMAs, LOMR-Fs, and LOMRs.

To ensure the modifications made by LOMAs, LOMR-Fs, and LOMRs are included in a physical map update, the assigned Mapping Partner shall perform searches for determinations at four stages: (1) before the Preliminary copies of the affected FIRM panel(s) are prepared and sent to the community for review and comment; (2) before Revised Preliminary copies of the affected FIRM panel(s) are prepared and sent to the community for review and comment; (3) before the Letter of Final Determination (LFD) letter is sent to the community; and (4) before the effective date of the revised FIRM panels.

At each stage, the assigned Mapping Partner shall sort the LOMAs, LOMR-Fs, and LOMRs into the following categories:

- Category 1 includes those LOMAs, LOMR-Fs, and LOMRs for which the results have been shown on the revised FIRM panel(s).

- Category 2 includes those LOMAs and LOMR-Fs for which the results could not be mapped and shown on the revised FIRM panel(s) because of scale limitations or because the affected areas were determined to be outside the SFHA as shown on the effective FIRM. These LOMAs and LOMR-Fs are automatically revalidated after the revised FIRM panel(s) become(s) effective.

- Category 3 includes those LOMAs, LOMR-Fs, and LOMRs for which the results have not been, and will not be, reflected on the revised FIRM panel(s) because the flood hazard information on which the original determinations were based is being superseded by new flood hazard information.

- Category 4 includes those LOMAs, LOMR-Fs, and LOMRs for which new determinations must be made. LOMAs and LOMR-Fs that were previously issued for multiple lots or structures where the determination for one or more of the lots or structures has changed as a result of the re-mapping cannot be revalidated through the revalidation process. The assigned Mapping Partner shall use the data submitted in support of the original LOMA or LOMR-F request to make a new determination after the revised FIRM becomes effective. A single new determination letter is issued for the subject properties.

During the preparation of the Preliminary copies of the FIRM (and FBFM, if required), the activities below shall be completed. Additional information on SOMA production procedures is provided in Section 10 of *Document Control Procedures Manual* (FEMA, 2000).

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- The designated Mapping Partner shall produce a Preliminary SOMA by generating a report of LOMAs, LOMR-Fs, and LOMRs completed or pending for the community.

- The designated Mapping Partner shall review the in-house LOMA, LOMR-F, and LOMR case files, other community-based files, hard copies of LOMAs and LOMR-Fs completed by the ROs, and case files for LOMAs, LOMR-Fs, and LOMRs completed by the designated Mapping Partner to ensure all affected LOMAs, LOMR-Fs, and LOMRs are identified and listed on the SOMA. LOMAs, LOMR-Fs, and LOMRs that have already been superseded by a previous map (i.e., its determination date is prior to the current effective FIRM date) will not be investigated for inclusion on the SOMA.

- The designated Mapping Partner shall review each identified LOMA, LOMR-F, and LOMR to determine whether it has been affected by new flood hazard information and if it can be incorporated into the FIRM. Those LOMAs, LOMR-Fs, and LOMRs that are unaffected by the new flood hazard information and can be reflected on the FIRM are listed in Category 1 of the SOMA. Those LOMAs, LOMR-Fs, and LOMRs that cannot be reflected on the FIRM but are unaffected by the updated flood hazard information are listed in Category 2 of the SOMA.

- For the remaining LOMAs and LOMR-Fs, the designated Mapping Partner shall review the case files to determine whether the LOMA or LOMR-F can be revalidated.

To determine this, the designated Mapping Partner shall perform the following activities:

- Locate the LOMC site on the Preliminary FIRM;
- Determine the proposed BFE for the site; and
- Compare the Lowest Adjacent Grade (LAG), or the lowest ground elevation of undeveloped lot(s) to the proposed BFE at the site.
- If the LAG(s) or lowest ground elevation at the site is above the proposed BFE, the designated Mapping Partner shall include the LOMA or LOMR-F in Category 2 of the SOMA, because it may be eligible for revalidation once the proposed BFEs are finalized. LOMAs and LOMR-Fs issued for properties with a LAG(s), LFFE(s), or lowest ground elevations below the BFE may be superseded and therefore may be included in Category 3 of the SOMA.
- As noted above, LOMCs are revalidated by a single letter, the LOMC-Valid letter; therefore, the designated Mapping Partner shall include the LOMAs and LOMR-Fs issued for multiple structures or lots where the determinations for the lots/structures are no longer as they were for the original determination in Category 4 of the SOMA.
- The designated Mapping Partner shall distribute the draft SOMA with the transmittal letter that accompanies the Preliminary copies.
- If no LOMAs, LOMR-Fs, and LOMRs have been issued since the affected FIRM panel(s) became effective, the designated Mapping Partner prepare a SOMA that indicates that there are no LOMCs involved with the subject Flood Map Project. In addition to this, an explanatory paragraph shall be included in the Preliminary transmittal letter to acknowledge this fact.

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1.4.3.5 Incorporation of Letters of Map Change

The Mapping Partner responsible for preparing the Preliminary FIS report and FIRM shall ensure that previously issued LOMAs, LOMR-Fs, and LOMRs are incorporated into the new FIS report and FIRM where new or revised flood hazard information do not supersede the determination made by the LOMC. The designated Mapping Partner shall include the outline of the areas covered by LOMCs with the submitted FIRM information. Guidance on the data formats and attributes for these features are provided in Appendix L of these Guidelines.

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1.4.3.6 News Release Notice Preparation

During the processing of a new or revised FIRM, a News Release notice is required for each community for the purpose of proposing new or revised 1-percent-annual-chance flood elevations. The News Release is critical in the initiation of the statutory 90-day appeals process.

The designated Mapping Partner must therefore prepare a News Release notice for publication that lists all new or revised BFEs appearing on the FIRM. The publication of the News Release Notice shall be in accordance with the specifications noted in Section 1.5 and the regulations found at Section 67.3 of the NFIP Regulations.

The News Release Notice is intended to:

- Provide the community information on proposed BFEs;
- Direct citizens to review the Preliminary FIS before the study becomes effective;
- Provide property owners awareness of proximity to detailed study 1-percent-annual-chance floodplains;
- Inform citizens where they can view or obtain copies of the preliminary and effective FIS report and FIRM; and
- Provide a complete list of studied and/or revised flooding sources and the proposed BFEs (lowest and highest) for each flooding source.

