G284.1— FLOODWAY STANDARDS

INTRODUCTION

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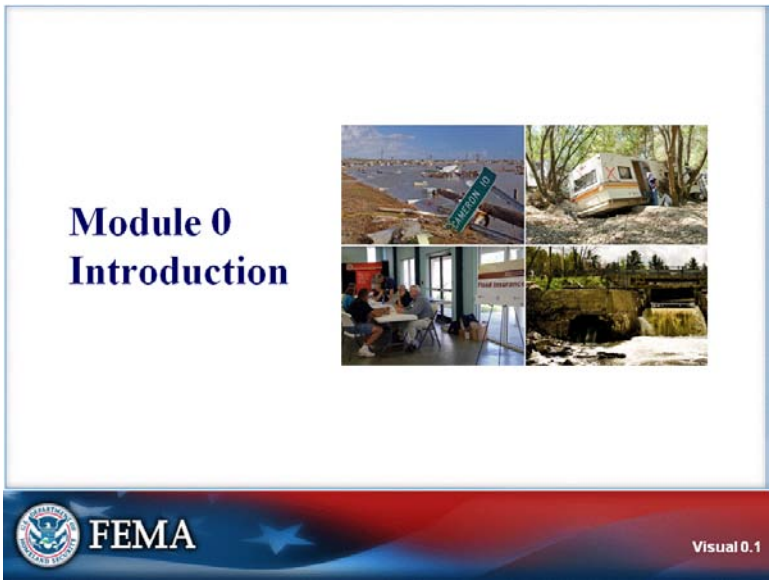
COURSE INTRODUCTION

Visual 0.1

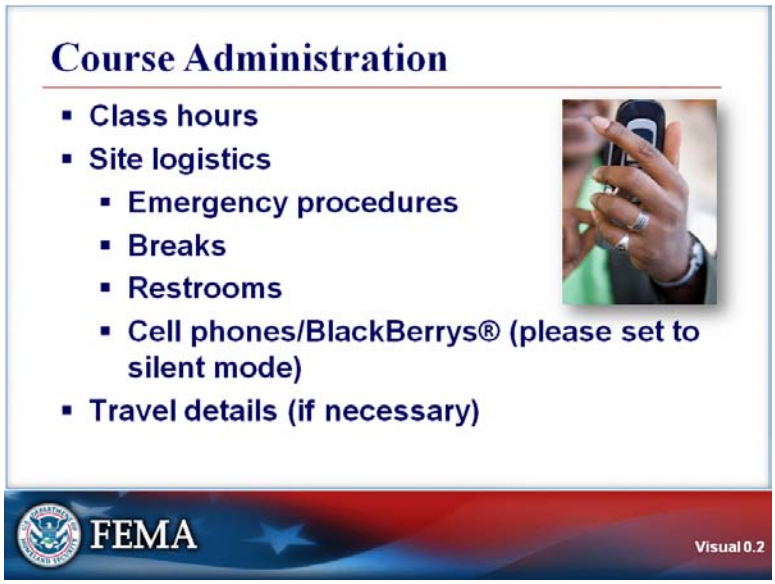


Key Points

This module serves as an introduction to G284.1—Floodway Standards.

COURSE ADMINISTRATION

Visual 0.2



Key Points

The instructor will present information about the class hours, this site, and travel details, if necessary.

INTRODUCTIONS

Visual 0.3

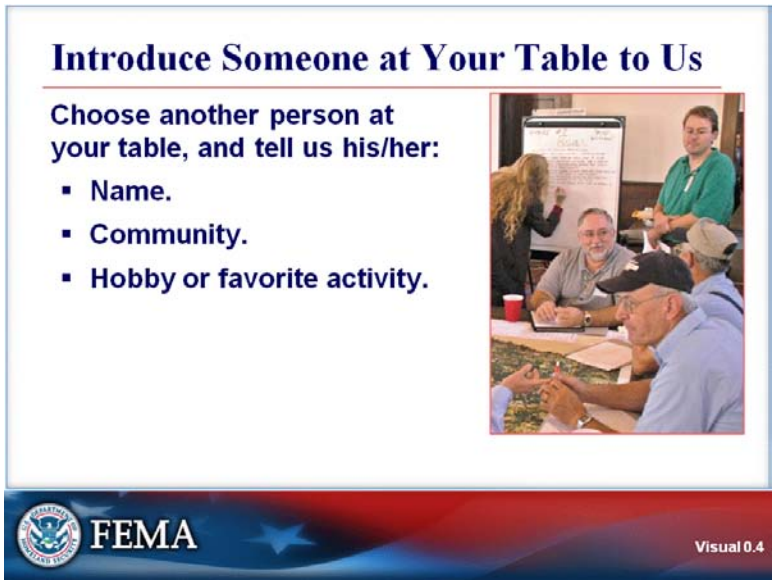
Key Points

Introduce yourselves to the members of your table group. Provide:

- Name.
- Community.
- Floodplain Manager (FPM) position in your community.
- Floodplain management concerns/need for improvement.
- A hobby or favorite activity.

INTRODUCTIONS

Visual 0.4



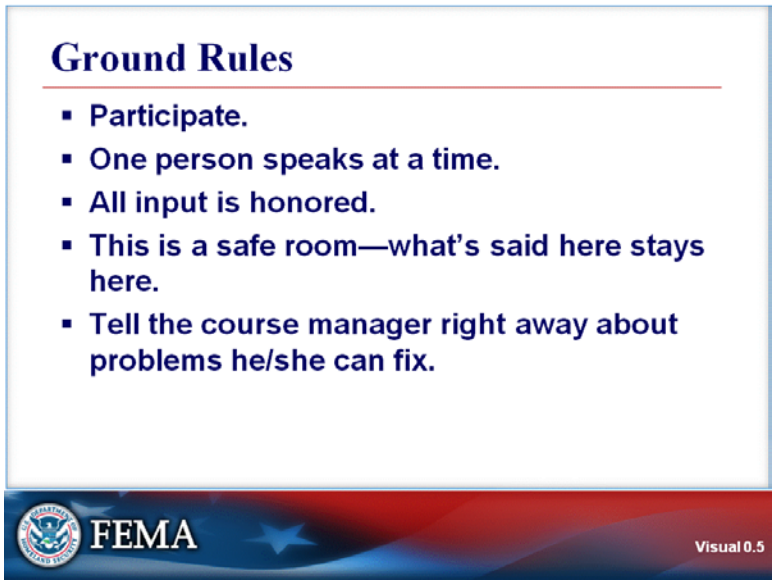
Key Points

Introduce one person at your table to the rest of the group by presenting his or her:

- Name.
- Community.
- Hobby or favorite activity.

GROUND RULES

Visual 0.5



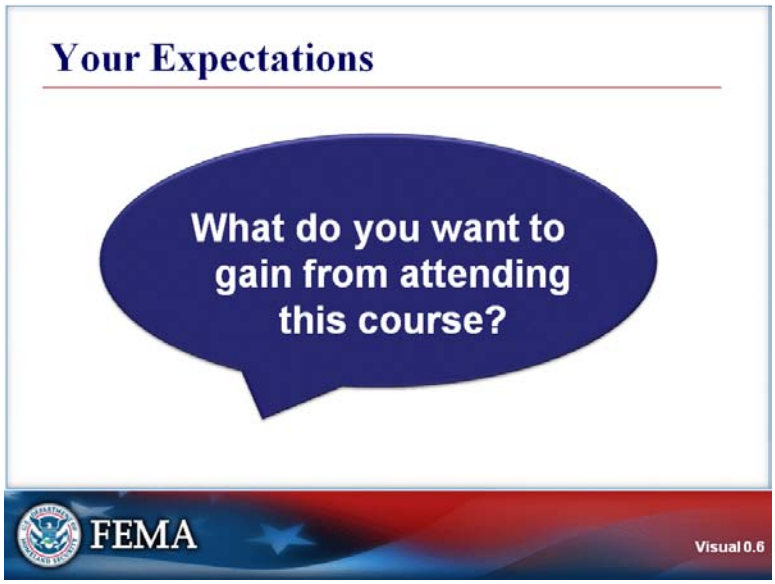
Key Points

The course ground rules are:

- Participate.
- One person speaks at a time.
- All input is honored.
- This is a safe room—what's said here stays here.
- Tell the course manager right away about problems he/she can fix.

EXPECTATIONS

Visual 0.6



Key Points

Discussion Question: What do you want to gain from attending this course?

G284.1—FLOODWAY STANDARDS

MODULE 1

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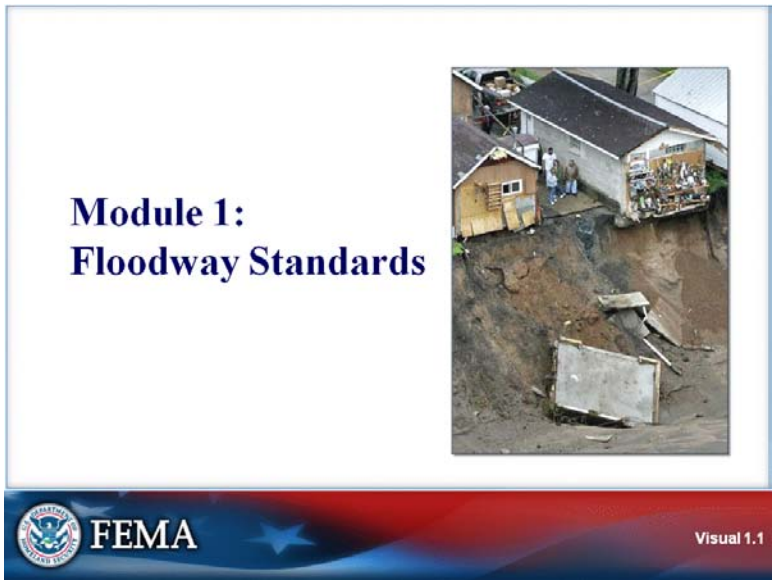
INTRODUCTION

Visual 1.1

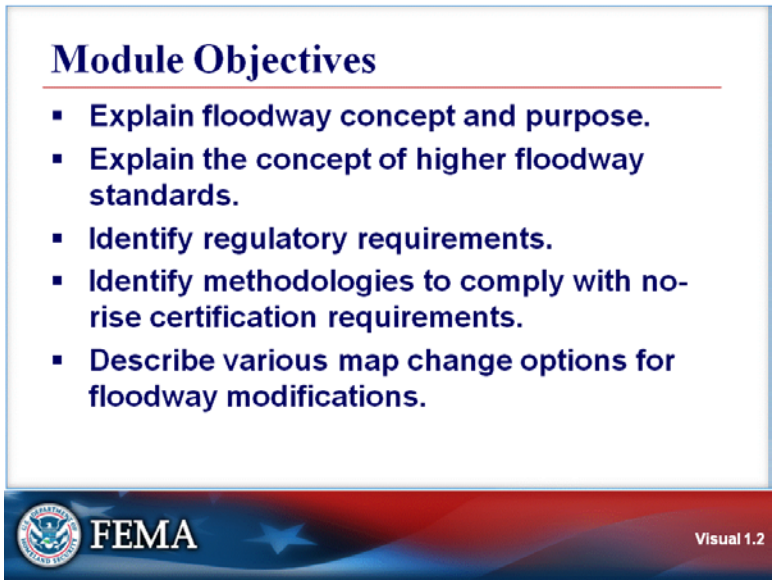


Key Points

This module will examine floodway regulations, and address issues related to floodways.

INTRODUCTION

Visual 1.2



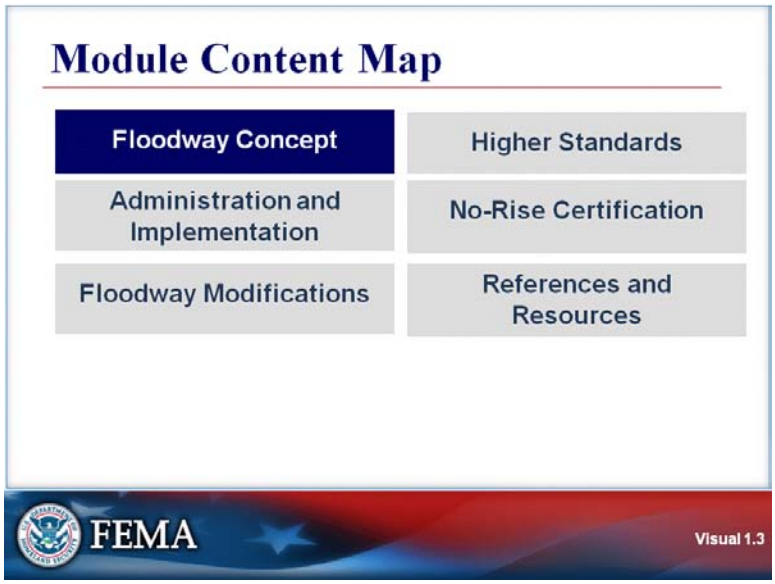
Key Points

After completing this module, you will be able to:

- Explain floodway concept and purpose.
- Explain the concept of higher floodway standards.
- Identify regulatory requirements.
- Identify methodologies to comply with no-rise certification requirements.
- Describe various map change options for floodway modifications.

