

# **How to Read a Flood Insurance Rate Map (FIRM) Tutorial**

Developed September 2000

## **Learning Objectives:**

The Objectives of the tutorial are:

1. To show the various types of flood maps,
2. To describe the elements and symbology on the Flood Insurance Rate Map FIRM, and
3. To explain how to read and use the FIRM

## **Overview**

Since the 1970s, the Federal Emergency Management Agency (FEMA) has been creating, storing, and updating flood hazard maps for National Flood Insurance Program (NFIP) communities across the United States. Flood Insurance Rate Maps, known as FIRMs, are the primary tool for state and local governments to mitigate the effects of flooding in their communities.

We are pleased to present this guide to Flood Insurance Rate Maps. Throughout this tutorial the common term Flood Map is used to refer to these documents.

Using this tutorial in conjunction with the Flood Maps themselves can assist you in deciding whether the potential flood risk for a specific property should be insured against flood loss.

The glossary terms used in this tutorial will be listed at the end.

## **FEMA and Flood Insurance**

In 1968, the US Congress created the National Flood Insurance Program (NFIP). Their intent was to reduce future damage and to provide protection for property owners from potential losses through an insurance mechanism that allows a premium to be paid by those most in need of the protection. FEMA produces Flood Insurance Rate Maps that show areas subject to flooding. The flood risk information presented on the Flood Insurance Rate Map is based on historic, meteorological, hydrologic, and hydraulic data, as well as open-space conditions, flood-control works, and development.

A variety of information can be found on a Flood Map, including:

- Common physical features, such as major highways, secondary roads, lakes, railroads, streams, and other waterways.
- Special Flood Hazard Areas (SFHA)
- Base flood elevation (BFE) or depths
- Flood insurance risk zones
- Areas subject to inundation by the 500-year flood

## **What Flood Maps Can Help You Do?**

The Flood Map provides information that allows you:

- To identify Special Flood Hazard Areas. (SFHA)
- To identify the location of a specific property in relation to the Special Flood Hazard Areas.
- To identify the base (100-year) flood elevation at a specific site.
- To identify the magnitude of flood hazard in a specific area.
- To locate regulatory floodways.
- To identify undeveloped coastal barriers, where flood insurance is not available.

## **Who Uses Flood Maps?**

FEMA distributes Flood Maps to a wide range of users. Private Citizens, insurance agents, real estate brokers, community officials, lending institutions, and Federal agencies all use the Flood Maps to assist them in understanding flood hazards. Private Citizens, insurance agents, and real estate brokers use the Flood Maps to locate properties, buildings and corresponding flood insurance risk zones. Community officials use the Flood Maps to administer floodplain management regulations and mitigate flood damage. Lending institutions and Federal agencies use the Flood Maps to locate properties, buildings and determine whether flood insurance is required when making loans or providing grants for the purpose or construction of buildings.

## **What Are Flood Maps?**

To prepare the Flood Maps that illustrate the extent of flood hazard in a flood prone community, FEMA generally conducts engineering studies referred to as Flood Insurance Studies (FISs). Using the information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on Flood Maps. Special Flood Hazard Areas are subject to inundation by a flood that has a 1-percent or greater chance of being equaled or exceeded during any given year. This type of flood commonly is referred to as the 100-year flood or base flood.

### **A 100-year flood is not a flood that occurs every 100 years!**

In fact, the 100-year flood has a 26 percent chance of occurring during a 30-year period, the length of many mortgages. The 100-year flood is a regulatory standard used by Federal agencies and most states, to administer floodplain management programs. The 100-year flood is used by the National Flood Insurance Program (NFIP) as the basis for insurance requirements nationwide.

## **Documents Related to Flood Maps are Available**

The results of the Flood Insurance Study are also available in a technical document that provides information used for floodplain management. This is known as the Flood Insurance Study Report (FIS).

Regulatory floodways and other floodplain management information may be shown on a separate Flood Map. This is known as a Flood Boundary and Floodway Map (FBFM). It is typically distributed with the Flood Insurance Study report, but is not distributed as a part of a standard map request. On many newer Flood Insurance Studies, floodways are included on the FIRM so FBFMs are not included. The Flood Insurance Study report and maps can be reviewed at the community office for floodplain management activities in your community.

Copies of the report and Flood Maps may also be obtained from FEMA's Map Service Center.

<http://www.msc.fema.gov/>

## **How to Obtain Flood Maps**

The Flood Maps for your community should be available for review at your local Community Map Repository site. Typically, this is your local planning, zoning, or engineering office.