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The following are guidelines that shall be used to prepare a News Release Notice:

- List the extreme BFEs (lowest and highest, rounded to the nearest whole foot) for new or revised flooding sources.
- List only one elevation for a given location.
- Never list a range of elevations for a given flooding source (i.e., 426 to 532 or 426-532).
- List the lowest (downstream) elevation and description of the location first, then the highest (upstream) and its location.
- Provide the latitude and longitude (if possible) for each referenced elevation.
- Use the Flood Profile to determine the proposed BFE whenever possible.
- For flooding sources not be represented by Flood Profiles, determine the flood elevations from supporting data tables in the FIS report or from the FIRM. For a coastal flooding source, the lowest BFE will likely be determined from a Zone AE area and the highest from a Zone VE area.

- For Zone AO (an area of shallow flooding with depths between 1 and 3 feet), show the depth as "#1", "#2", or "#3"

- For Zone AH, an area of shallow flooding with a BFE, shown the BFE as *(BFE number).

- For proposed BFE revisions, the location and elevation listed for the proposed revised elevation shall be at the point where there is only a one foot (rounded to the nearest whole foot) difference between the effective and the revised elevations. Exceptions are when the revision limits are at the corporate limits, Limit of Detailed Study, or stream confluence, or for any coastal flooding sources. For proposed revisions to existing BFEs, when determining the lowest and highest revised BFE value, it is important to note that the difference between effective and revised elevations may be as little as 0.1 foot. For example, an effective elevation of 55.4 (which rounds to 55) is revised to an elevation of 55.5 (which rounds to 56). Conversely, an effective elevation of 55.5 and revised elevation of 56.4 both round to 56; therefore this is not considered a changed elevation.

- If the Flood Profile for a detailed study tributary of a revised flooding source has been revised solely due to the backwater effects from that flooding source, entries for lowest and highest elevation change entries may be necessary on the News Release. The following guidelines shall be followed in this case.

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- The tributary requires its own News Release entries if the effects of the backwater extend more than 500 feet upstream of the tributary's confluence with the flooding source.

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- If the backwater effects are less than 500 feet, the entries for the flooding source will cover the backwater elevations of the tributary. No separate entries are necessary.

- Follow the guidance below for the listing of location reference points on a News Release Notice:

  - Points shall be reflected on the Flood Profile.

  - Avoid using arbitrary points or points with no definite name (i.e., Unnamed or Access Road).

  - "Limits of Detailed Study" may be used only if it is the nearest point on the Flood Profile for 2 or less miles and it can be referenced to a stable point such as the confluence with the main flooding source or a named structure.

  - Convert the measured distance to miles (rounded to the nearest 1/10 mile) when the measured distance exceeds 2,000 feet Avoid referencing points that are great distances (more than three miles) from the subject elevation.

  - Describe distances as "approximately (measured distance) upstream/downstream of."

- Describe locations in close proximity (less than 50 feet) to a structure as "upstream side of" or "downstream side of."

- Reference Zone AO or AH shallow flooding areas by the surrounding streets. For example: "Between Jones Road and Main Street" and "300 feet north of Jones Road and 500 feet west of Main Street."

- Relate the coastal elevation reference points to a point on the shoreline. Flooding areas affected by a single elevation such as with a lake can be referenced as the entire shoreline.

The Sample Base Flood Elevations Worksheet in Figure 1-8 is provided as a guide for the Mapping Partner preparing the News Release.

Flooding Source(s)	**Location of Referenced Elevation**	**Latitude** (optional)	**Longitude** (optional)	**BFE (NGVD)**	
				Effective	**Proposed**

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Figure 1-8. Base Flood Elevations Worksheet

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1.4.3.7 Countywide News Release Notice

The Mapping Partner responsible for preparing the Preliminary FIS report and FIRM shall prepare a single News Release for communities covered by a FIRM prepared in the FEMA Countywide format. This News Release will then be published in the appropriate local newspaper(s) to initiate the 90-day appeal period for each community. The Countywide News Release will provide a listing for each stream that has proposed BFE changes at any location within the subject county, and will include a column to indicate the communities affected by the new or revised flood elevations.

There are four distinct situations that will necessitate a news release entry for a stream in a countywide format FIRM. These situations are as follows:

- The subject stream has either been restudied or is newly studied within the county.

- The subject stream was studied by detail methods in adjacent communities within the county, but the former community-based FIRMs do not exhibit a seamless match of BFEs across community boundaries. In this situation, one of the two mismatched datasets must be adjusted to agree with the one that is considered to be the most

recent and accurate. The revised BFEs shall be listed on the Countywide News Release and the affected jurisdictions will be noted appropriately.

- The subject stream has been studied by detail methods in one community but has either not been studied or has been studied by approximate methods in an adjacent community. The former Zone A floodplain must be converted to a detailed Zone AE with BFEs, thereby necessitating a News Release entry.

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- The floodplain for a detailed-study stream has been extended into an adjacent community to achieve a seamless match across jurisdiction boundaries. This scenario may occur even if the subject stream does not physically lie in the affected jurisdiction, but its associated floodplain extends across jurisdiction boundaries.

- The sample Countywide Base Flood Elevations Worksheet in Figure 1-9 is provided as a guide for the Mapping Partner preparing the countywide format News Release.

Flooding Source(s)	**Location of Referenced Elevation**	**Latitude** (optional)	**Longitude** (optional)	**BFE (NGVD)**		**Communities Affected by the Proposed BFEs**
				Effective	**New/ Revised**	

Figure 1-9. Countywide Base Flood Elevations Worksheet

[February 2002]

1.4.3.8 Preparation of the Preliminary Flood Insurance Study Report

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The Mapping Partner responsible for preparing the Preliminary FIS report shall incorporate any corrections resulting from the technical review, coordinating such revisions with the Mapping Partner responsible for performing the analyses, the FEMA Lead, and other Project Team members. When required, the designated Mapping Partner shall prepare the FIS report in final form in accordance with the requirements and specifications provided in Appendix J. Preliminary copies and, if necessary, Revised preliminary and proof copies of the FIS report shall be distributed to the affected community or communities at each of the processing stages.

During the preparation of the Preliminary FIS report, the designated Mapping Partner shall also develop and process the SOMc and the News Release of new and revised flood elevations.

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1.4.3.9 Preliminary Map Specifications and Standards

The designated Mapping Partner shall prepare the Preliminary FIRM in accordance with the specifications provided in Appendix K, Section K.1 of these Guidelines. The formats described in Appendix K include Digital, Map Initiatives, Partial Map Initiatives, Countywide, Single-Jurisdiction, FIRM and FIS Report Combinations, FIRM/FBFM (Standard), and Manual.