FLOODWAY CONCEPT

Visual 1.3

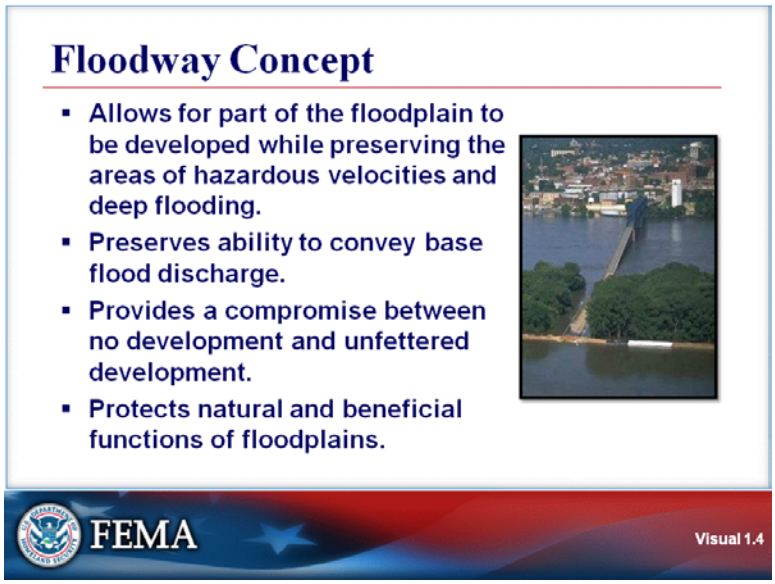


Key Points

The first section of this module will explain the concept of the floodway.

FLOODWAY CONCEPT

Visual 1.4



Key Points

The regulatory floodway is reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

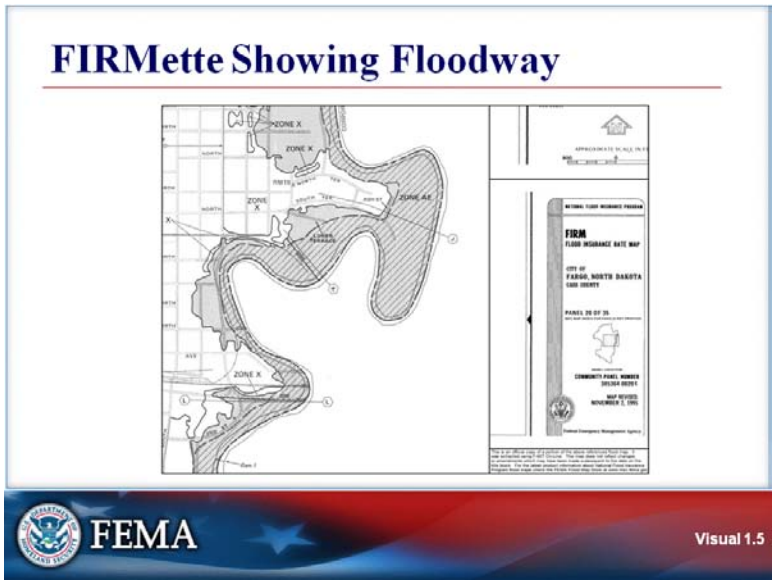
The floodway:

- Allows for part of the floodplain to be developed while preserving areas of hazardous velocities and deep flooding from being developed.
- Preserves the ability to convey base flood discharge.
- Provides a compromise between outright prohibition of development and unfettered floodplain development.
- Protects the natural and beneficial functions of floodplains.

The floodway can protect substantial portions of the natural and beneficial functions of a floodplain. However, communities may allow development in the floodway fringe areas.

FLOODWAY CONCEPT

Visual 1.5



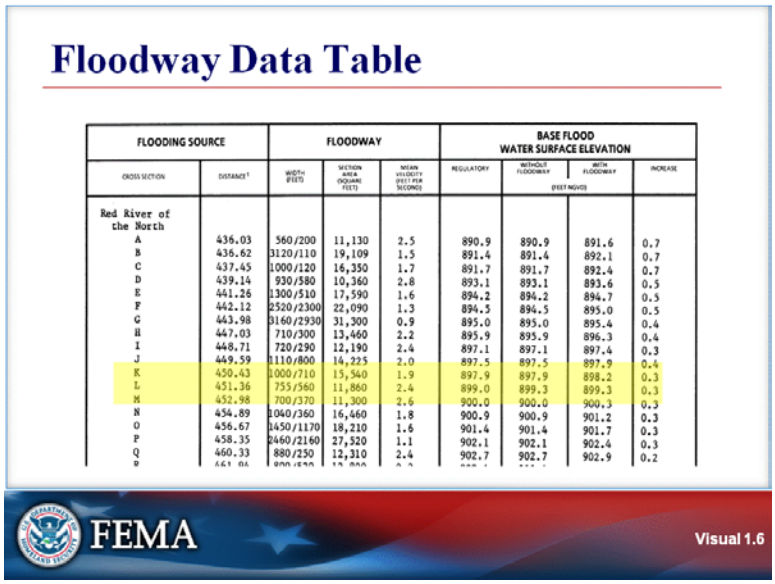
Key Points

This FIRMette was obtained by using FEMA's online Map Service Center, and shows a portion of the floodplain of Red River of the North in Fargo, North Dakota.

Note that the FIRMette shows the floodway (area marked with slanted lines), floodplain, and areas of moderate flood hazard (shaded X).

FLOODWAY CONCEPT

Visual 1.6



Key Points

The Floodway Data Table is connected to the Flood Insurance Rate Map (FIRM). Note that cross-sections K, L, and M on the Red River of the North FIRMette each correlate to one row of highlighted data for the cross-section in the Floodway Data Table.

The Floodway Data Table columns contain the following information:

The distance is the number of miles from the mouth or reference location measured upstream to the cross-section.

The next three columns are physical measurements associated with the floodway.

- The width is the total floodway length. This is the length of the cross-hatched area from one side of the floodway boundary to the other.
- The section area is the cross-sectional area at that location of the waterway.
- The mean velocity is the average velocity of the water flowing through the floodway at that cross-section.

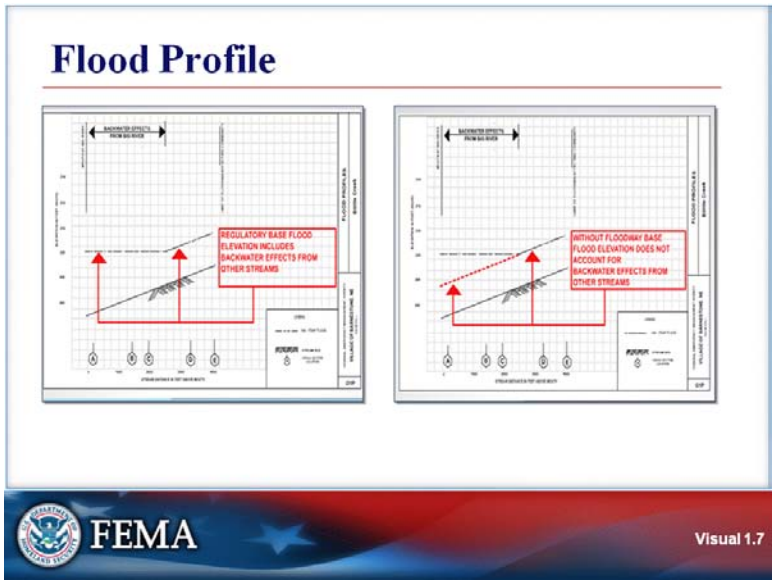
FLOODWAY CONCEPT

The Base Flood Water Surface Elevation columns represent the one-percent chance flood elevations under different conditions:

- Regulatory elevation includes any backwater effects from other waterways or bodies of water.
- Without floodway, elevation does not account for encroachment into the floodplain.
- With floodway, elevation takes into account the increase caused by the encroachments in the floodway fringe areas in their entirety.
- The increase is the amount the elevation changed at the cross-section due to the encroachments. The maximum increase is 1.0 foot unless there are higher standards such as in Minnesota, which stipulates a maximum increase of 0.5 foot.

FLOODWAY CONCEPT

Visual 1.7



Key Points

The visual shows two flood profiles of the same stream for the one percent or 100-year flood.

- Note that the flood profiles in the FIS typically show more than one profile.
- The FIS profiles usually include 10 percent (10-year), two percent (50-year), one percent (100-year), and 0.2 percent (500-year) flood profiles.

The profile on the left shows the Regulatory Base Flood Elevation, which includes backwater effects from other streams.

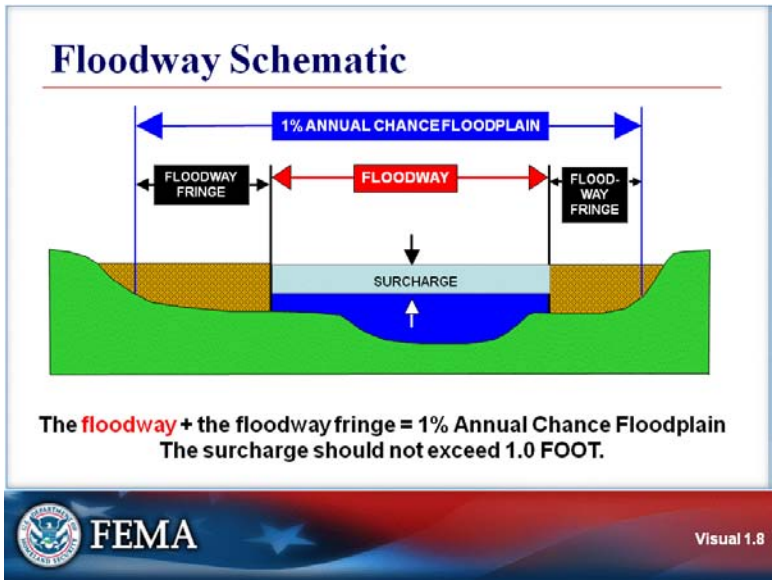
The profile on the right shows the Without Floodway Base Flood Elevation, which does not account for:

- The backwater effect from other streams.
- The encroachments in the floodway fringe areas in their entirety.

Note the difference between the Base Flood Elevation (BFE) levels on the left side of the profiles due to inclusion of backwater effects.

FLOODWAY CONCEPT

Visual 1.8



Key Points

The floodway is not something you can see when you look at a river.

- A hydraulic computer model (usually U.S. Army Corps of Engineers Hydrologic Engineering Center's (HEC-2) or Hydrologic Engineering Centers River Analysis System (HEC-RAS) identifies the floodplain and floodway.
- Discharge is the amount of flow through the cross-section area times the average velocity. The model squeezes the floodplain by removing equal amounts of conveyance from the ends of each cross-section.
- The floodway boundary is set when the maximum surcharge is reached to one foot at any cross-section along the waterway.

The visual animation demonstrates the following features of the floodway.

- View #1 shows the shape of the floodplain and stream level at a cross-section.
- View #2 shows the location of the floodplain for the one-percent flood.
- View #3 shows the encroachments such as fill or other development in the floodplain.
- View #4 shows a rise in the water level caused by the obstructions. The rise is called the surcharge and should not exceed 1.0 foot. The allowable surcharge establishes the floodway boundaries.
- View #5 shows the floodway and the floodway fringes on either side.

The view of the floodway shown in the visual is looking upstream.

Floodways are important to convey floodwaters. Preserving floodways prevents development from occurring in floodways that will increase flood heights and damages upstream properties.