If you would like copies of Flood Maps, they may be obtained from FEMA's Map Service Center (<http://www.msc.fema.gov/>). Because the Map Service Center maintains thousands of Flood Maps, you will need to provide specific information about the map(s) you want to order, such as the name of the community and the county it lies in, or the six-digit community number.

### **Federal Emergency Management Agency Map Service Center**

P.O. Box 1038

Jessup, Maryland 20794-1038

Telephone: (800) 358-9616

Fax: (800) 358-9620

<http://www.msc.fema.gov/>

## **Flood Map Overview**

Since the National Flood Insurance Program began over 25 years ago, many improvements have been made to the design of Flood Maps, so that they are easier to use and better meet users' needs. To control costs, FEMA includes design improvements in Flood Maps as new maps are produced. These improvements occur on a community-by-community basis. As a result, all Flood Maps are not exactly the same. They may differ in format and content. The two basic formats used for Flood Maps are a "Flat Flood Map" and a "Z-Fold Flood Map." In addition, every flood map has several basic elements, such as an associated index map, panel, title box, legend, and standard symbols.

## **Flood Map Formats**

A Flat Flood Map consists of one or more 11"x17" pages and a cover sheet that includes an index and a legend.

A Z-Fold Flood Map is a larger map that is folded like a highway map.

Z-Folds consist of one or more panels, which have a legend printed on it.

Z-fold Flood Maps involving more than one panel also have an index.

When discussing Flood Maps, it is common to refer to the set of panels that make up a geographic area as one Flood Map.

In order to determine your community's flood map format or geographic coverage, you can contact FEMA's Map Service Center, to consult a Flood Map Specialist.

## **Flood Map Coverage**

The coverage of Flood Maps can include all of these jurisdictions: Counties/Parishes, Towns, Townships, Cities. For standard identification purposes, FEMA assigns a six-digit Community Identifier (CID) to all active participants in the NFIP. Flood Maps contain flood hazard information on one or multiple communities, identified by CID on the map panels. When a Flood Map includes multiple communities, a list of the affected communities, by name and CID, is listed on the title block of each panel. To determine the geographic coverage of your community's Flood Map, contact the Map Service Center.

Most Flood Maps cover only one jurisdiction. If that jurisdiction is the unincorporated part of a county, flooding information is shown only for the areas under the jurisdiction of the county government. This means you will not find flooding information for incorporated areas (e.g. town and cities) on the Flood Maps produced for the unincorporated areas of a county.

Separate Flood Maps are prepared for incorporated areas. More recently, however FEMA has produced countywide Flood Maps. These Flood Maps usually show flooding information for all of the geographic areas of a county, including towns and cities. To determine the geographic coverage of your community's Flood Map, contact the Map Service Center.

## **The Index**

The index serves as a guide to map sheets found on a Flood Map. Since the geographic coverage of a Flood Map may be quite large, FEMA divides the area into sections called panels. The index is provided to indicate what areas are shown on each map.

Due to variations in content found on Flood Maps, separate formats exist for both Flat Flood and Z-Fold Maps.

See the section on How to Read a Flood Map Index for further information on the variations of these maps. When determining flood hazard potential for an area, you should first consult the index to determine which flood map panel illustrates your community.

## **The Panel**

The Flood Map for your Community may include one or more individual maps. Each map is called a panel. When a Flood Map contains multiple panels that simply means that the Flood Map for your community will not fit on one page. The number of panels depends on the community size and the scale(s) of the Panels. The Index is used to determine which panel should be utilized to obtain flood hazard information for a specific location.

## **Flood Map Basics**

In addition to the two basic formats, Flood Maps also have several basic elements. Every flood map will include a title box, legend, body, and basic symbols.

Due to variations in format and content, not all elements appear on every flood map.

### The Title Block:

Found on each Panel (or page), the title box contains the community name, the panel number (page number), date, and other information necessary to identify the Flood Map panel.

### The Legend:

Found on Z-fold Flood Maps, the Legend provides information for identifying the risk zones and/or floodway on the Flood Map.

### The Body:

The body of a flood map displays the map contents. On an index, the body will usually only display primary features like major roads, corporate limits and other general landmarks that help to identify location. On a panel, the body will show more detail than what is shown on the index, including secondary roads, bridges, and flood hazard information.

In addition, every map regardless of format will contain a typical set of symbology as noted on the next page.