[February 2002]

Mapping and Flood Insurance Risk Zone Standards

While unique themes and presentation formats may be coordinated with FEMA on a case-by-case basis, there are specific core mapping standards and components that must be followed in preparing FIS reports and FIRMs.

Many of these standards are detailed throughout these Guidelines. Mapping Partners that wish to deviate from any of these core mapping standards and formats must coordinate an exception directly with the FEMA and the other Project Team members.

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Mapping Standards

A list of Core Mapping Standard components to be used by all Mapping Partners is as follows:

- The 1-percent-annual-chance floodplains (the national standard) will be mapped on the FIRM.
- Whole-foot BFEs will be shown within detailed-study floodplains; exceptions to this are made where BFEs are expressed in metric increments such as Puerto Rico.
- The 0.2-percent-annual-chance floodplains will be on the fringe of detailed-study 1-percent-annual-chance floodplains when available.
- Regulatory floodways will be mapped within the 1-percent-annual-chance floodplain and must meet the minimum standards outlined in Paragraph 60.3 (d) (3) of the NFIP regulations.
- Stream channel boundaries or centerlines must stay within the identified 1-percent-annual-chance floodplain; if a regulatory floodway is developed, the stream must stay within the regulatory floodway boundaries.
- For detailed-study streams, cross sections must be shown to represent the riverine hydraulic analysis.
- Transects must be shown to represent the coastal hydraulic analysis.
- Flood insurance risk zone labels must be present on the FIRM for each zone.
- “Flood Insurance Rate Map” will be the official name appearing on the FIRM, regardless of whether it is produced manually or digitally.
- “Flood Insurance Study” will be the official name appearing on the FIS report cover.
- “Flood Boundary and Floodway Map” will be the official name appearing on the FBFM, if one is produced.

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- The FEMA logo will appear in the FIRM (and FBFM) title block and on the FIS report cover.
- The proper use of leaders to flood hazard zone and map features must be applied. (See Appendix K of these Guidelines.)
- Roads in and near identified Special Flood Hazard Areas must be labeled.
- Studied flooding sources must be labeled.
- FIRM legend and border notes specified in Appendix K of these Guidelines must be used.
- Procedures for mapping multiple-county communities must be followed as detailed in Appendix K, Subsection K.1.5.1 of these Guidelines.

During various phases of the Flood Map Project process, it is recognized that certain Mapping Partners will want to portray unique mapping formats and flood hazard themes on FIRMs. FEMA partners must recognize that certain core features must be present in order to facilitate the writing of flood insurance policies and to maintain consistent national floodplain management standards. Examples of deviations from these standards are the tiling of FIRM panels to a unique grid system; the portrayal of floodways reflecting future conditions; or a reference to a CTP or State seal to accompany the FEMA seal on the FIRM title block. All such exceptions must be coordinated and approved in advance with FEMA.

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Flood Insurance Risk Zone Standards

Flood insurance risk zones are defined in the Section 64.3 of the NFIP regulations and further described on the prototype FIRM Legend information provided in Appendix K, Section K.5 of these Guidelines.

In addition to the mapping standards listed above, the standards listed below for flood insurance risk zones shall be applied by all Mapping Partners participating in Flood Map Projects.

To assist the insurance agent in determining actuarial flood insurance rates for specific properties, each floodplain or special flood hazard area is divided into flood insurance rate zones that are based on the floodplain boundaries determined in an FIS. The Mapping Partner preparing the hydrologic and hydraulic analyses shall designate appropriate flood insurance risk zones on the submitted work map. Areas within the 1-percent-annual-chance floodplain boundary are termed Special Flood Hazard Areas; areas between the 1- and 0.2-percent-annual-chance floodplain boundaries are termed Areas of Moderate Flood Hazard; and remaining areas above the 0.2-percent-annual-chance floodplain are termed Areas of Minimal Flood Hazard. The areas are subdivided into flood insurance rate zones according to the criteria discussed below.

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. The BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. A description of technical methods used to identify these areas is provided in Appendix E of these Guidelines.

Zone AO

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Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross section and then along the direction of flow to determine the extent of the zone. Average depths derived from the detailed hydraulic analyses are shown within this zone. A description of technical methods used to identify these areas is provided in Appendix E of these Guidelines. In addition, alluvial fan flood hazards are shown as Zone AO on the FIRM. For a comprehensive description of alluvial fan studies, refer to Appendix G of these Guidelines.

Zone A99

Zone A99 is the flood insurance risk zone that corresponds to areas of the 1-percent-annual-chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone.

Zone AR

Zone AR is the flood insurance risk zone that corresponds to areas of special flood hazard that results from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide a 1-percent-annual-chance or greater level of flood protection.

Zone V

Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 1-percent-annual-chance floodplain, and areas of 1-percent-annual-chance sheet flow flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1-percent-annual-chance flood by levees. No BFEs or depths are shown within this zone.

Zone D

Zone D is the flood insurance risk zone that corresponds to unstudied areas where flood hazards are undetermined, but possible. Zone D designation may not be used in Flood Insurance Studies unless otherwise approved by the Regional Project Officer. It should be noted that the Mapping Partner is not required to perform a flood hazard factor analysis and subsequent Zone A1-A30 or AE determination even though this information may currently be reflected on a community's FIRM published in the non-map initiative format.

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If community officials request that FEMA show future-conditions flood hazard information on the FIRM, the future-conditions flood insurance risk zone—Zone X (Future Base Flood)—shall be referenced on the FIRM and in the FIS report. Zone X (Future Base Flood) shall be defined in the FIRM legend and in the FIS report as follows:

> Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.

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1.4.3.10 Development of Spatial Database for Digital Maps

When developing new flood hazard data, FEMA's goal is to produce a version that can be used in the GIS environment. By structuring and storing its flood hazard data in a GIS format, FEMA expects to be able to increase the utility and value of these data. The Mapping Partner will be responsible for creating the finished digital FIRM GIS Database in conjunction with the creation of the finished FIS report and FIRM.

To facilitate community review of the Preliminary FIS produced by FEMA, the designated Mapping Partner must produce a Preliminary digital FIRM Database. The Preliminary digital FIRM Database shall be distributed for review with the hard-copy FIS report and FIRM.

The Preliminary digital FIRM Database shall also be sent to FEMA for the initial independent QA/QC review at this time. This QA/QC review will occur in parallel with the community review of the Preliminary FIS report, FIRM and digital FIRM Database.