FLOODWAY CONCEPT

Conveyance can be shown in mathematical form as follows:

$$Q_{100} = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

Where:

Q_{100} = 1 percent (100-year) flood discharge

n = Manning's roughness factor (weighted for the entire cross-section)

A = Cross-section area

R = Hydraulic Radius = $\frac{A}{P}$

Where P = wetted perimeter

S = Slope of energy line

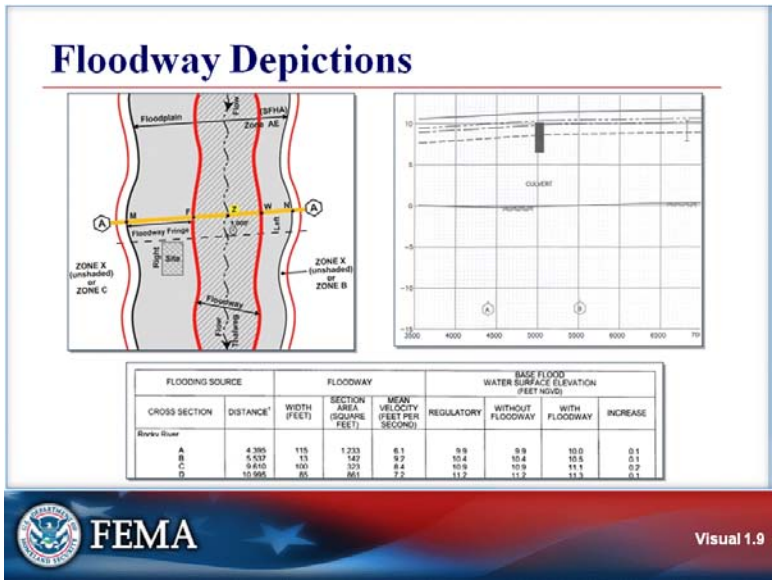
$$Q_{100} = K S^{1/2}$$

Where

K = Conveyance, $\frac{1.486}{n} A R^{2/3}$

FLOODWAY CONCEPT

Visual 1.9



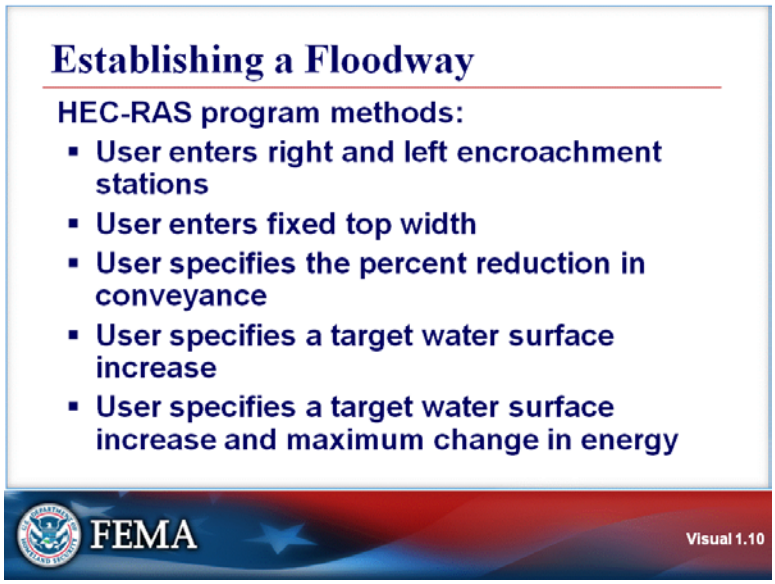
Key Points

Shown in the visual are alternative methods to depict the floodway.

- At the top left is a portion of a flood map that shows the floodway.
- At the top right is a flood profile showing cross-sections A and B.
- At the bottom is an excerpt from the Floodway Data Table with each row showing data for the cross-section labeled in column 1.

FLOODWAY CONCEPT

Visual 1.10



Key Points

Different methods are available for defining the floodway in the hydraulic model.

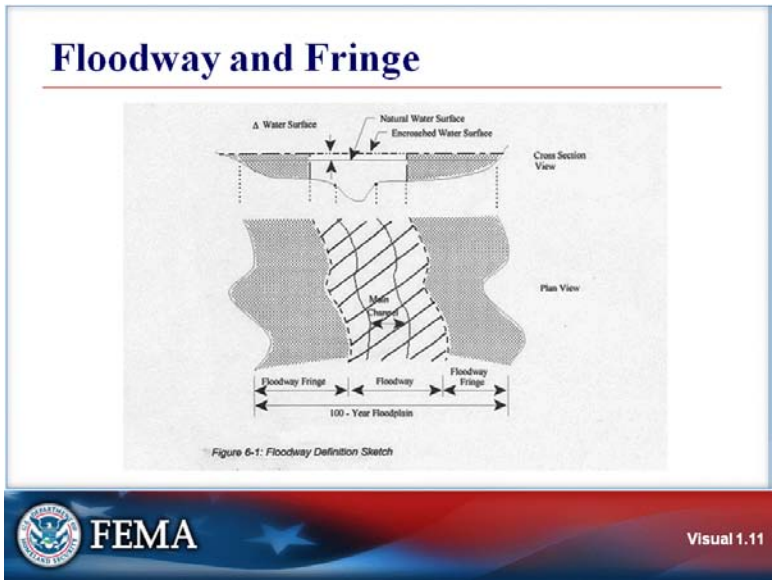
HEC-RAS program methods include:

- User enters right and left encroachment stations.
- User enters fixed top width.
- User specifies the percent reduction in conveyance.
- User specifies a target water surface increase.
- User specifies a target water surface increase and maximum change in energy.

Note that the hydraulic model may contain many more cross-sections than those shown in floodway data tables and flood profiles. Water surface profiles are plotted with a constant slope between cross-sections. If split or diverted flow paths are identified in the model, the applicable profiles for each of those paths must be plotted separately.

FLOODWAY CONCEPT

Visual 1.11



Key Points

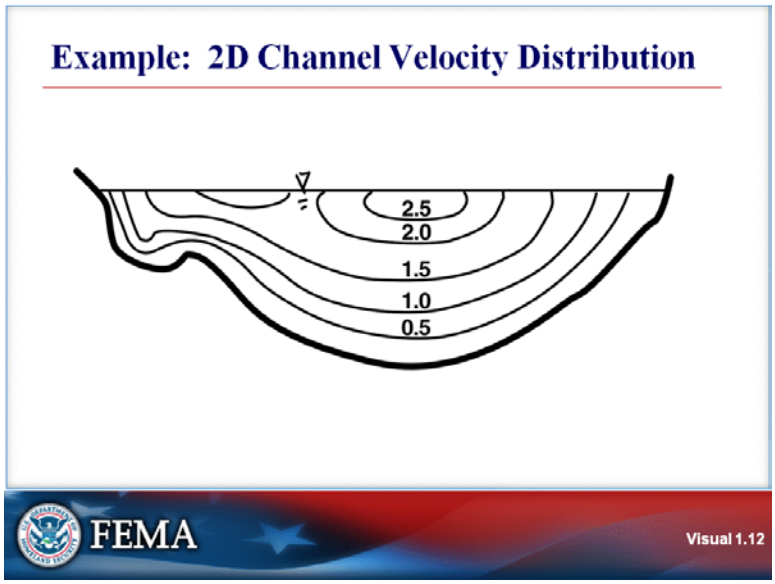
The diagrams in the slide show a cross-section view and a plan view of a floodway and floodway fringe.

Note that the cross-section view shows the difference between the natural water surface and the encroached water surface.

In the plan view, note that the floodway combined with the floodway fringe is the one-percent chance floodplain.

FLOODWAY CONCEPT

Visual 1.12



Key Points

Distribution of the flow velocity within the channel is important to calculate when establishing a floodway.

The diagram in the visual shows an example of velocity distribution in a channel.

- Each numbered line represents lines of specific velocity, similar to numbers representing elevations on a topographic map.
- As you can see, the velocity tends to increase as you move away from the channel boundary and approach the center of the stream and towards the surface.

Channel velocity can be calculated using the following formula: $Q = AV_{avg}$

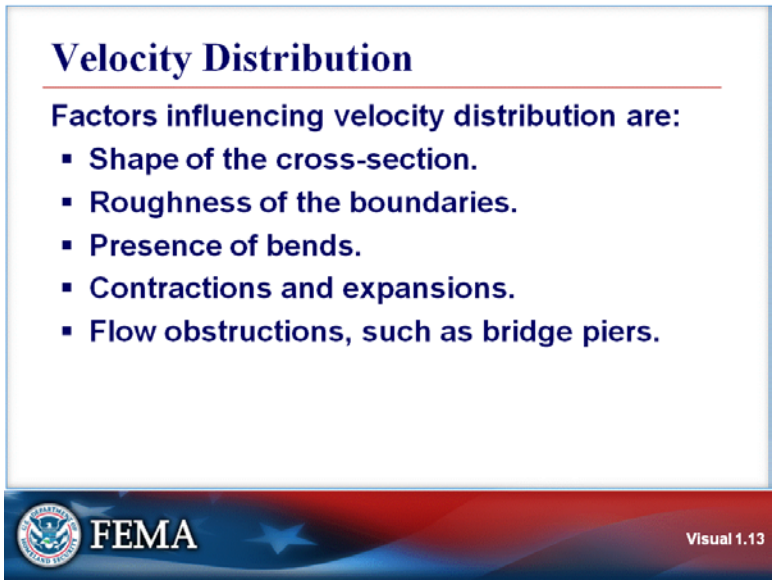
- Q = Discharge in cubic feet per second
- A = Area in square feet
- V_{avg} = Average velocity in feet per second

Q = AV truly applies only to uniform flow in pipes and manmade concrete channels, for example. However, we can also use it for calculations in natural channels.

Looking at the individual velocities in the diagram, you can guess that the average velocity in the channel is probably about 1.5 feet per second.

FLOODWAY CONCEPT

Visual 1.13



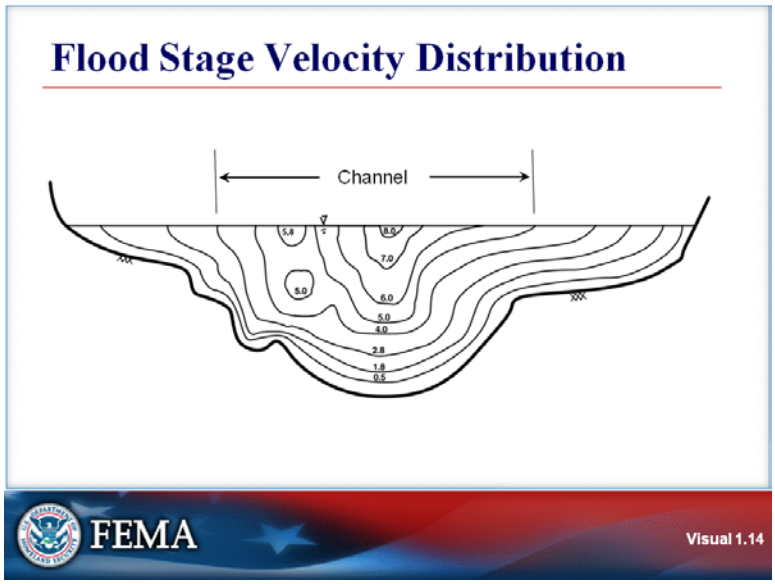
Key Points

In addition to the factors listed in the visual, channel slope from one cross-section to the next affects velocity distribution.

Slope may not necessarily change the distribution across the section, but it will definitely affect the average velocity. If the slope increases, the average velocity will also increase.

FLOODWAY CONCEPT

Visual 1.14

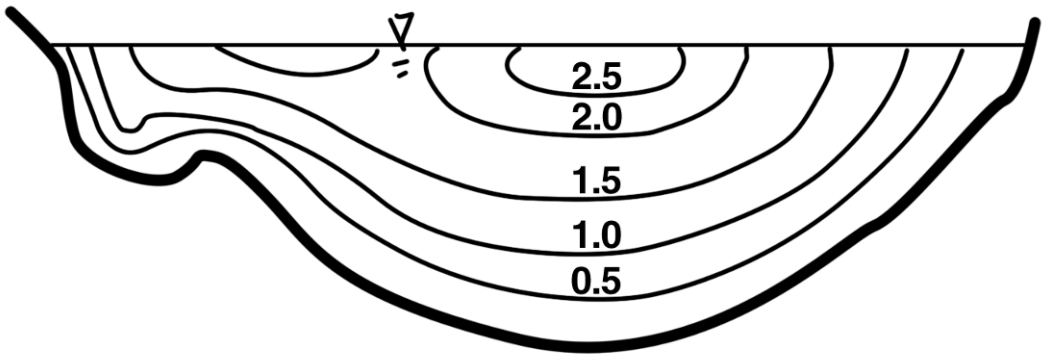


Key Points

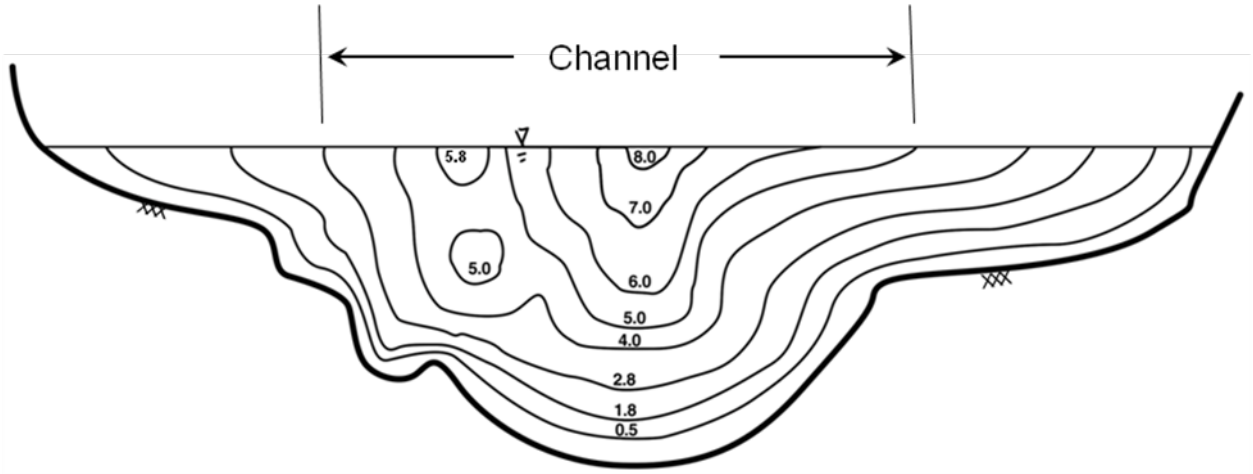
This visual shows the same channel at flood stage.