## Typical Flood Map Elements

These seven items are typically found on all FEMA Flood Maps regardless of the format or the area covered by the Flood Map. Other items may be found on specific Flood Maps depending upon the formats and geographic area. These will be discussed later in this tutorial.

### Community Name:

The title block displays name of the mapped community, the community type (e.g. town, city, county), the county, and the state. When the mapped community is a county, the words "Unincorporated Areas" often appear below the county name. This indicates that the incorporated areas in the county area not covered by the Flood Map. When the Flood Map covers the entire geographic area of the county, the words "and Incorporated Areas" appear after the county name.

### Community Number:

The Community Number is a six-digit identification number assigned to the mapped community. This number is also referred to as the community identification number (CID). You need to use the community identification number when you ask FEMA staff questions about a Flat Flood Map or a Z-fold Flood Map for an individual community and when you order a Flood Map from the Map Service Center.

### Corporate Limit or County Line:

The Corporate Limit or County Line identifies the jurisdictional limits of the community's regulatory authority over land development and building construction. In some states, an incorporated community may exercise extraterritorial jurisdiction over land development and building construction in areas beyond its corporate limits. Where appropriate, these limits are shown and labeled on the index.

### Inset Note:

Inset Notes identify what panel includes special areas on the map.

### North Arrow:

This arrow orients the Flood Map.



## **Typical Flood Map Elements (continued)**

### Panel Limit Line:

This line reveals the extent of the area covered by each panel shown on the index.

### Panel-not-Printed Notes:

These notes identify the panels included in the Flood Map layout that are not printed and explain why they are not printed. For instance, when a panel covers an area of the community that falls entirely in one flood insurance risk zone, that panel may not be printed, and an explanatory note is added to the index. If all panels are printed this annotation is omitted.

## **How to Read a Flood Map Index**

If a Flood Map is composed of more than one panel, an index is usually provided that serves as a guide to the information found on each map. FEMA produces indexes for both Flat Flood and Z-Fold Flood Maps. Regardless of the format, each index is divided into sections that correspond to individual flood map panels.

When determining flood hazard potential for an area, you should first consult the index to determine which flood map panel illustrates the area.

In order to determine your community's flood map format or geographic coverage, you can contact FEMA's Map Service Center to consult a Flood Map Specialist.

## **Types of Flood Map Indexes**

The index shows the outline of the mapped community and the numbers and positions of the individual panels. There are three different types of indexes depending upon the community you are interested in, Flat Flood Maps, Community Flood Maps, and Countywide Flood Maps.

### Flat Flood Map Index:

Flat Flood Map indexes cover communities that are mapped on 11" x 17" sheets. This index shows the outline of the community and the numbers and positions of the individual panels (sheets). The flat map index contains a key to the various flood insurance risk zone designations and important notes to the user. Several important dates are also shown on the index. These dates include the flood insurance rate map effective dates, and dates of revision to the Flood Map. The community name and number will be shown in the title block.

### Individual Community Flood Map Index:

Individual Community indexes range in size. The smallest being 8½" x 11" to the largest 37½"x 25 ½". These index maps show the community boundary and the number and position of the individual panels. Individual Community Index Maps do not have a legend and general panel notes to the user.

The title block contains the community name, community number and the lowest and highest panels included in the layout of the Flood Map.

The community number and panel number are combined into a 10-digit number for each panel. A map repository listing is contained on the index.

## **Types of Flood Map Indexes (continued)**

### Countywide Flood Map Index:

A Countywide Flood Map displays an entire county and any incorporated areas. Countywide Flood Maps may include more than one community. As with all indexes the community boundaries are shown along with the numbers and position of the individual panels. All panels may not be printed so "Panels Printed" are listed in the title block.

Some indexes may contain a generalized depiction of SFHA shown on each panel, this is for reference purposes only. On selected index maps, a flood-prone streets index may be included that lists flood-prone streets on the Flood Map. Occasionally, there are exceptions where a community that falls within the area of a countywide Flood Map may continue to be shown on a separate Flood map.

## **Elements Found Only on a Flat Flood Map Index**

### Legend:

This is the Flood Map Legend that identifies the symbols on the Flood Map and provides information to assist users of the Flood Map, including explanations of the various flood insurance risk zone designations.

### Notes to User:

These notes provide important additional information about the flood map.

## **Elements Found Only on a Z-Fold Flood Map Index**

### Effective or Revised Date:

This is the date the new or revised Flood Map becomes effective for flood insurance and floodplain management purposes. Partial revisions are common and the inside of the index will show the suffix of each panel to determine what has been revised. New countywide indexes will have effective dates printed on each panel.