To provide a consistent digital flood hazard data product, the Preliminary digital FIRM Database must meet the specifications in Appendix L of these guidelines. The requirements for the Preliminary digital FIRM Database are the same as for the Final digital FIRM Database with the exception of database field that contains the effective date of the current FIRM. These fields are left blank for the Preliminary digital FIRM Database.

The files must be accompanied by metadata that comply with the Federal Geographic Data Committee metadata standards. See Appendix L for details.

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1.4.4 Status Reporting

Specific reporting requirements for each Mapping Partner will be specified in the task order or MAS for the Flood Map Project. If so directed by the FEMA Lead, Mapping Partners shall use the FEMA Monitoring Information on Contracted Studies database for reporting purposes. Additional information on this database is provided in Volume 3 of these Guidelines.

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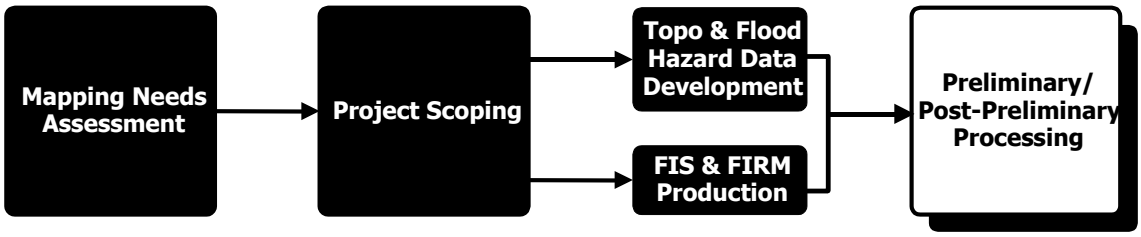
1.5 Preliminary and Post-Preliminary Processing



As shown in Figure 1-2, during the Project Scoping phase of the Flood Map Project, FEMA will assign Preliminary and post-Preliminary processing support tasks to the appropriate Mapping Partner. The designated Mapping Partner shall follow the required procedures for preparing and distributing new and revised FIS reports and FIRMs, standard correspondence, and enclosures as documented in Section 1 and Appendix A of the *Document Control Procedures Manual* (FEMA, 2000). FEMA will update the document processing procedures detailed in the *Document Control Procedures Manual* to incorporate FEMA policy and procedure changes. FEMA will notify the designated Mapping Partner of these policy and procedure changes through memorandums. FEMA also will notify all Mapping Partners of these changes by posting updates to the *Document Control Procedures Manual* and posting the policy and procedure memorandums themselves on the FEMA Flood Hazard Mapping website at http://www.fema.gov/mit/tsd/frm_docs.htm.

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During the Preliminary processing phase, the designated Mapping Partner, with the approval of the FEMA RPO and the PO at FEMA HQ, shall prepare and distribute Preliminary copies of the new or revised FIS report and FIRM. During the phase following the issuance of the Preliminary FIS report and FIRM—referred to as the Post-Preliminary processing phase—community officials, residents, and other interested parties shall have several opportunities to review and comment on the FIS report and FIRM. During the Post-Preliminary processing phase, the following activities are likely to occur:

- The FEMA CCO will hold a public meeting with community officials, residents, and other interested parties to present and explain the new or revised FIS report and FIRM and review NFIP requirements with the affected communities.

- FEMA will, if new or modified BFEs result from the Flood Map Project, initiate a 90-day appeal period to allow community officials and other interested parties to submit scientific or technical data in an effort to refute the findings of the Flood Map Project.

- Community officials and interested parties will inform FEMA of their agreement with the project results or submit data in support of an appeal or protest them during the statutory 90-day appeal period.

- FEMA will consider and evaluate all comments received during the 90-day appeal period and resolve all appeals and protests in consultation with the communities.

- FEMA will provide communities with a compliance period to make any necessary changes to their floodplain management ordinances.
- The community will update its ordinances as appropriate and submit them to FEMA for approval.
- The designated Mapping Partner will perform final QA/QC checks on the FIS report and FIRM and will prepare the final versions of the new or revised FIS report and FIRM for publication.
- The Mapping Partner will submit the final versions of the new and revised FIS report and FIRM to the FEMA Map Service Center (MSC).
- The MSC will coordinate printing of the FIS report and FIRM with the U.S. Government Printing Office (GPO) and distribute the printed copies to the affected communities and other Mapping Partners identified by FEMA.

More detailed information on Preliminary and post-Preliminary processing requirements is provided in Subsections 1.5.1, 1.5.2, and 1.5.3.

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1.5.1 Preliminary Processing Requirements

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The designated Mapping Partner shall distribute copies of the Preliminary FIS report and FIRM to community officials, the State NFIP Coordinator, the FEMA Regional Engineer, and other Mapping Partners identified by FEMA as appropriate. The exact distribution requirements will vary, depending on the production techniques used to produce the FIS report and FIRM and their format. However, the Mapping Partner also shall distribute copies of the Preliminary FIS report and FIRM to all Mapping Partners that contributed to the Flood Map Project, with formal documentation of changes that were agreed upon during the review and processing period that preceded production.

For new and revised FIRMs prepared in Countywide Format, the Mapping Partner shall distribute complete sets of panels to the appropriate county, State, and Federal agencies, as well as other interested agencies. However, the Mapping Partner shall distribute to the incorporated communities within the county only the FIRM Index(es) and those FIRM panels containing information affecting those particular communities. For FIS reports prepared in the Countywide format for the first time, the designated Mapping Partner shall distribute copies of the entire FIS report to each incorporated community and the county.

For Preliminary copies of revised FIS reports and FIRMs, the designated Mapping Partner may, under certain circumstances, distribute only the revised components of the FIS report. At the direction of the FEMA PO for cost containment purposes, the designated Mapping Partner may distribute only certain volumes of a multiple-volume FIS report, only the Flood Profiles revised as a result of the Flood Map Project, or only the pages of the Floodway Data Table that were revised as a result of the Flood Map Project. FEMA will discuss such decisions with the CTP Lead and other community officials on a project-by-project basis.

Format specifications for the Preliminary FIS report are provided in Subsection 1.4.2 and Appendix J of these Guidelines. Format specifications for the Preliminary FIRM are provided in Subsection 1.4.2 and Appendix K of these Guidelines.