Velocity in the channel has increased significantly now that channel and overbank areas are in flood stage. Note that the former 1.5 feet per second line went up to 4.0 feet per second.

FLOODWAY CONCEPT



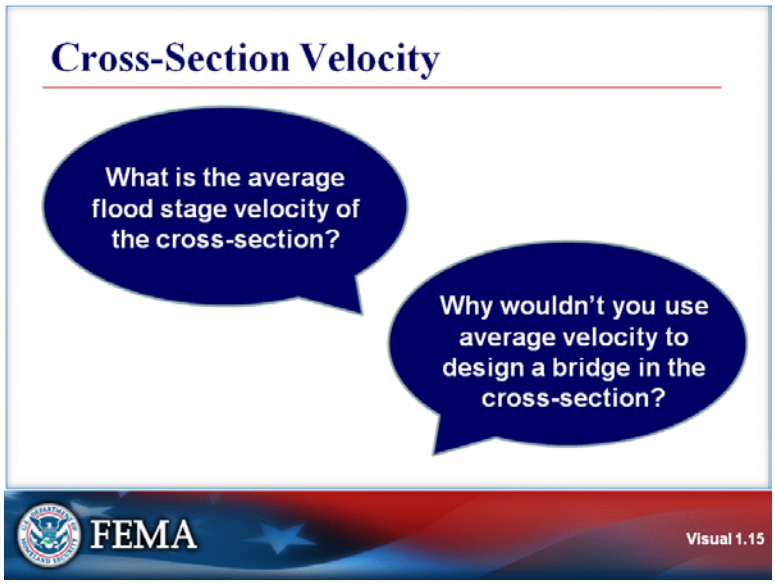
Channel Velocity Distribution: Normal Flow
Note: 50% (2-year) Flood



Channel Velocity Distribution: Flood Stage

FLOODWAY CONCEPT

Visual 1.15



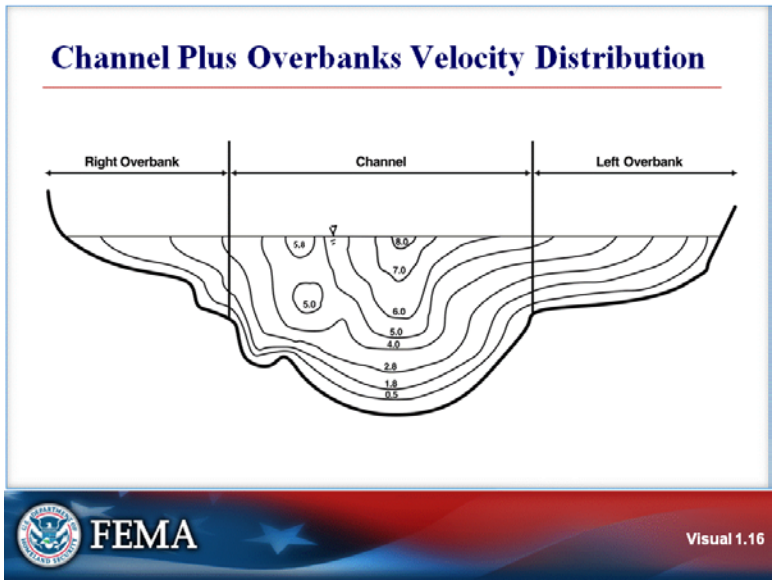
Key Points

Discussion Question: What is the average flood stage velocity of the cross-section?

Discussion Question: Why wouldn't you use the average velocity to design a bridge in the cross-section?

FLOODWAY CONCEPT

Visual 1.16



Key Points

The visual shows the cross-section in the channel and the left and right overbanks at flood stage. Note that when looking at a cross-section diagram, the viewer is positioned behind the diagram, looking downstream.

The average velocity in the channel, between the vertical lines, is probably about 4.0 feet per second.

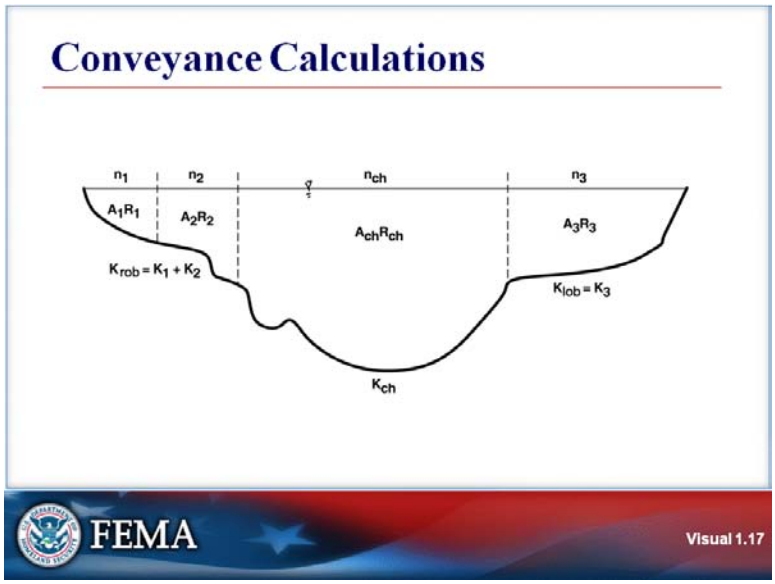
The average velocity in the left overbank is probably about 3.0 feet per second.

The average velocity in the right overbank is about 2.0 feet per second.

Note that the left overbank has a higher velocity than the right overbank. The left overbank has a greater flow of water.

FLOODWAY CONCEPT

Visual 1.17



Key Points

The default approach used in HEC-RAS for calculating conveyance is to subdivide flow in the overbank areas using the input cross-section n-value break points (locations where n-values change) as the basis for subdivision.

Conveyance is calculated within each subdivision using the Manning's equation, a method for calculating flow in an open channel.

The Manning's equation calculates flow based on the following factors:

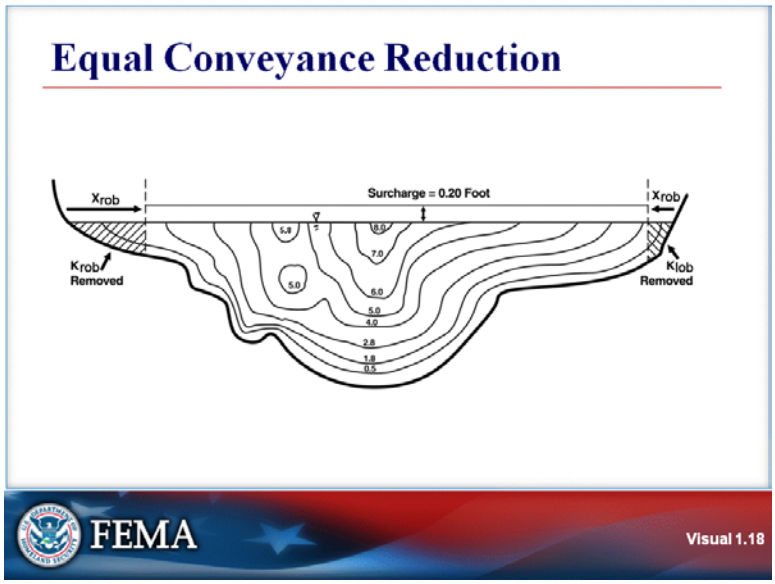
- Average velocity in the cross-section
- Surface roughness of the channel and overbanks
- Wetted perimeter
- Cross-section area
- Hydraulic radius
- Slope

The HEC-RAS program sums up all the incremental conveyances in the overbanks to obtain conveyance for the left overbank and the right overbank.

The main channel conveyance is normally computed as a single conveyance element unless "n" values change within the channel. The total conveyance for the cross-section is obtained by summing the three subdivision conveyances (left overbank, channel, and right overbank).

FLOODWAY CONCEPT

Visual 1.18



Key Points

The HEC-RAS default method uses the following approach:

- Encroachments are made from the edges of the floodplain from both sides by a **distance that reduces conveyance** by an equal amount from both the left and right overbanks.

- Conveyance removed from the left overbank equals conveyance removed from the right overbank.

Note that the distance of the right overbank encroachment is much greater than the left overbank encroachment.

In the next step of equal conveyance reduction, encroachments are increased on each side.

Again, the distance encroached on the right overbank is greater than the distance encroached on the left overbank.

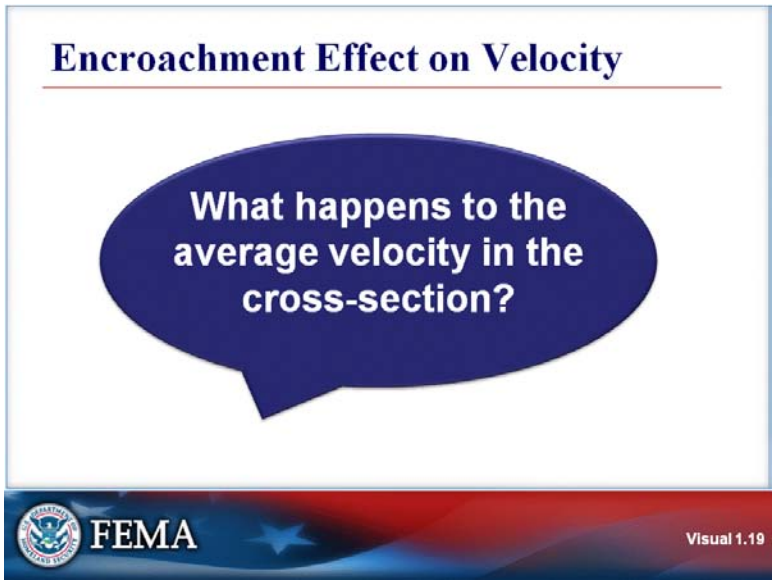
What happens to the average velocity in the cross section?

It increases.

Removing water from the edges where velocity is low and putting it in the remaining floodplain where the surcharge occurs increases the flood stage. This process is repeated for all cross-sections throughout the waterway for every iteration.

FLOODWAY CONCEPT

Visual 1.19

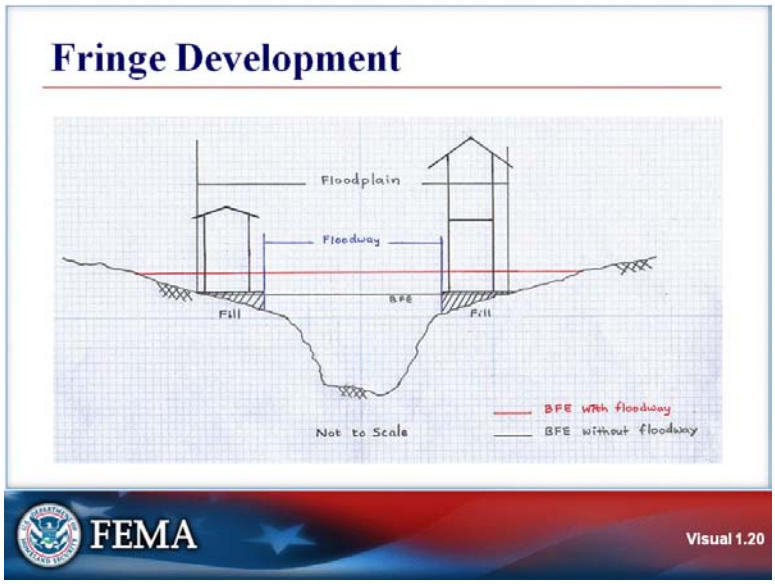


Key Points

Discussion Question: What happens to the average velocity in the cross-section?

FLOODWAY CONCEPT

Visual 1.20



Key Points

The diagram in the visual portrays how the BFE will rise as the fringe becomes developed to the full extent.

A community's 30-year plan may identify an area to be fully developed. Designation of a floodway in the area leaves the fringe area open for development.

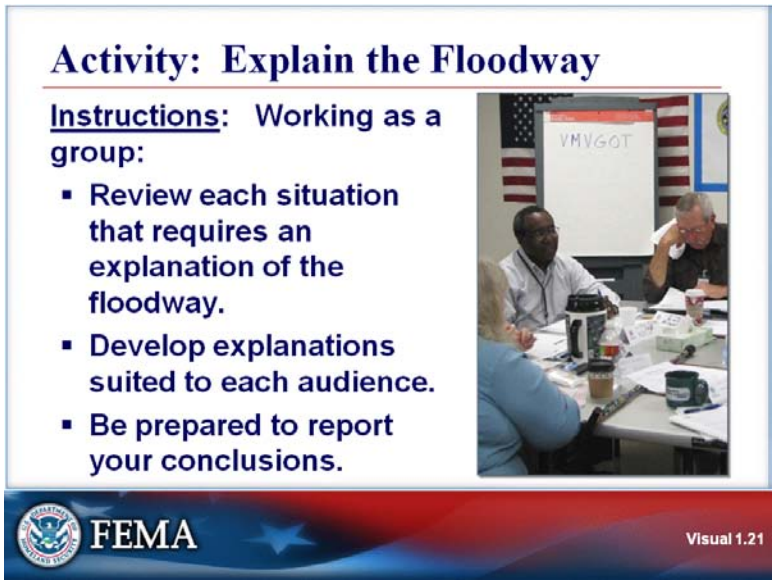
In the diagram, the houses on either bank were built on fill to the BFE that would be effective if there were no floodway.