### List of Printed Panels:

This list identifies those panels that are printed, but not necessarily revised. Partial revisions are common and the inside of the index will show the suffix of each panel to determine what has been revised. New countywide indexes will have effective dates printed on each panel.

## **Elements Found Only on a Countywide Flood Map Index**

### List of Floodprone Communities:

- Floodprone communities covered by the Flood Map. (Note: All communities are listed; the non-floodprone communities are footnoted to indicate they are non-floodprone.)
- The community identification number for each community
- The panel on which each community is shown
- The initial flood identification date (the date that flood hazards were first identified)
- Post FIRM date for each community (the date of the first FEMA Flood Map for the community)

## **Elements Found Only on a Z-Fold Flood Map Index for Individual Communities**

### Community Panel Number Range:

This range, presented in the title box of the index, gives the lowest and highest panels in the layout of the Flood Map. The Panels are identified by 10-digit community-panel numbers.

## **Elements Found on Some Z-Fold Flood Map Indexes**

Due to the dynamic nature of flood hazard mapping these elements are included on some versions of Z-Fold Flood Maps.

### Floodprone Area Overview:

Floodprone Area Overviews are shown on some Flood Maps. These areas on the map provide a generalized depiction of the Special Flood Hazard Areas shown on each panel. It helps you find the appropriate panel and orients you to the Flood Map. It should not be used in place of the more detailed delineations on the panels.

### Floodprone Street Index:

Shown on selected Flood Maps, this index lists the streets in the mapped community that are partially or completely in the special Flood Hazard Area. It also indicates the panel(s) on which each street is shown. Grid coordinates that allow you to locate the street on the panel are listed for each street. The Floodprone Street Index may be shown either on the index or on a separate panel.

### Map Repository Address:

This is the address of the official community office where reference copies of the Flood Map and Flood Insurance Study report are stored and made available.

## **How to Read a Flood Map Panel**

When a Flood Map cannot be presented on one page, it is produced on several pages known as panels. Flood Map Panels depict the flood hazards in different parts of a community.

### **Elements Found on all Panels**

As noted in the Map Overview Section, there are seven basic elements common to all indexes and panels. In addition to these items, there are 14 more Elements that may be found on Flood Map panels.

- Area Not Included Label
- Base Flood Elevation
- Coastal Barrier Area
- Elevation Reference Marks
- Floodplain Boundary
- Hazard Area Designation
- Map Scale
- Panel Number
- Notes to User
- River Mile Marker
- Stream Line
- Zone Designation
- Zone Division Line
- Flood Insurance Risk Zone Label

### **Elements Found on all Panels**

#### Floodplain Boundary:

These boundaries show the 100-year and 500-year floodplains.

#### Hazard Area Designation:

These areas appear as dark and light tints. Dark tints indicate areas of greater flood hazard; light indicates areas of lesser flood hazard.

## **Elements Found on all Panels (continued)**

### Base Flood Elevation (BFE)

For detailed study areas this line and label indicates the water surface elevation of the base flood in relation to a standard set of geographic data in Special Flood Hazard Areas. A wavy line is used to indicate when the base flood elevation varies along a watercourse. When the base flood elevation is uniform across a large area, a label is used.

### Zone Division Line

This line separates Special Flood Hazard Areas with different zone designations and separates Special Flood Hazard Areas with differing Base Flood Elevation in coastal hazard areas.

### Flood Insurance Risk Zone Designations:

The zone designations indicate the magnitude of the flood hazard in specific areas of a community.

### River Mile Marker:

This marker identifies the distance in miles from a reference point on a river or other major watercourse.

### Stream Line:

This line identifies the location of a watercourse. Narrower streams are usually shown by a single line, representing the approximate location of the stream centerline. Wider streams are often shown by double lines, representing stream bank locations.

### Coastal Barrier Symbol:

Coastal barrier symbols appear only on Flood Maps that contain coastal communities. These symbols identify undeveloped coastal barriers in the Coastal Barrier Resources System. No new flood insurance coverage may be provided after specified dates for new or substantially improved structures on any Coastal Flood Hazard Area in the System.

## **Elements Found on all Panels (continued)**

### Area Not Included Label:

This label identifies areas that are in the panel area, but are not in the jurisdiction of that community; thus, no flood hazard information is shown in that area.