To ensure the modifications made by LOMCs are included in the FIS report and on the FIRM, the designated Mapping Partner shall perform searches for LOMC determinations at four stages:

- Before the affected Preliminary FIRM panels are prepared and sent to the community for review and comment;
- Before the affected Revised Preliminary FIRM panels (if necessary) are prepared and sent to the community for review and comment;
- Before the Letter of Final Determination (LFD) is sent to the community; and
- before the effective date of the revised FIRM panels.

The results of this research are documented in the versions of the SOMA that accompaniy the Preliminary FIS report and FIRM, Revised Preliminary FIS report and FIRM. and LFD.

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1.5.2 Post-Preliminary Processing Requirements

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After the designated Mapping Partner distributes the Preliminary copies of the new or revised FIS report and FIRM, FEMA and the Mapping Partners involved in the Flood Map Project shall follow the processing requirements documented below.

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1.5.2.1 Partner Coordination and Input

Following issuance of the Preliminary FIS report and FIRM, FEMA will provide a period (usually 30 days) for community officials, community residents, and other interested Mapping Partners to review the Preliminary FIS report and FIRM before proceeding with processing of the FIS report and FIRM. If the Mapping Partner that performed the engineering analyses and prepared the initial floodplain mapping or another Mapping Partner involved in the Flood Map Project determines that the Preliminary FIS report and FIRM do not accurately reflect the BFEs, 1- and 0.2-percent-annual-chance floodplain boundary delineations, and/or regulatory floodway boundary delineations, that Mapping Partner shall inform the FEMA Lead within 15 days of the receipt of the Preliminary FIS report and FIRM. The FEMA Lead, working in consultation with other Project Management Team members, shall determine which Mapping Partner will revise the BFEs, floodplain boundaries, and/or regulatory floodway boundaries, if appropriate, and shall direct the designated Mapping Partner to distribute corrected copies.

If no such comments are submitted to the FEMA Lead, the Preliminary FIS report and FIRM are deemed to be correct. The Mapping Partners involved in the Flood Map Project shall prepare to present and support the project results if requested by the FEMA Lead or other FEMA RO staff.

At the end of the review period, the FEMA Lead will forward all comments received to the designated Mapping Partner. These comments might come from officials and residents of the community, representatives of State and local floodplain management agencies, Mapping Partners, or FEMA RO staff. Comments may involve the revised areas or other areas not affected by the revision. They may concern technical issues involving flood discharge values, BFEs, floodplain and floodway delineations, or base map information (e.g., corporate limits, road locations, road names), or information presented in the FIS report. Comments from Mapping Partners usually concern the technical, editorial, and format changes made by the designated Mapping Partner to the draft FIS report and maps; however, they may also include recommended revisions based on information obtained by the Mapping Partners after the draft FIS report and work maps were submitted to FEMA.

The designated Mapping Partner shall make minor revisions, as necessary, but shall not undertake major revisions without prior FEMA Lead approval. In some cases, the FEMA Lead or his/her designee may direct the designated Mapping Partner to undertake major revision work involving new technical data or extensive changes in the corporate limits of the community. The designated Mapping Partner shall coordinate with the community, State NFIP Coordinator, other Mapping Partners, and FEMA RO as necessary during this process.

In an effort to provide proper public notice and explain the effects of the revised FIS report and FIRM to the community officials, citizens, and other interested parties, the FEMA RO usually will hold a public meeting—often referred to as a Final Consultation Coordination Officer (CCO) Meeting—before initiating a statutory 90-day appeal period or continuing with the processing of the FIS report and FIRM in another way. During this meeting, the FEMA Lead for the Flood Map Project and Project Team members will explain how the revised information was prepared, the entity that was responsible for the revised information, and the administrative procedures available to community officials and interested citizens who may wish to provide comments on the results prior to adoption of the new or revised FIS report.

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This public meeting is not mandatory; however, certain circumstances warrant holding this meeting for the best interest of the public. Such a meeting is well advised when SFHAs have increased significantly from those shown on the currently effective FIRM. In addition, revisions that are large in scope or affect a great number of the population of the community usually necessitate a final meeting. The FEMA RO shall coordinate with the community

For other revisions that have either been extensively coordinated with the community or are not controversial, FEMA and the community may decide not to hold the Final CCO Meeting and issue a letter to the community instead.

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1.5.2.2 Revised Preliminary Report and Map

During or subsequent to the public coordination meeting, the FEMA Lead may decide that revisions to the FIS report and FIRM are warranted because changes to BFEs, floodway boundary delineations, or significant floodplain boundary delineation changes are required or for political reasons. In such cases, the designated Mapping Partner, at the direction of the FEMA Lead, shall prepare and distribute copies of the Revised Preliminary FIS report and FIRM.

In most cases, the Revised Preliminary copies shall be sent to the community with the official notification of the start of the 90-day appeal period. However, at the request of the FEMA Lead in coordination with the community and other Project Team members, the designated Mapping Partner shall prepare and distribute Revised Preliminary copies for review before the statutory 90-day appeal period is initiated.

When Revised Preliminary copies are prepared and submitted to the community for review, the designated Mapping Partner shall generate a SOMA and conduct a review similar to that conducted before the Preliminary copies were issued (see Section 1.4). When required, the designated Mapping Partner shall revise the Preliminary SOMA and submit it to FEMA for review with a special transmittal letter to the community. The designated Mapping Partner shall mail the revised SOMA to the CEO, RO, and State NFIP Coordinator with the special transmittal letter.

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1.5.2.3 Statutory Appeal Period

In the performance of a Flood Map Project, FEMA may determine new BFEs for flooding sources for which it has not previously determined BFEs or may determine that BFEs shown on the effective FIRM must be modified. When it determines new or modified BFEs for a community, FEMA must, in accordance with Section 110 of the Flood Disaster Protection Act of 1973 (Public Law 93-234), provide the community with a 90-day appeal period.

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In accordance with Section 67.4 of the NFIP regulations, FEMA initiates the appeal period by publishing a proposed BFE determination notice in the *Federal Register*; by notifying the CEO of the community by certified mail, return receipt requested; and by publishing the proposed BFE determinations twice in a prominent local newspaper during the 10-day period immediately following notification of the community CEO. The proposed BFE determination notice typically is published in the legal advertisements portion of the newspaper. Although it is not required, FEMA encourages community officials to provide an even wider distribution of the notice to ensure that residents, property owners, and other interested stakeholders are aware of the proposed BFE determinations.

The designated Mapping Partner shall prepare the letter and notices in accordance with the procedures detailed in Subsection 1.6 of the FEMA *Document Control Procedures Manual* (FEMA, 2000). The designated Mapping Partner shall ensure that the notices are correct and that they include BFEs for the affected portions of all flooding sources within the community where modified or new BFEs are being proposed.