- Floodway designation resulted in an increase in BFE to account for fringe development.
- The houses are now below BFE.

The community may require elevation of future development in the floodplain above the BFE in anticipation of BFE increases. Additional elevation requirements are termed "freeboard."

FLOODWAY CONCEPT

Visual 1.21



Key Points

Activity Purpose: The purpose of this activity is to give you the opportunity to practice explaining the floodway to various audiences.

Instructions: Working as a group:

1. Review each situation that requires an explanation of the floodway.
2. Develop explanations suited to each audience.
3. Be prepared to report your conclusions.

Time: 15 minutes

Situations:

1. A community has a new floodway defined on a DFIRM update. Develop explanations for each of the following audiences:

   a. Local elected officials

   b. The general public

   c. Other local departments

FLOODWAY CONCEPT

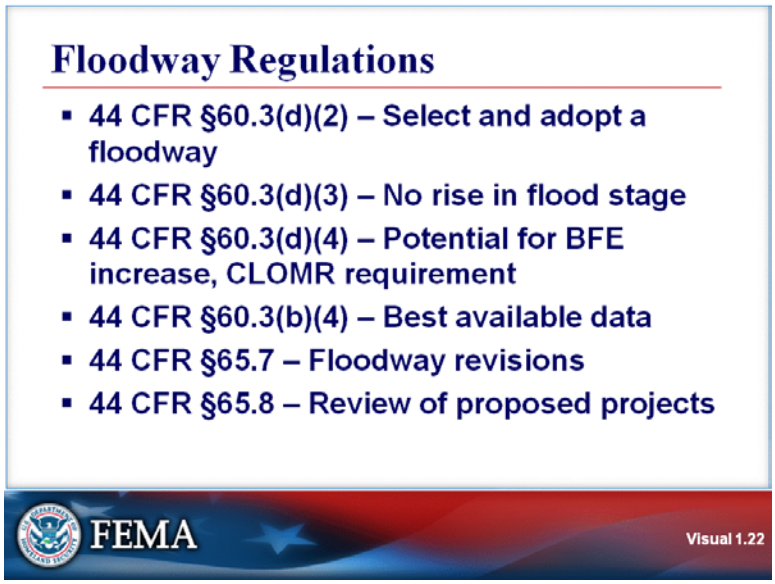
Activity: Explain the Floodway: (Continued)

2. A developer wants to change the method by which the floodway was identified in the effective FIS by using a different method than "equal conveyance reduction."

   Provide an explanation of the option of using a different floodway modeling option.

FLOODWAY CONCEPT

Visual 1.22



Key Points

Consider the following situation relating to the application of floodway regulations.

- A developer in your community wants to relocate the floodway area to the right side of the current floodway (looking downstream) 200 feet farther into the floodplain, extending the floodplain.

- On the other side of the river is another community. The other community wants the floodway to remain as is.

The communities will need to come to an agreement about whether the floodway should be changed.

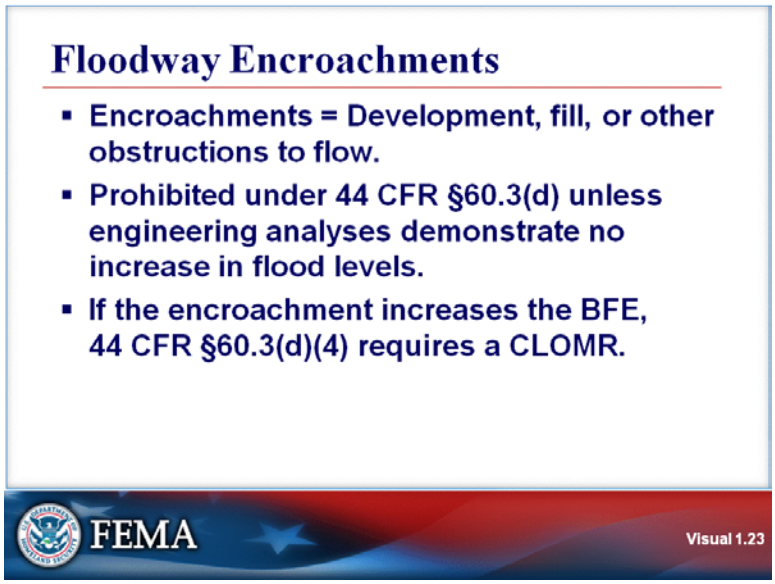
If the floodway is relocated, the Flood Insurance Rate Map (FIRM) will need to be revised. The floodway and floodplain boundaries will need to be changed, and the one-foot surcharge cannot be exceeded in the revised floodway.

The steps to select and adopt a new floodway for this community are:

- Propose to revise the floodway and floodplain boundaries and discuss the proposal with adjacent communities.
- Conduct an appeals process upon concurrence from all affected communities.
- Verify if insurable structures exist in the area of BFE increase.
- If no insurable structures exist, follow through with the Conditional Letter of Map Revision (CLOMR) request to FEMA.
- Submit as-built development data and certified as-built plans to effect FIRM revision. (Note: CLOMR does not revise the FIRM.)

FLOODWAY CONCEPT

Visual 1.23



Key Points

Floodway encroachments are any types of development that become obstructions to flow. Anything placed in a floodway is an encroachment.

Encroachments are prohibited under 44 CFR §60.3(d) unless engineering analyses demonstrate no increase in flood levels.

If an encroachment in a floodway will increase the BFE, the community may permit the encroachment by first applying for a Conditional Letter of Map Revision (CLOMR) in accordance with 44 CFR §60.3(d)(4) and §65.12, which detail requirements for a CLOMR. Refer to 44 CFR Part 72 for procedures and fees for processing map changes.

There are some things that need to be consistent in the models.

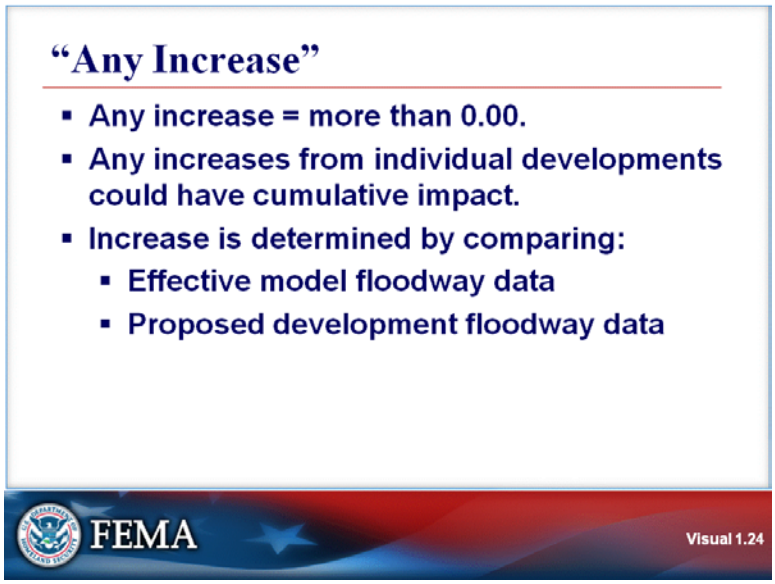
- Input values cannot change.

- In an engineering analysis for the No-Rise Certification, the hydraulics will change due to proposed encroachment. The hydrology, or flood discharges, may not change; however, unless the changes in flood discharges will be statistically significant.

Any development within the floodway needs analysis.

FLOODWAY CONCEPT

Visual 1.24



Key Points

Increases in floodway levels can be cumulative. For example:

- Several developments over time caused increases of 0.05, 0.1, 0.08, and 0.3.
- Individually considered, the increases don't seem to be significant, but when added together water elevations increase by over a half-foot.

The increase is determined by comparing:

- The current effective floodway data information (hydraulic model).
- Floodway data that will result from the proposed development.

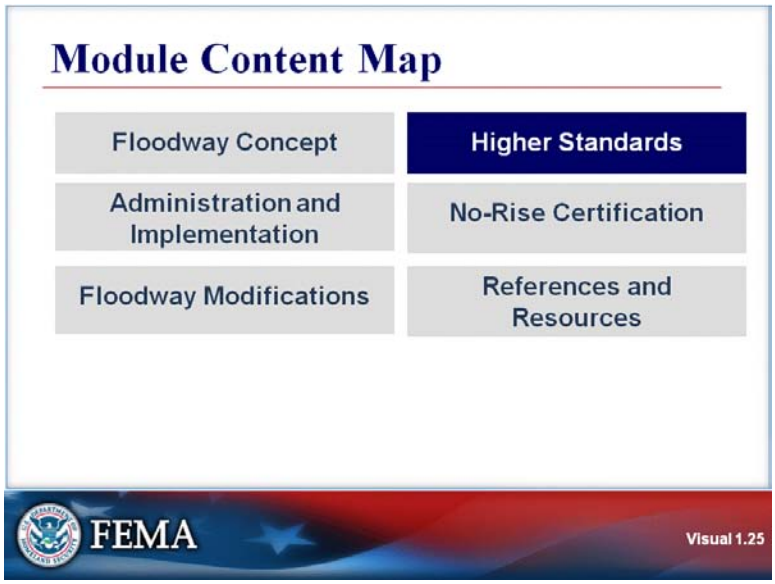
The current effective floodway data information is established in the current effective Flood Insurance Study (FIS) for the community.

Floodway data resulting from the proposed development is established by an engineering study, which revises the effective hydraulic model by incorporating additional cross-sections through and near the proposed development.

Remember cross-sections that are not located within the project area may not even be seen by the model to evaluate the impact of the proposed development.

HIGHER STANDARDS

Visual 1.25

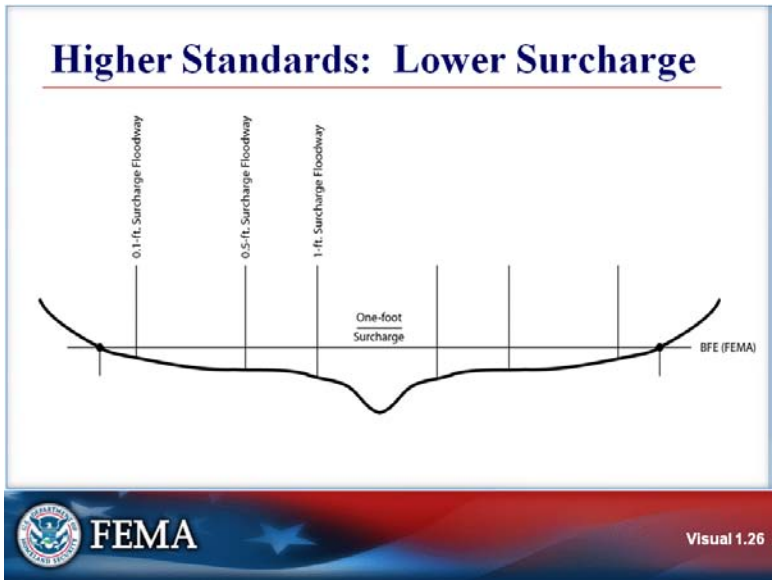


Key Points

The next section of this module will discuss higher standards for floodways.

HIGHER STANDARDS

Visual 1.26



Key Points

The diagram in the visual shows a cross-section view of a floodway.

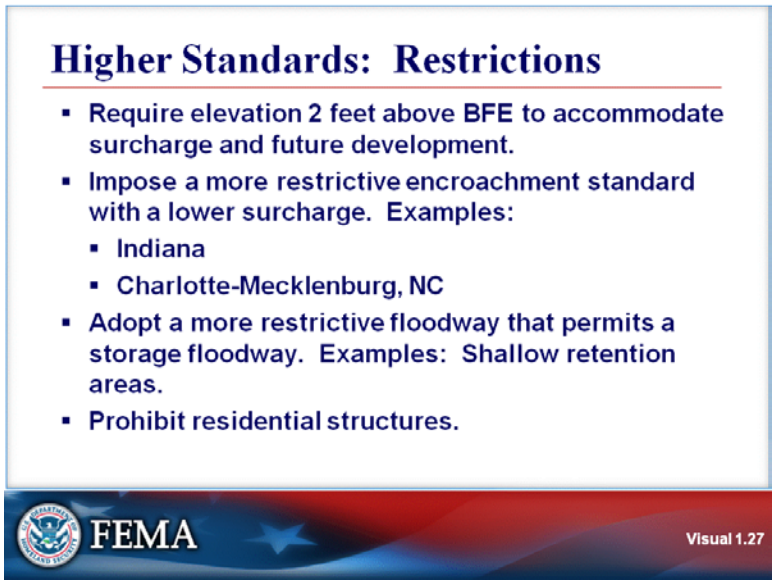
Note that the two lines on either side of the center, labeled 1-foot surcharge floodway, represent the boundaries of the floodway with a one-foot surcharge.

The diagram illustrates two alternative higher standards. Each alternative widens the floodway horizontally.