### Map Scale:

This allows you to relate distances measured on the Flood Map to actual distances on the ground. The scale shown on a panel applies only to that panel. Most commonly used scales are one inch on the map equals 500, 1000, or 2000 feet on the ground

### Panel Number:

This number distinguishes each panel from others in the same community; each page is given a unique panel number. On Flat Flood Maps, the panel number is a two-digit number. On Z-Fold Maps, the panel number matches the last four digits of the community panel number. On Countywide Z-fold Flood Maps, the panel number matches the last four digits of the map number.

### Notes to User:

These notes provide additional information to clarify zone designations or special notes on the use of the Flood Map.

### Elevation Reference Marks (ERMs):

These marks identify points where a ground elevation is established by survey. Descriptions of reference marks appear on different places, depending on the map format.



## **Elements Found Only on Some Z-Fold Panels**

### Alpha-numeric Grid:

This is the basis of the coordinate systems established for the Floodprone Street Index.

### Cross Section Symbol:

This symbol shows locations of floodplain cross sections used for computing detailed flood information. These locations can be correlated to the flood profiles refer to in the Flood Insurance Study.

### Floodway Boundaries:

These boundaries show the limits of the floodway.

### Floodway Designation:

This designation identifies floodway areas. The floodway is the channel of a river or other watercourse plus any adjacent floodplain areas that are reserved so that the 100-yr flood discharge can be conveyed without increasing the elevation of the 100-yr flood more than a specified amount.

### Map Repository Address:

This is the address of the official community office where reference copies of the Flood Map and Flood Insurance Study report are stored and made available for viewing.

### Panel Locator Diagram:

This diagram shows the area covered by the panel in relation to the outline of the mapped community.

## **Elements Found Only on Some Z-Fold Panels Individual Communities**

### **Community Panel Number:**

This number identifies the community and panel; it corresponds to a community panel number shown on the index. On the FIRM, a letter suffix follows the number and usually indicates the number of times a particular panel has been revised.

### **Initial Identification Date:**

This date appears in the legend and indicates when the flood hazards in the mapped community were first identified.

### **Flood Hazard Boundary Map Revisions Chronology:**

This chronology lists dates of revised versions of the Flood Hazard Boundary Map (FHBM) for the community, if one was printed.

### **Map Effective Date:**

The date, appearing in the legend, indicates when the Flood Insurance Rate Map was first printed and became effective for the Regular Phase of the National Flood Insurance Program.

### **Map Revisions Chronology:**

This chronology lists the effective dates of revised versions of the Flood Map, if any, and briefly describes the reasons for the revisions.

## **Elements Found Only on Countywide Panels**

### Effective Date on Countywide Map:

The date on which the Countywide Flood Map first became effective. Flood Maps may have been in effect for one or more of the individual communities in the county before the countywide Flood Map was published. If so, the initial Flood Map Effective dates for each community will be shown as "Post FIRM Dates" in the List of Flood Prone Communities.

### Map Number:

This number identifies the panel. It is composed of a five-digit code that identifies the county; a letter "C" that indicates countywide mapping, and a four-digit number corresponding to the panel number and a letter suffix that indicates the number of times a panel has been revised.

## Getting Specific Information

In this section, we present a step-by-step process that you may follow to obtain this information when you locate a property on a Flood Map.

### Background:

You are considering buying a new home on Water Street in Sampleville. Before you make any final decisions, you want to know the potential risk that this house could be flooded. To help you do this, you need to know if the property is in a Special Flood Hazard Area. If it is in the SFHA, you may also will want to find the flood insurance risk zone designation and Base Flood Elevation that apply to the property to help you determine the appropriate insurance rate.

### Step 1: Finding the Correct Panel:

To find the panel that covers the property, you will first refer to the index for the Sampleville Flood Map. By reviewing the index, you learn that the Flood Map you need was prepared in a Z-Fold format composed of four panels. The index title box indicates that all four panels (0001, 0002, 0003, and 0004) are printed. You then check the title boxes on individual panels to find Panel 0004

Background: You know that the property is on Water Street, which lies in the southeastern portion of the town, south of Interstate Highway 32. Although Water Street is not on the index, you may have determined from the north arrow and the major roads shown on the index that Water Street is on panel 0004.

### Step 2: Finding the General Location:

Using the panel number determined from the index, you obtained Panel 0004 that shows the property. Because the individual panel shows more physical landmarks than the index, you can find the general location by referring to features such as major roads or city limits.

Your property is located east of the main intersection of Oak Avenue, and Water Street. To find the specific property location, you will use known property dimensions and the Flood Map scale.