The designated Mapping Partner also shall ensure that the newspaper notices are published correctly and in accordance with the requested schedule and that payment for the notices is sent to the newspaper in a timely manner. The designated Mapping Partner shall notify the community and other Mapping Partners involved in the Flood Map Project when corrections are required.

The newspaper notice shall be published twice, with the second notice usually being published one week after the first notice is published. The 90-day appeal period begins on the date of the second publication.

At the beginning of each month, the designated Mapping Partner shall compile the proposed BFE lists for all communities receiving proposed BFE determination letters and notices during the previous month and prepare the Proposed Rule for concurrence and signature and for publication in the *Federal Register*. The designated Mapping Partner shall then submit the Proposed Rule to the designated FEMA coordinator for routing, concurrence, and signature.

The FEMA coordinator shall coordinate with GPO to ensure timely publication of the Proposed Rule in the *Federal Register*. The FEMA coordinator and the designated Mapping Partner shall review the published Proposed Rule to ensure it is accurate, and shall coordinate correction of the Proposed Rule when appropriate.

During the appeal period, in accordance with Section 67.5 of the NFIP regulations,

> …any owner or lessee of property within a community where a proposed flood elevation determination has been made, who believes his/her property rights to be adversely affected by the proposed flood elevation, may file a written appeal of the determination with the CEO of the community.

An "appeal" is a challenge of a proposed BFE. BFEs that were not added or modified (as a result of a Flood Map Project (i.e., effective BFEs) cannot be appealed. Changes in effective BFEs must be processed as map revision requests in accordance with Part 65 of the NFIP regulations. (See Volume 2 for additional information on map revision processing requirements.)

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The sole basis of an appeal, as indicated in Section 67.6 of the NFIP regulations, is the possession of knowledge or information indicating that the BFEs proposed by FEMA are scientifically or technically incorrect. The proposed BFEs are considered scientifically incorrect if the methodology or assumptions used in the determination of the BFEs is inappropriate or incorrect. The BFEs are considered technically incorrect if the BFEs were based on insufficient or poor quality data, analysis contains mathematical or measurement errors, or physical changes have occurred in floodplain.

Comments received by FEMA during the appeal period that do not challenge proposed BFEs are considered "protests." A protest is a challenge of information or data from a Preliminary FIS Report or FIRM other than BFEs. Types of protests include, but are not limited to, the following:

- Challenges of proposed floodplain boundary delineations based on more detailed or recent topographic data;
- Challenges of proposed regulatory floodway boundaries based on better modeling,
- Requests that changes effected by a previous Letter of Map Change be incorporated;
- Base map errors; and

- Errors of omission.

Appeals and protests must be supported by scientific or technical data, provide proof of error, and provide sufficient data to make revisions (bridge plans, cross-section data) and may require certification of data by a Registered Professional Engineer or Licensed Land Surveyor.

Additional information on the data required to support an appeal is presented in Chapter 3 of *Appeals, Revisions, and Amendments to National Flood Insurance Program Maps: A Guide for Community Officials* (FEMA, 1993). Additional information on the data required to support a protest is presented in Chapter 4 of *Guide for Community Officials*.

In accordance with Section 67.7 of the NFIP regulations, private persons shall submit appeals to the community CEO during the appeal period. The CEO, or a community official designated by the CEO, shall review and consolidate all appeals by private persons and prepare a written opinion stating whether or not the appeal is justifiable. The community CEO or other designated community official shall then submit the opinion and the appeal(s) to FEMA for review.

In accordance with Section 67.8 of the NFIP regulations, FEMA will "review and fully consider any technical or scientific data submitted by the community that tend to negate or contradict the information upon which the proposed determination is based." Although not specifically required by the regulations, FEMA also will consider all technical or scientific data submitted in support of a protest as well.

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To assist FEMA, a designated Mapping Partner shall review and evaluate submitted data, request additional data when required, and recommend resolutions to FEMA for all appeals and protests submitted during the 90-day appeal period. An expanded discussion of these procedures also appears in the *Guide for Community Officials* (FEMA, 1993).

At the request of FEMA, the designated Mapping Partner shall perform the following tasks:

- Work with FEMA to acknowledge the receipt of an appeal or protest in writing;
- Evaluate any scientific or technical data submitted;
- Request any additional scientific or technical data required to properly review the appeal or protest;
- Make a recommendation to FEMA to resolve the appeal;
- Perform any engineering analyses required (e.g., hydrologic and hydraulic, structural, geo-technical);
- Prepare and distribute, if warranted, Revised Preliminary copies of the FIS report and FIRM; and
- Prepare an appeal or protest resolution letter or insert to the LFD.

Appeal resolutions must be made within a reasonable time. All resolution information must be made available for public inspection and shall be admissible in a court of law.

The assigned Mapping Partner shall send the signed FEMA appeal resolution letter to the community CEO and floodplain administrator and all appellants before the LFD, discussed in Subsection 1.5.2.4, is prepared and sent to the community. Most often, the designated Mapping Partner incorporates changes resulting from protests at the time that the final reproduction materials are prepared; however, if the changes are significant, the FEMA Lead or his/her designee may direct the designated Mapping Partner to prepare and distribute Revised Preliminary copies or Proof Copies of the FIS report and FIRM. Also, the protest resolution may be included in the LFD.

FEMA shall provide a comment period (usually 30 days) following the date the appeal or protest resolution letter is issued before proceeding with the processing of the revised FIS report and FIRM by preparing and issuing an LFD. FEMA, with the support of the assigned Mapping Partner and other members of the Project Team for the Flood Map Project, shall address any comments received during this comment period before proceeding with the LFD.

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1.5.2.4 Final Determination

After the 90-day appeal period (if required) has elapsed and all appeals and protests have been resolved, the designated Mapping Partner shall choose an LFD date/FIRM effective date from a list provided by FEMA HQ. The designated Mapping Partner shall select the LFD date such that it is no earlier than 1 week after the 90-day appeal period or 30-day review period has ended. The designated Mapping Partner shall then prepare an LFD based on community status, study type, whether BFEs were affected, and whether an appeal was received. (See Subsection 1.11 of the *Document Control Procedures Manual* [FEMA, 2000] for additional information on LFD content.)