- The first alternative designates the floodway boundaries where the surcharge is 0.5 foot. The lines labeled 0.5-ft. floodway show floodway width.
- The second alternative designates the floodway boundaries where the surcharge is 0.1 foot. The lines labeled 0.1-ft. floodway indicate floodway width.

HIGHER STANDARDS

Visual 1.27



Key Points

Elevation 2 feet above BFE is recommended to accommodate surcharge and future development.

A more restrictive surcharge of less than one foot is a higher standards option. Some States and local jurisdictions have more restrictive surcharge standards. Examples are Indiana and Charlotte-Mecklenburg, NC.

A more effective or restrictive encroachment standard is another possibility. A lower surcharge results in a wider floodway that will be left free of encroachment.

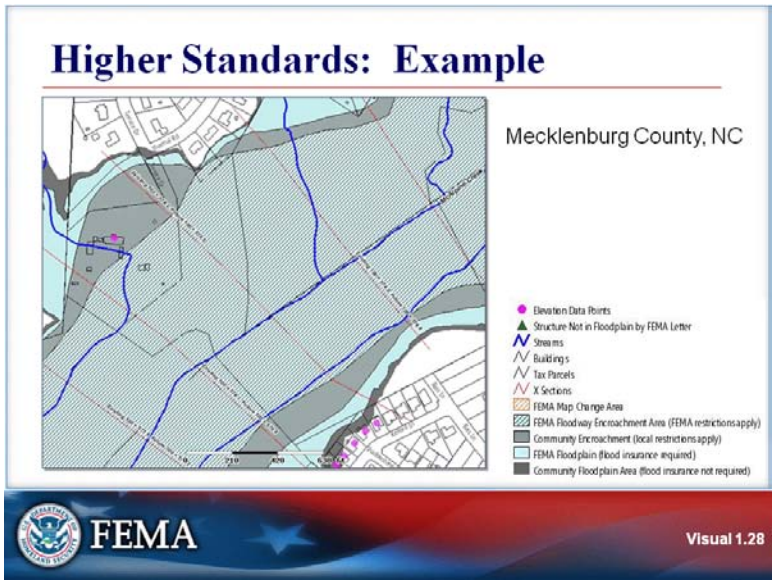
A more restrictive floodway may permit a storage floodway. Examples of storage floodways are shallow, vegetated retention areas, which may also serve as stormwater treatment areas.

Another higher standard is prohibition of residential structures in floodways. Zoning ordinances should include the same restrictions.

CRS points are available for more restrictive floodway standards.

HIGHER STANDARDS

Visual 1.28



Key Points

Mecklenburg County, NC is a Cooperating Technical Partner (CTP) and develops its own maps.

The County has established two floodways.

- One floodway is based on a 0.5-foot surcharge and is called a "FEMA Floodway Encroachment Area." 44 CFR §60.3(d)(3) is applied to demonstrate "no rise."

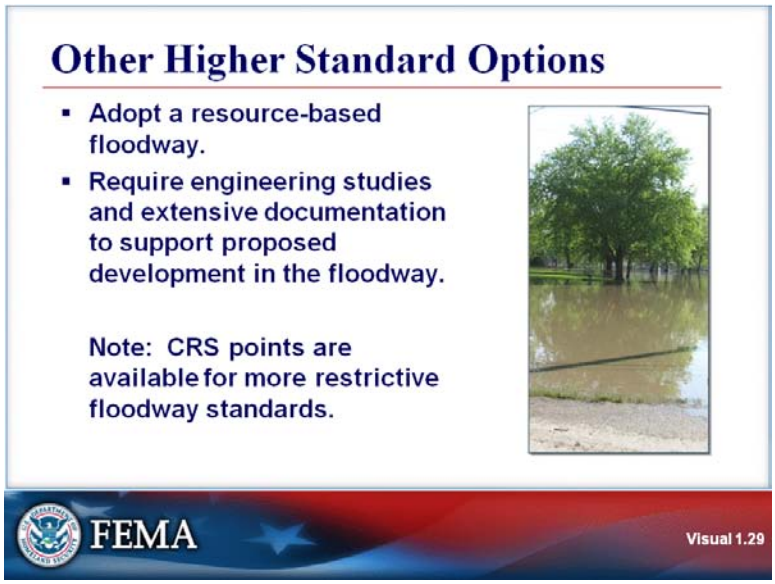
- The second floodway is based on a 0.1-foot surcharge. Local restrictions apply, with a rise up to 0.1-foot allowed. If a structure is impacted, a variance must be issued.

The County established a "Community Floodplain Area" based on future conditions.

The County also chose to use vector topographic maps with building footprints instead of ortho topographic photos.

HIGHER STANDARDS

Visual 1.29



Key Points

A resource-based floodway can include areas that protect other important natural floodplain functions. For example, the floodway could be expanded to include adjacent wetlands, key riparian habitat, a setback to protect water quality, and similar areas.

A higher standard option is to require engineering studies and extensive documentation to support proposed development in the floodplain.

- Property owners may choose to locate development outside of the floodway rather than undergo the time and expense of no-rise engineering studies.

- Exercise caution to avoid causing a "taking" issue. An outright development ban could be politically difficult.

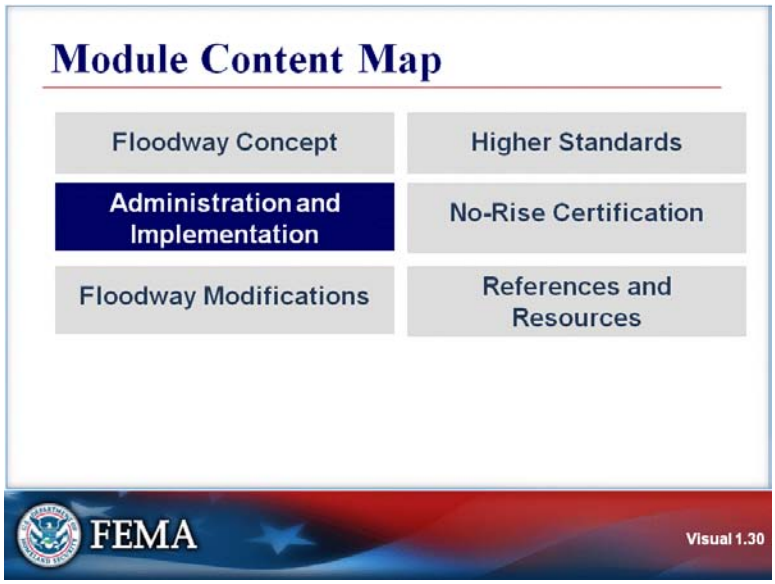
It is very important to emphasize to elected officials and citizens that no development should take place in the floodway. Emphasize that the floodway:

- Conveys floodwaters.
- Prevents development from increasing flood heights.
- Prevents damage to upstream properties.
- Usually includes that portion of the floodplain that experiences higher velocities and greater depths.
- Limits development in the most hazardous area of the floodplain.

Up to 200 CRS points are available for adopting and effectively enforcing more restrictive floodway standards.

ADMINISTRATION AND IMPLEMENTATION

Visual 1.30



Key Points

The next section of this module will review how to administer and implement floodway regulations.

ADMINISTRATION AND IMPLEMENTATION

Visual 1.31

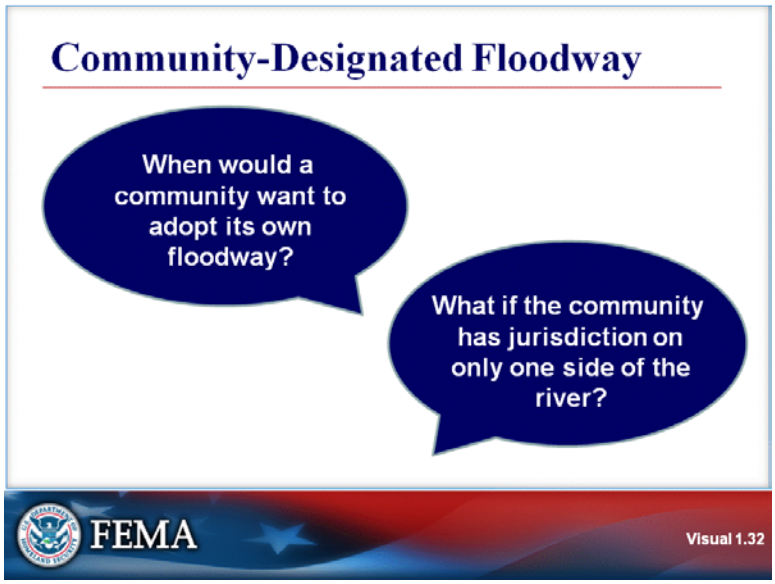
Key Points

Any floodway is a community-adopted floodway.

- FEMA normally uses the equal conveyance reduction method to identify a floodway.
- A community can choose to analyze the floodway model to shift the filled obstructions when determining the floodway boundaries.

ADMINISTRATION AND IMPLEMENTATION

Visual 1.32



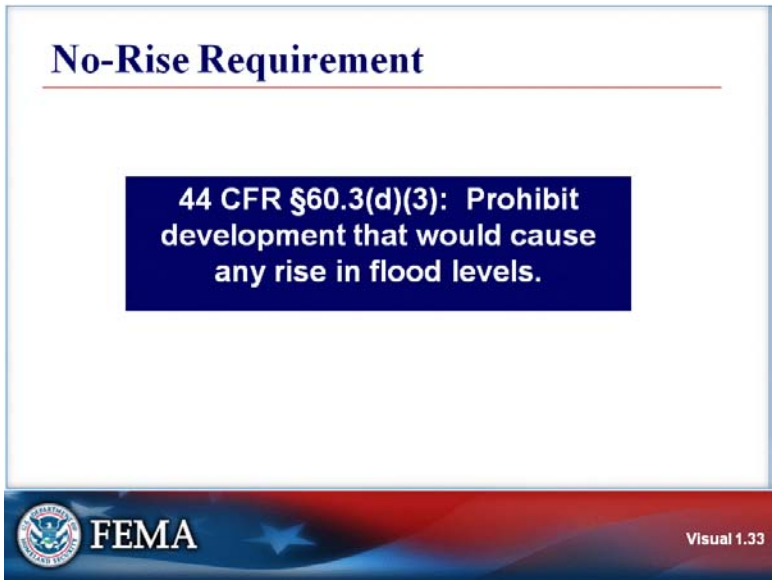
Key Points

Discussion Question: When would a community want to adopt its own floodway?

Discussion Question: What if a community has jurisdiction on only one side of the river?

ADMINISTRATION AND IMPLEMENTATION

Visual 1.33



Key Points

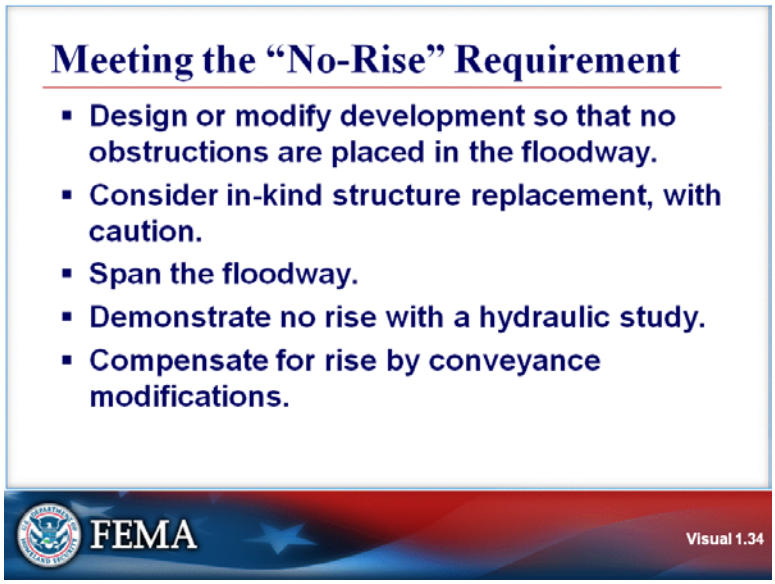
There are alternatives to deal with that rise in the 100-year model.

NFIP regulations stipulate that a community must avoid changes in a floodway that would increase flood levels.

There is another alternative that will be addressed later.

ADMINISTRATION AND IMPLEMENTATION

Visual 1.34



Key Points

Any development will generally cause an increase in flood elevations, but there are situations when a no-rise can be obtained.

Many times developers will ask the Floodplain Manager to suggest what they can do to meet this no-rise requirement. Suggestions include the following options:

- Replace structures in-kind. This option may require determining how structures were modeled in the current effective Flood Insurance Study (FIS).

  Several structures might have been originally modeled as obstructions in floodway. Later, some of those structures might have burned down or been demolished.

  The absent structures could be replaced by in-kind structures, assuming Substantial Improvement and Substantial Damage (SI/SD) and other requirements can be met. The replacement structures also must maintain the same footprint, height, and orientation as the original ones.

- Another option is to use pilings and columns rather than building on fill. However, "no-rise" must be demonstrated by appropriate engineering analysis.

ADMINISTRATION AND IMPLEMENTATION

Meeting the No-Rise Requirement (Continued)

- Redesign development to avoid the floodway.

  For example, relocate the structure on the lot outside of the floodway boundary.