In addition, to find the specific location of the property, you may refer to a plat map of the property, tax assessor's map, or the property description found on the deed. The next page explains how to determine the specific location of the property.

### Step 3: Finding the Specific Location of the Property

You know the property lies on the northern side of Water Street, east of the intersection of Oak Avenue and Water Street.

First, you find the dimensions of the property on a tax assessor's map, a plat map, or in a legal description.

Then, you convert the known dimensions to inches using the Flood Map scale and measurements on the Flood Map panel.

For example, in a map scale where 1 inch=500 feet, you will find that 250 feet on the ground is equal to 1/2 inch on the Flood Map, and 50 feet on the ground is equal to 1/10 inch on the Flood Map. Continue to the next page for a description of how to determine the specific location using the map scale.

### Step 4: Identify the Flood Insurance Risk Zone of the Property

The property you are considering buying is partially in the Special Flood Hazard Area. In addition, the building on the property is partially in the SFHA. (Note: Current NFIP regulations indicate that if any portion of a building is in the SFHA, the entire building is considered to be in the SFHA.) You can now identify the flood insurance risk zone designation for the property by finding the zone label. The SFHA near the property is labeled Zone AE. The zone designation applies both to the portion of the property in the SFHA and to any building on that portion.

Occasionally, a property or building is shown in the SFHA on the map, but the property or building is higher than the BFE. This is often due to the limitations of the mapping.

To be sure whether a property or building should be in the SFHA, a comparison between the elevation of the property or building and the BFE should be performed. If the lowest elevation of the property or the lowest grade adjacent to the building (and, in some instances, the lowest floor including the basement of the building) are below the BFE, then the property or building are in the SFHA. If a property or building is inadvertently shown within the SFHA or if a property or building has been raised above the BFE by the placement of fill; FEMA can amend or revise the maps with a letter that states the property or building is not within the SFHA. These letters are called Letter of Map Amendment (LOMA) or Letter of Map Revision based on Fill (LOMR-F).

To make this determination, you need to know the lowest lot elevation, or the lowest adjacent grade at the building and in some instance the lowest floor (including basement) elevation. This usually will require an elevation survey of the property or building. Also, you will need to know the BFE at the site.

### Step 5: Identify the Base Flood Elevation at the Property

To estimate a Base Flood Elevation (BFE) at a property, the BFE lines (labels) shown near the property on the Flood Map can be used. For example, if BFE lines 109 and 110 are near the property, and 110 is the nearer of the two, you may estimate the BFE at the property by interpolating between the two base flood elevations. For an accurate elevation number, you refer to the flood profiles for the flooding source that appear in the Flood Insurance Study (FIS) report for the associated stream. However, the BFEs shown on the Flood Map are only accurate to plus or minus a half foot. For an accurate BFE, you should refer to the Flood Profiles or Flood Elevation Tables in the FIS report.

Some SFHAs do not have BFEs shown on the Flood Maps. These SFHAs are shown as zone A or zone V and where determined by approximate methods.

Possible sources for obtaining a BFE in these areas may be the community's planning, public works, engineering, environmental or transportation departments; the local district of the U.S. Army Corps of Engineers; or the State's Environmental, Natural Resources, or the Transportation Departments. Also a registered professional engineer could conduct an engineering analysis to determine the BFE at the site. Additional information regarding BFEs in these areas is available in the FEMA publication Managing Floodplain Development in Approximate Zone A Areas.

## **The Future of Flood Insurance Rate Maps**

### DFIRM: The Next Generation

The new Digital Flood Insurance Rate Map (DFIRM) product involves converting the existing inventory of manually produced Flood Maps into digital format. This conversion is designed to be the building block for a more robust, interactive, digital map, which may potentially include multiple hazards.

Linkages will be built into a database to allow access to the engineering back-up material used to develop the map (e.g., hydrologic and hydraulic models, flood profiles, floodway data tables, digital elevation models, and structure-specific data, such as digital elevation certificates and digital photographs of bridges and culverts).

The contents of the digital Flood Insurance Rate Maps will vary. Where accurate community vector data is available, community vector data will be utilized to show base map data as backdrops to flood data layers. If accurate community data is not available, digital aerial photography (Digital Ortho Quads (DOQs)) will be utilized as the base map layer.

## Glossary Terms

**1% Annual Chance Floodplain:** the boundary of the flood that has a 1-percent chance of being equaled or exceeded in any given year. Also known as the 100-year floodplain.