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The Mapping Partner shall then include the affected community on a docket listing all LFDs scheduled for a particular date and submit the docket to the FEMA PO or his/her designee for review and approval. The FEMA PO or his/her designee shall notify the designated Mapping Partner by concurring on the docket that the letters can be mailed. If special circumstances exist with the community, or the proposed BFEs were appealed, the FEMA PO or his/her designee may direct the designated Mapping Partner to submit an original hard copy of the LFD for review.

On the LFD date, the designated Mapping Partner shall mail the LFD and enclosures (including the SOMA, discussed in Subsection 1.5.2.5) to the community CEO and floodplain administrator, mail copies to appellants and protesters as necessary, and distribute external and in-house file copies in accordance with the requirements provided in Subsection 1.11 of the *Document Control Procedures Manual* (FEMA, 2000).

At the beginning of each month, the designated Mapping Partner shall compile the final BFE lists for all communities receiving LFDs during the previous month and prepare the Final Rule for concurrence and signature and for publication in the *Federal Register*. The designated

Mapping Partner shall then submit the Final Rule to the d FEMA coordinator for routing, concurrence, and signature. The FEMA coordinator shall coordinate with GPO to ensure timely publication of the Final Rule in the *Federal Register*. The FEMA coordinator and the designated Mapping Partner shall review the published Final Rule to ensure it is accurate, and shall coordinate correction of the Final Rule when appropriate.

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1.5.2.5 Final Summary of Map Action Preparation

Approximately two weeks before the LFD date, the designated Mapping Partner shall generate and review the Final SOMA. The Final SOMA shall include all LOMCs included in the Preliminary SOMA and all LOMCs issued since the Preliminary or Revised Preliminary copies of the FIS report and FIRM were distributed. The designated Mapping Partner shall mail the Final SOMA to the CEO of the community, RO, and State Coordinator with the LFD. If no LOMCs have been issued for the affected map panel(s), the designated Mapping Partner shall include an explanatory paragraph in the LFD to acknowledge this fact, and no SOMA shall be sent to the CEO or any of the other recipients of the LFD.

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1.5.2.6 Accelerated Processing Procedures and Schedules

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Accelerated processing procedures may be initiated when a community in the NFIP requests that its FIRM become effective in less time than the 6 months allotted in the NFIP regulations for adoption of floodplain management ordinances. The procedures to be followed are outlined in FEMA Instruction No. 8400.1, entitled *Early Conversion of Communities to the Regular Phase of the National Flood Insurance* (FEMA, 1988).

As indicated in FEMA Instruction No. 8400.1 the community CEO or a community official designated by the CEO shall submit a request for accelerated processing in writing to the FEMA CCO. The CCO shall then immediately inform the appropriate FEMA HQ staff of the community's request. To meet the criteria for accelerated processing, the community must prove compliance with the appropriate floodplain management requirements of Section 60.3 of the NFIP regulations, and submit a letter from the CEO indicating that the community agrees with the Preliminary FIS report and FIRM and proposed BFEs, does not expect appeals, and agrees to shortened compliance period. If an individual property owner submits a legitimate appeal during the 90-day appeal period, FEMA shall cancel the accelerated processing and the attendant effective date of the FIRM.

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1.5.2.7 Floodplain Management Ordinance Updates

With the issuance of the LFD, FEMA provides the community with 6 months (or otherwise agreed-upon timeframe) to adopt floodplain management ordinances that comply with the new or updated flood hazard data presented on the FIRM as discussed in Section 60.2 of the NFIP

regulations. The new or updated ordinances, which are sometimes referred to as "compliant" ordinances, must meet the requirements Section 60.3 of the NFIP regulations.

If the community has floodplain management ordinances in effect that require no amendment as a result of the new or updated flood hazard data, the compliance period may not be required. However, if the community did not have compliant ordinances when the LFD was issued, FEMA must give the community a 6-month compliance period and remind the community that it must submit updated floodplain management ordinances to the RO for review.

If the community fails to submit compliant ordinances to the RO within the first 90 days of the compliance period, the designated Mapping Partner shall, at FEMA's request, prepare a 90-day suspension reminder letter to the community. If the community has not submitted compliant ordinances to the RO within 30 days of the effective date, the designated Mapping Partner shall prepare a 30-day suspension reminder letter for the community. For these suspension reminder letters, the designated Mapping Partner shall follow the preparation and distribution requirements presented in Subsection 1.14 of the *Document Control Procedures Manual* (FEMA, 2000).

If the community does not adopt the floodplain management ordinances by the effective date, FEMA shall suspend the community from participation in the NFIP until the community adopts compliant floodplain management ordinances.

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1.5.2.8 Final Reproduction Materials and Paperwork

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During the 6-month compliance period, QA/QC reviews and revisions are performed, final reproduction materials and GPO paperwork are prepared, technical and administrative support data are archived, and the FIS report and FIRM are printed and distributed.

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Quality Assurance/Quality Control Review

The designated Mapping Partner shall conduct a QA/QC review to ensure all Post-Preliminary comments and Revised Preliminary (if applicable) information has been incorporated. In addition, the designated Mapping Partner shall perform a final QA/QC review for consistency between mapping components.

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Final Reproduction Materials

The designated Mapping Partner shall prepare final (camera-ready) reproduction materials for printing by GPO. The specifications for hardcopy and digital materials are provided in Appendix J of these Guidelines.

For an FIS report and FIRM that are not being processed under accelerated processing procedures and schedules (see Subsection 1.5.2.6), the designated Mapping Partner shall deliver the final reproduction materials to the MSC approximately two months after the date of the LFD,

or approximately four months before the effective date of the FIS report and FIRM. If delays in delivering the final reproduction materials beyond this date are necessitated by significant revisions submitted by the community after the LFD was issued, the designated Mapping Partner shall coordinate with the MSC as well as the FEMA Lead or his/her designee. For accelerated processing, the delivery schedule may be adjusted in coordination with the MSC and the FEMA Lead. The procedures to be followed are outlined in FEMA Instruction No. 8400.1 (FEMA, 1988).

[February 2002]

Map Packaging

The designated Mapping Partner shall follow the procedures below in packaging the hardcopy FIRM, FBFM, and DFIRM indexes and panels for printing.

- Map panels shall be rolled and sealed in brown packaging paper.
- Map indexes prepared in the Z-fold format shall be packaged by themselves.
- All other panels shall be separated according to type (FIRM, DFIRM, or FBFM) and frame size (A, B, C, D, and E); however, no more than 16 panels shall be included in any rolled package.
- Map panels using the DOQ base map option and requiring two-color printing (two negatives) shall be rolled individually by panel, with the panel number clearly marked in the lower right hand corner of each negative.