  The structure could be a bridge that spans the floodway. When spanning the floodway, the low chord of the bridge must be above the surcharge elevations, the abutments must be in the flood fringe, and no vertical supports can be placed in the floodway.

- Compensate for any rise through channel or overbank improvements.

- Remove an obstruction comparable in size and area of the proposed development.

All of these options will require hydraulic analyses to demonstrate no increase in flood levels, except the first one, where there is no floodway development.

Greenways and biking and hiking trails are good recreational uses of the land in a floodway near a stream. Most can be exempt, depending on their extent, from the requirement to run the hydraulic model to show the no-rise if the path or trail remains at grade and the topography is not changed.

Floodway revision can sometimes narrow or shift a floodway by remodeling and still meet the maximum surcharge requirements.

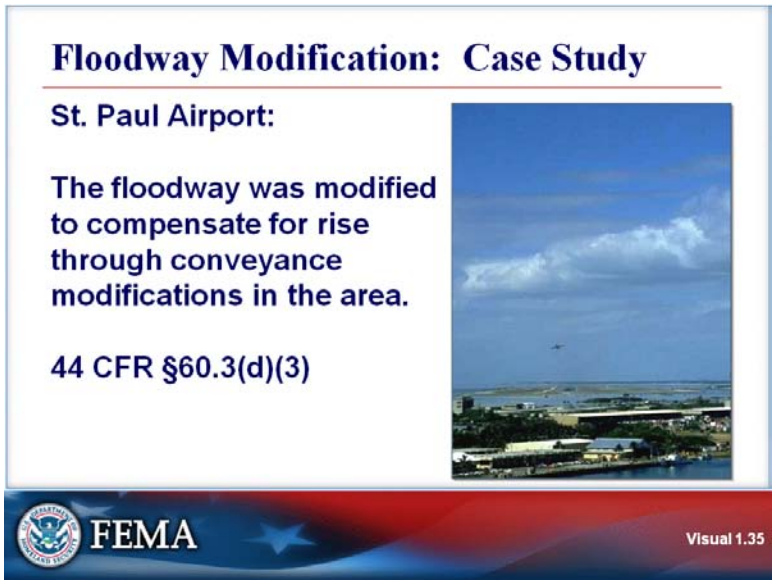
- Remember the earlier demonstration of how the equal conveyance method can be altered.

- If modifying the floodway, a FIRM revision is required in accordance with 44 CFR §65.7 and Part 72 requirements.

If the no-rise result cannot be achieved by any of the suggested options, another map change route can be pursued. This module will address that route later.

ADMINISTRATION AND IMPLEMENTATION

Visual 1.35



Key Points

Land use planning for the St. Paul, MN airport resulted in a modification to the floodway to accommodate the airport.

A no-rise Letter of Map Revision (LOMR) was done to change the floodway boundary because State law doesn't allow most buildings in the floodway.

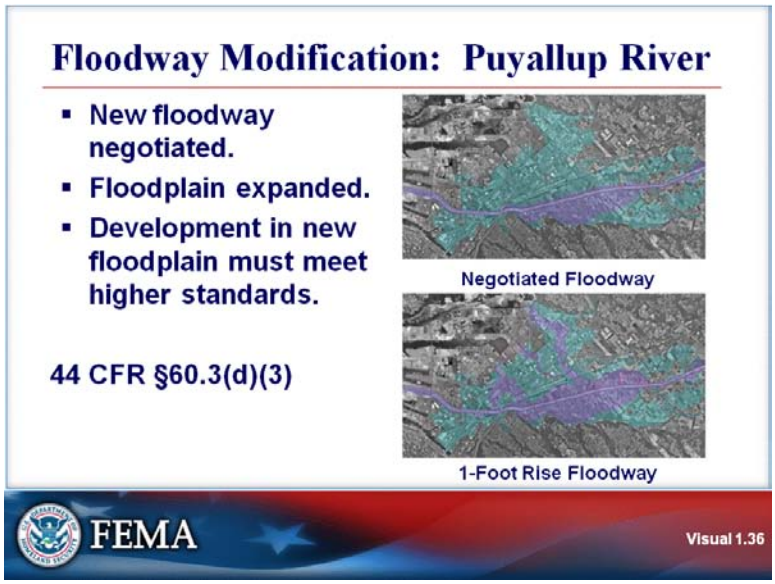
Temporary flood walls were erected in an area that is now flood fringe. The airport can be used at higher flood elevations as a result.

The airport traditionally was not usable at flood stage 17.5 feet, but now is usable at least to flood stage 19.8 feet.

St. Paul Airport at flood stage 19.8 feet. Note floodwalls at water's edge.

ADMINISTRATION AND IMPLEMENTATION

Visual 1.36



Key Points

The communities around the Puyallup River in Washington State have developed around the effective floodway for the last 18 years.

There has been a levee system in place for over 85 years. A city, rail lines, and a deep-water port facility have been built, along with supporting infrastructure. As a result, there is no flow path remaining to be preserved.

- The current effective floodway no longer meets FEMA's regulatory requirements.

- A consultant working for FEMA tested possible alternative floodways, but there were no solutions that met the one-foot rise criteria and were defensible to maintain a conveyance path for the 1-percent flood.

FEMA negotiated a new floodplain among local communities. The floodplain includes designated areas regulated as floodways.

The City of Fife, on the right bank, is actively expanding right-of-way along the road that tops the levee. Development in the new floodplain must meet higher community standards.

In unincorporated Pierce County, approximately 500 acres of the floodplain will be regulated as floodway.

ADMINISTRATION AND IMPLEMENTATION

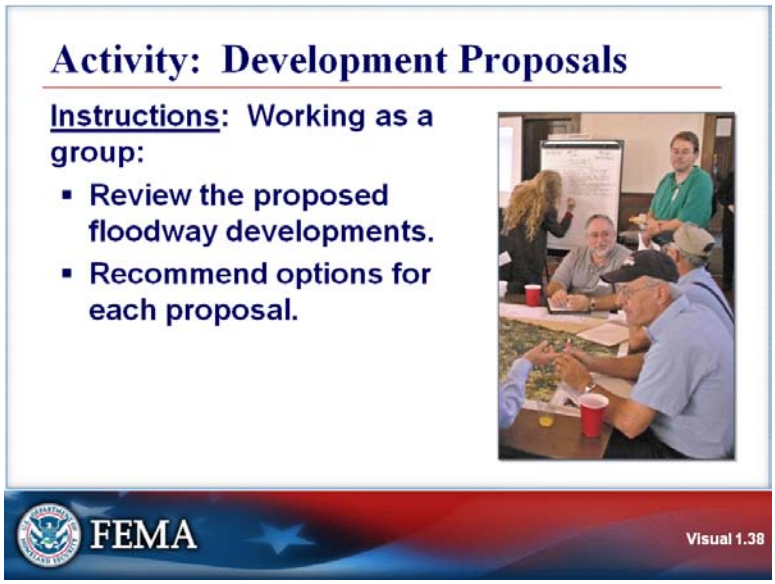
Visual 1.37

Key Points

Discussion Question: What options can the community consider to meet no-rise requirements?

ADMINISTRATION AND IMPLEMENTATION

Visual 1.38



Key Points

Activity Purpose: The purpose of this activity is to allow your group to identify options to offer in response to floodway development proposals.

Instructions: Working as a group:

1. Review the proposed floodway developments.
2. Recommend options for each proposed development.
3. Be prepared to report your conclusions.

Time: 15 minutes

Proposed Floodway Developments:

1. A garage is being added to a current home. The garage is in the floodway, but the home is not.

ADMINISTRATION AND IMPLEMENTATION

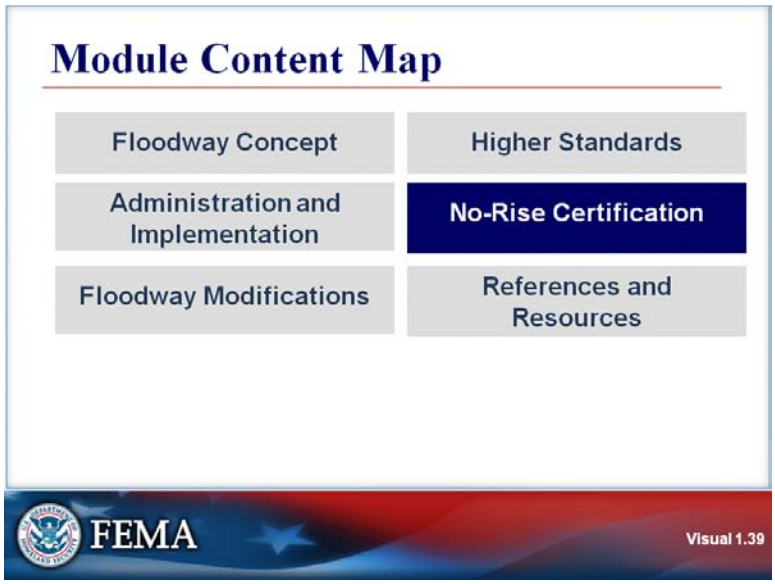
Activity: Development Proposals (Continued)

2. Construction of a big box store is proposed in a floodway. Part of the property is not in the floodway. The store footprint is so large that the project cannot be relocated.

3. A developer applies for a floodplain development permit after a project has been designed, plans are completed, and permits have been obtained from the State and from the Corps of Engineers. The Floodplain Manager discovers that part of the project is in the floodway.

NO-RISE CERTIFICATION

Visual 1.39

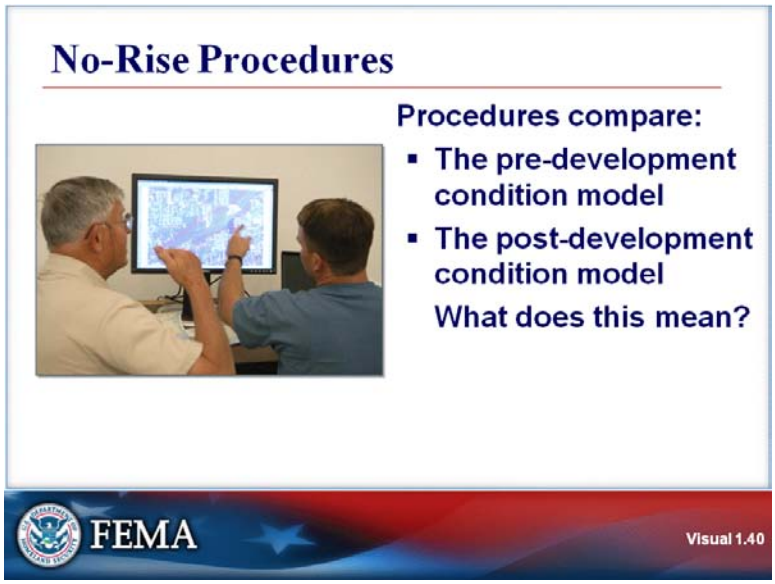


Key Points

The next section of this module will review requirements for No-Rise Certifications.

NO-RISE CERTIFICATION

Visual 1.40

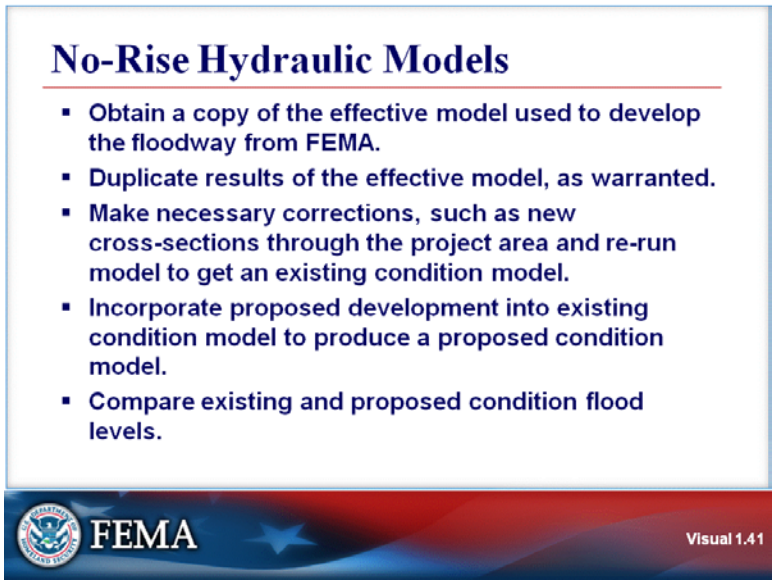


Key Points

No-rise procedures compare the pre- and post-development condition models used to generate floodway data, and determine whether the project can be certified as meeting the no-rise requirement.