**1% Annual Chance Water-Surface Elevation:** the height, in relation to the National Geodetic Vertical Datum of 1929 (or other datum, where specified), of the flood having a 1-percent chance of being equaled or exceeded in any given flood year (also known as the 100-year flood or the base flood).

**100-year Flood:** the flood having a 1-percent chance of being equaled or exceeded in any given year; also known as the base flood. The 1-percent annual chance flood, which is the standard used by most Federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on an NFIP map has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage.

**100-year Floodplain:** the boundary of the flood that has a 1-percent chance of being equaled or exceeded in any given year. Officially termed the 1-percent annual chance floodplain.

**500-year Floodplain:** the boundary of the flood that has a 0.2-percent chance of being equaled or exceeded in any given year. Officially termed the 0.2-percent annual chance floodplain.

**Backwater:** the effect of downstream flow on the water-surface profile.

**Base Flood:** the flood having a 1-percent chance of being equaled or exceeded in any given year; also known as the 100-year flood. The base flood, which is the standard used by most Federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on an NFIP map has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage.

**Base Flood Elevation (BFE):** the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum of 1929, the North American Vertical Datum of 1988, or other datum referenced in the Flood Insurance Study report, or depth of the base flood, usually in feet, above the ground surface.

**Channel Bank Stations:** points that identify the extreme limits of the natural stream channel. These stations are typically assigned at locations along a cross section where a relatively flat area exists outside of the channel.

**Confluence:** a location where two streams or rivers meet.

**Contour:** a line on a map joining points of equal altitude.

**Critical Depth:** the depth of flow at which, for a given discharge at a given location, the total energy is the minimum value possible for flow to occur.

**Cross Section:** a line developed from topographic information across a floodplain at which a computation of flood flow has been made to establish a potential flood elevation. Cross sections are shown on the Flood Boundary Floodway Map, Flood Insurance Rate Map, and/or Flood Profiles of a Flood Insurance Study.

**Cubic feet per second (cfs):** typical units used to express the rate of flow of surface water in open channels. One cubic foot is approximately equal to 7.5 gallons per second.

**Datum:** a fixed starting point of a scale.

**Depth:** maximum depth of water in the cross section as measured below the water-surface elevation.



**Digital Flood Insurance Rate Map (DFIRM):** part of FEMA's Map Modernization Objectives; a spatial database with options that can be invoked depending on the available data. The DFIRM spatial database will include certain standard features and meet minimum mapping requirements. Additional enhancements will be included depending on community needs, available data, and funding. A review of needs and available data will lead to recommendations concerning which options to exercise.

**Discharge:** the volume of water that passes a given location within a given period of time. Usually expressed in cubic feet per second (cfs).

**Federal Emergency Management Agency (FEMA):** an independent agency of the Federal government, founded in 1979, which reports directly to the President. FEMA is responsible for identifying and mitigating natural and man-made hazards. The agency's mission is: to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery.

**Flood (also Flooding):** a general and temporary condition of partial or complete inundation of normally dry land areas. For flood insurance claim purposes, two or more structures must be inundated before flood damage will be covered.

**Flood Boundary Floodway Map (FBFM):** a pre-Map Initiatives floodplain management map that delineates the 100-year (1% annual chance) and 500-year (0.2% annual chance) floodplains, floodway, and cross sections.

**Flood Hazard Boundary Map (FHBM):** initial map issued by FEMA to identify approximate Special Flood Hazard Areas (SFHAs) within a community.

**Flood Insurance Rate Map (FIRM):** a map on which the 100-year (1% annual chance) and 500-year (0.2% annual chance) floodplains, Base Flood Elevations, and risk premium zones (and floodway information on Map Initiatives FIRMs) are delineated to enable insurance agents to issue accurate flood insurance policies to homeowners in communities participating in the National Flood Insurance Program.

**Flood Insurance Study (FIS):** an examination, evaluation, and determination of flood hazards and, if appropriate corresponding water-surface elevations. The resulting reports are used to develop Flood Insurance Rate Maps. Also known as a flood elevation study.

**Flood Profile:** a cross-sectional drawing showing the contiguous cross sections along a stream, with ground elevations and potential flood elevations plotted.

**Floodplain or Flood-Prone Area:** any land area susceptible to inundation by water from any source.

**Floodplain Management:** the operation of a program of corrective and preventative measures for mitigating flood damage, including, but not limited to, emergency preparedness plans, flood-control works, and floodplain management regulations.