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- Each set of camera-ready negatives shall be rolled and wrapped in brown kraft-paper and shall be labeled. The labeling information shall be in the order shown and include the following information: frame width, name and state of community or county, map type (FIRM or FBFM), and whether the enclosed panel is an index. See the following example:

30	FLOOD COUNTY, USA,	FIRM	INDEX (when applicable)

- For each community or county for which negatives are being submitted, corresponding GPO paperwork shall be submitted as follows:
    - Two envelopes (one 18” x 20” and one 15” x 18”) shall be used in the transmittal of this paperwork. The Mapping Partner transmittal shall be attached on the front of the larger envelope.
    - The completed FEMA transmittal (179) letter(s), Print Processing Worksheet(s), and Print Requisition form(s) shall be placed in the larger envelope.

    - The FIS report materials shall be placed in the smaller envelope, and the smaller envelope shall be placed in the larger envelope.

- A final paper copy of FIRM panels shall be provided. They shall be rolled and attached as one set to the appropriate hardcopy wrapped rolls. (The paper copies are not to be wrapped or labeled.)

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Report Packaging

The designated Mapping Partner shall adhere to the procedures provided below in preparing FIS reports for printing.

- The FIS report shall be put together in final form, with appropriate graphics and profiles in place, and placed in an envelope. The envelope shall be marked to indicate the name of the community and the effective date of the FIS report.

- For the purpose of the GPO processing, the designated Mapping Partner shall number the pages of the report in non-photo blue pencil starting with the page following the cover, "Notice to Flood Insurance Study Users," being page 1. The pages shall be numbered consecutively (1, 2, 3, etc.) with certain exceptions.

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    - No material shall be printed on the back of the "Notice to Flood Insurance Study Users" page; therefore, this page shall be numbered "1/2 blank."

    - No material shall be printed on the back of the page preceding any graphics (e.g., transect location map) prepared in 11" x 17" format. If this page has an odd number, it would be numbered "5/6 blank."

    - No material shall be printed on the page immediately preceding the first profile panel.

  It is important to note that these are not the official page numbers printed at the bottom of each page, but only reference numbers to track individual pages by the GPO.

- The Flood Profiles shall always be given two page numbers, starting with an odd number. For example, if the last text page number is 50, Panel 01P would be marked "51/52 blank."

The designated Mapping Partner shall provide the camera-ready originals only; no hard copy of the revised FIS report is required.

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Government Printing Office Paperwork

The designated Mapping Partner shall prepare the paperwork summarized below to accompany the final reproduction materials for the FIS report, FIRM, and FBFM (if produced).

- Transmittal to Community CEO—One letter shall accompany the material for each community. For FIRMs prepared in the Countywide Format, one letter shall be prepared for each community. The transmittal letters (179, 179-M, 179-R, 179-RS, and 179-S) that the designated Mapping Partner shall prepare and submit with the final reproduction materials are presented in Appendix A of the FEMA *Document Control Procedures Manual* (FEMA, 2000).

- Print Processing Worksheet—Although the worksheet may include several pages, only one worksheet shall be prepared for each community (including FIRMs prepared in Countywide Format). FEMA shall provide the Print Processing Worksheet to the designated Mapping Partner.

- Printing Requisition Form—One requisition form for each is prepared for the FIS report, the FIRM Index, the individual rolls of FIRM panels, the FBFM Index (as applicable), and the individual rolls of FBFM panels (as applicable). FEMA shall provide the Printing Requisition forms to the designated Mapping Partner.

- Community Map Action (CMA) List — Two copies of the CMA list shall accompany each submission to the MSC; however, several communities may be shown on one CMA list, provided that the FIRMs have the same effective date. The CMA list shall be placed in its own envelope and submitted with the other components for that MSC submission. (Note: Preliminary CMA lists are to be prepared and submitted for review to the MSC approximately two months before the other above-mentioned materials.) If the compliance period is accelerated, then the submittal time will change to reflect such.

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Revalidation of Letters of Map Change

Approximately 1 month before the FIRM effective date, the designated Mapping Partner shall review and update the list of LOMCs included in the Final SOMA. The designated Mapping Partner shall use the list to produce the LOMC-VALID letter that is issued to the CEO of the community. For further information on this process, see Volume 2, Section 2.5 of these Guidelines.

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Archived Data

Upon completion of the final QA/QC review, a standardized digital package shall be prepared by the designated Mapping Partner to archive all administrative and technical support data generated during the preparation and technical review of the FIS report and FIRM. The archival requirements, including the requirements for the TSDN, are provided in Volume 3, Section 3.3 and Appendix M of these Guidelines.

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1.5.3 File Maintenance Requirements

The designated Mapping Partner shall keep records and files of correspondence for each community affected by the Flood Map Project to assist FEMA in meeting the community file requirements documented in Section 66.3 of the NFIP regulations. Filing requirement for specific letters are documented in Section 1 and Appendix A of the FEMA *Document Control Procedures Manual* (FEMA, 2000).

The designated Mapping Partner also shall establish and maintain a Flood Elevation Determination Docket for each community affected by a Flood Map Project to assist FEMA in meeting the requirements of Section 67.3 of the NFIP regulations.

Additional information on file maintenance requirements is provided in Volume 3, Subsection 3.3.1.1 of these Guidelines.

[February 2002]

This Document is Superseded.
For Reference Only.

1.6 References

Federal Emergency Management Agency, FEMA Manual 7810.2, *Regional Project Officer Guidance for Flood Insurance Studies*, 1990.

Federal Emergency Management Agency, FEMA Instruction 8400.1, *Early Conversion of Communities to the Regular Phase of the National Flood Insurance Program*, 1991.

Federal Emergency Management Agency, FIA-12, *Appeals, Revisions, and Amendments to National Flood Insurance Program Maps: A Guide for Community Officials*, 1993.

Federal Emergency Management Agency, *Guidelines for Determining Flood Hazards on Alluvial Fans*, 1999.

Federal Emergency Management Agency, *Document Control Procedures Manual*, July 2000.

Interagency Advisory Committee on Water Data, Bulletin 17B, *Guidelines for Determining Flood Flow Frequency*, 1982.

National Research Council, *Alluvial Fan Flooding*, National Academy Press: Washington, DC, 1996.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration Atlas 2, *Precipitation-Frequency Atlas of the Western United States*.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Technical Paper No. 40, *Rainfall Frequency Atlas of the United States*.

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