**Floodway:** channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood discharge can be conveyed without increasing the elevation of the 100-year flood by more than a specified amount (1 foot in most states).

**HEC-2:** a step backwater program developed by the US Army Corps of Engineers Hydrologic Engineering Center for use in calculating water-surface profiles for steady, gradually varied flow in natural or man-made channels.

**Hydraulic Radius:** equal to (Area of cross section / Wetted Perimeter)

**Mannings “n” Roughness Coefficient:** coefficient used to account for the friction caused by earthen, vegetative, and/or man-made surfaces within a floodplain cross-section. The coefficient, n, is commonly used to represent flow resistance for hydraulic computations of flow in open channels. The procedure for selecting n values is subjective and requires judgment and skill that is developed primarily through experience. The expertise necessary for proper selection of n values can be obtained in part by examining characteristics of channels that have known or verified roughness coefficients. A table of Manning` values is available from the pull-down menu in the Quick-2 program.

**Map Initiatives:** a Flood Insurance Rate Map format developed in 1985 that incorporates information formerly shown on the separately printed Flood Boundary Floodway Map (FBFM) (e.g., floodways and cross-sections). Also referred to as combined Flood Insurance Rate Map/FBFM.

**Map Repository:** the location where a community's flood maps are kept; usually the local zoning and planning office.

**Map Service Center (MSC):** the Map Service Center (MSC) distributes National Flood Insurance Program (NFIP) products including: Digital Flood Insurance Rate Maps (DFIRM), Flood Insurance Rate Maps (FIRM), Flood Insurance Studies (FIS), Digital Q3 flood data, Community Status Book, Flood Map Status Information Service (FMSIS), and Letters of Map Change (LOMC).

**National Flood Insurance Program (NFIP):** federal insurance program under which flood-prone areas are identified and flood insurance is made available to residents of participating communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage.

**Normal Depth:** the depth expected for a stream when the flow is uniform, steady, one-dimensional, and is not affected by downstream obstructions or flow changes. This is the usual calculation that is utilized to determine Base Flood Elevations for property or structures in approximate Zone A) areas.

**Overbank:** the area of a cross section that is found outside of the channel bank stations on either side of the stream channel.

**Peak Discharge:** the peak volume of water that passes a given location within a given period of time. Usually expressed in cubic feet per second.

**Rating Curve:** a curve showing the relationship between depth of flow and the discharge of a stream at a given location.

**Scale:** a representative fraction of map distance to ground distance. Example: 1:12,000 is the representative fraction in which one unit of measure on the map is equal to 12,000 of the same units of measure on the ground. Federal Emergency Management Agency map scales are expressed in a ratio of map distance equal to a given number of feet on the ground.

**Special Flood Hazard Area (SFHA):** area inundated by the base flood, identified on the Flood Insurance Rate Map as Zones A, AE, AH, AO, AR, V, VE, or A99.

**Step-Backwater Analysis:** method used in Quick-2 (and other modeling programs) to analyze multiple cross-sections. Water-surface elevations are determined for all sections based on a given discharge. The initial water-surface elevation is automatically determined by the normal depth method or by a direct input of a water-surface elevation or depth.

**Water-Surface Elevation:** the height, in relation to the National Geodetic Vertical Datum of 1929 (or other datum, where specified) of floods of various magnitudes and frequencies in the identified floodplains of coastal or riverine areas.

**ZONE A:** corresponds to the 100-year floodplains that is determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

**Zone A99:** corresponds to areas of the 100-year floodplains that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

**Zone AE and A1-A30:** corresponds to the 100-year floodplains that is determined in the Flood Insurance Study by detailed methods. In most instances, Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

**Zone AH:** corresponds to the areas of the 100-year shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. The Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

**Zone AO:** corresponds to the areas of 100-year 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 flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the Flood Insurance Rate Map. Mandatory flood insurance purchase requirements apply.

**Zone AR:** results from the decertification of a previously accepted flood protection system that is being restored to provide protection from the 100-year or greater flood event.

**Zone D:** areas where there are possible, but undetermined, flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted. Mandatory flood insurance purchase requirements do not apply, but coverage is available. The flood insurance rates for properties in Zone D are commensurate with the uncertainty of the flood risk.

**Zone V:** corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no Base Flood Elevations are shown within this zone. Mandatory flood insurance purchase requirements apply.

**Zone VE:** corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

**Zone B, C, and X:** correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. No Base Flood Elevations or depths are shown within this zone.