NO-RISE CERTIFICATION

Visual 1.41



Key Points

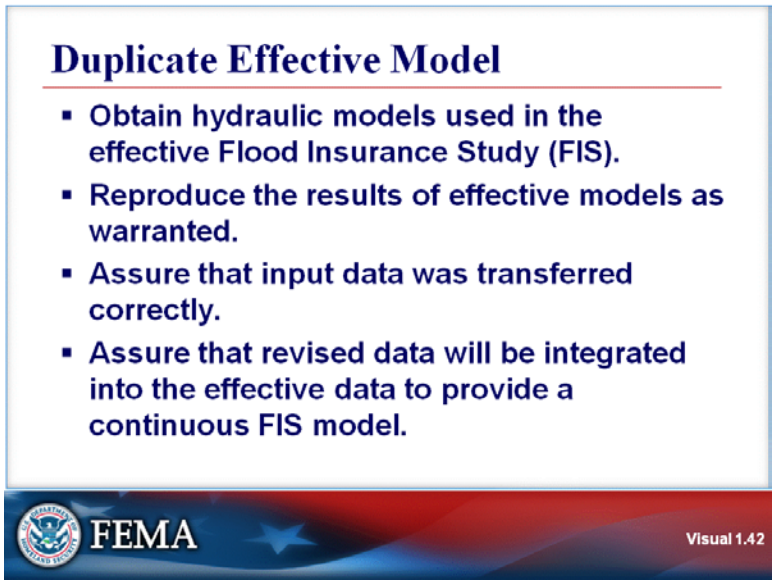
The no-rise hydraulic model is developed by completing the following steps.

- First, the effective model used to develop the floodway needs to be identified, located, and copied.
- Next, enter original input data and run the model to determine whether the results can be duplicated, if using a newer version of the effective model or totally different software.
- Make necessary corrections, such as obtaining new cross-sections through the proposed project area. Run the model again to get an existing conditions model.
- Incorporate proposed development into existing condition model to produce a proposed condition model.
- Compare existing and proposed condition flood levels.

The Floodplain Manager will need to work with engineers who are doing the modeling to complete the Riverine Hydrology & Hydraulics Form, which is part of the MT-2 application forms.

NO-RISE CERTIFICATION

Visual 1.42



Key Points

The hydraulic analyses used in the effective Flood Insurance Study (FIS), referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and the results must be reproduced.

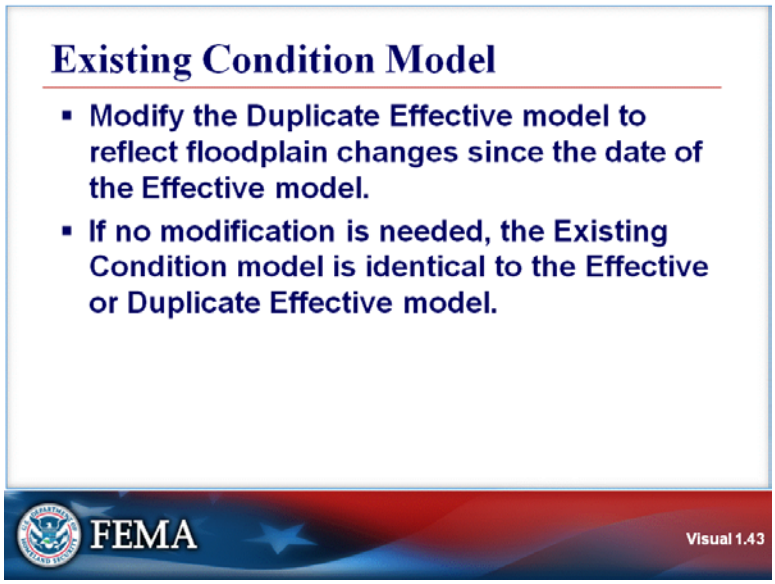
The effective model may be run on a newer version of the hydraulic modeling software. For example, the effective hydraulic model might have been USACE HEC-2, version 4.6.2, and the engineer-of-record is currently using HEC-RAS, version 3.1.1 or newer.

Reproduction of results is required to assure that:

- The effective model's input data has been transferred correctly.
- The revised data will be integrated into the effective data to provide a continuous FIS model both upstream and downstream of the proposed development area.

NO-RISE CERTIFICATION

Visual 1.43



Key Points

The Duplicate Effective model or Corrected Effective model is modified to produce the Pre-Development Condition model, also referred to as the Existing Condition model.

The Existing Condition model reflects any modification that has occurred since the date of the Effective model, but prior to initiating development for which the no-rise certification is being prepared, or a map revision is being requested.

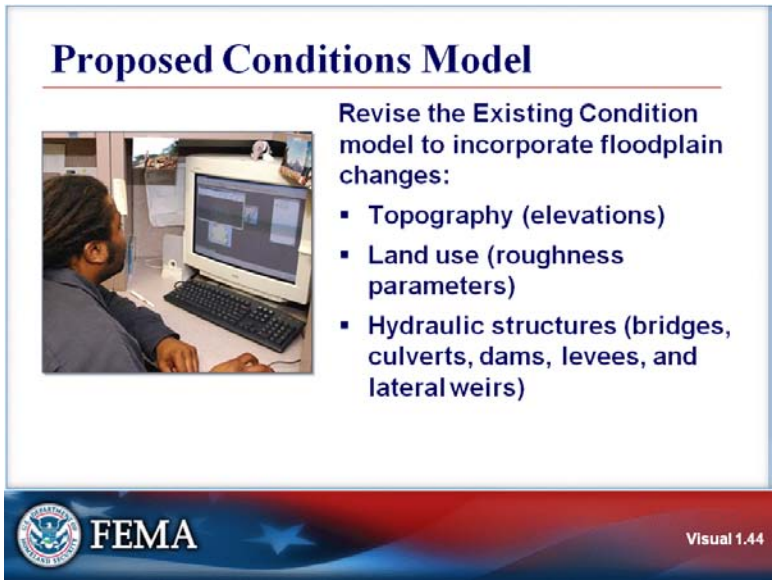
Modifications include:

- Changes in floodplain topography or land use.
- New hydraulic structures.
- Any new floodplain development.

If no modification has occurred since the date of the Effective model, the Existing Condition model is identical to the Corrected Effective or Duplicate Effective model.

NO-RISE CERTIFICATION

Visual 1.44



Key Points

The Existing Condition model is revised to incorporate:

Any physical changes that occurred in the floodplain since the Effective model data was gathered. These changes may include:

- Topography (elevation of ground).
- Land use (roughness parameters).
- Hydraulic structures (bridges, culverts, dams, levees, and lateral weirs) newly built, as well as those removed or replaced).
- The development in the floodplain.

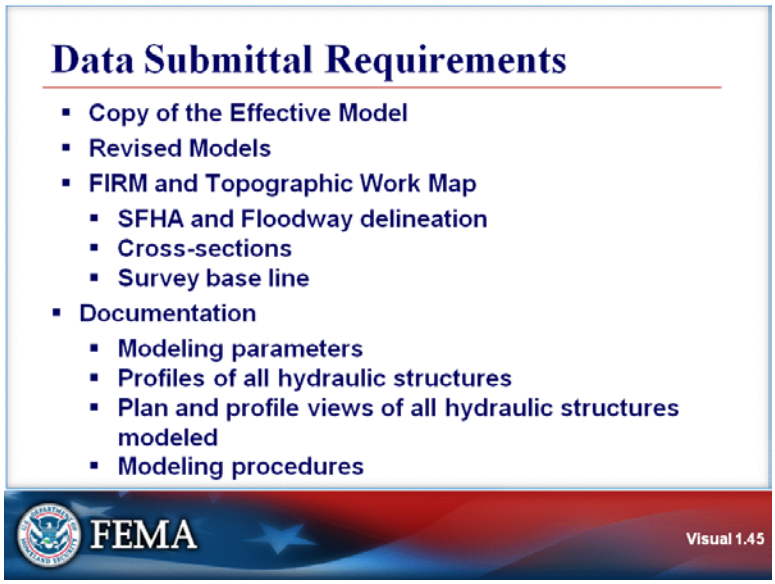
Note that if significant development occurred in the watershed, including the floodplain, the hydrology study also may need to be revised to incorporate such development.

The Existing Condition and Proposed Condition models should tie into the Effective model. The requester may have to go a given distance both upstream and downstream to obtain continuous flood profiles. The revision may not always be isolated in the immediate area of concern.

Assure that new cross-sections include the immediate project area. Upstream and downstream cross-sections may be too distant to reflect development impact.

NO-RISE CERTIFICATION

Visual 1.45



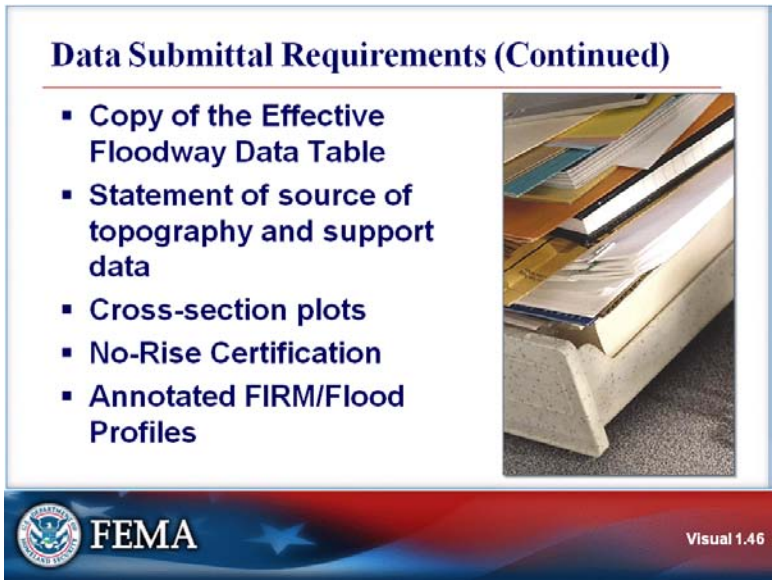
Key Points

Data required to document no-rise include:

- A copy of the effective model.
- Revised models, including the Existing Condition and Proposed Condition models.
- The FIRM and topographic work map that shows:
  - The Special Flood Hazard Area (SFHA) and Floodway Delineation
  - Cross-sections, including which cross-sections changed, and reasons for changes
  - Survey base line, showing the stationing along the cross-section
- Documentation must also include:
  - Modeling parameters, including roughness factors and expansion/contraction coefficients
  - Profiles of all hydraulic structures
  - Plan and profile views of all hydraulic structures modeled
  - Modeling procedures

NO-RISE CERTIFICATION

Visual 1.46



Key Points

Additional data required to document no-rise include:

- A copy of the effective Floodway Data Table.
- A statement describing the source of topography and support data.
- Detailed, full cross-section plots showing BFE and roughness parameters.
- No-Rise Certification.
- Annotated FIRM as flood profiles, as required.

NO-RISE CERTIFICATION

Visual 1.47

Key Points

The visual shows the language used in a "No-Rise" certification.

The certification also includes signatures and the seal of the professional who is completing the certification.

The certifying professional will attach all documentation used to develop the certification.

A full version of the sample certification is shown on the following page.

NO-RISE CERTIFICATION

Below is an example of a "No-Rise" certification.

ENGINEERING "NO-RISE" CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice Civil Engineering in

the State of _____.

I further certify that the attached technical data supports the fact that the proposed

_____
(Name of Development)

will not impact the base (100-year) flood elevations, floodway elevations, and floodway location and widths on

_____
(Name of Waterway)

between published sections in the Flood Insurance Study (FIS) for

_____ _____
(Name of Community) (Dated)

and will not impact the base (100-year) flood elevations, floodway elevations, and floodway widths between unpublished cross-sections in the vicinity of the proposed development.

I further certify that the hydrology and hydraulic studies/analyses are conducted in accordance with the accepted standards of engineering practice to meet the requirements of Part 65, Identification and Mapping Special Flood Hazard Areas, of Title 44 of the Code of Federal Regulations.

_____ _____
(Date) (Signature)

_____
(Title)

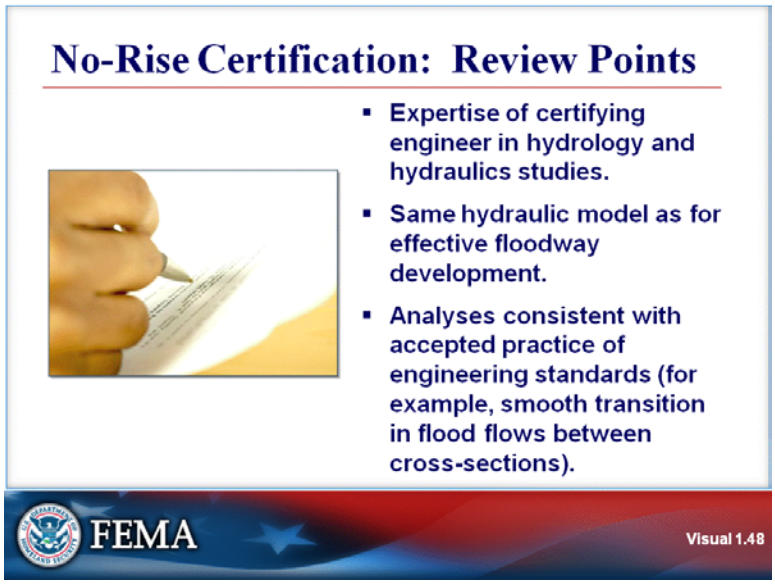
[Insert professional seal here]

_____
[Sign and date according to State Licensing regulations] (Address)

_____
(City/State/Zip)

NO-RISE CERTIFICATION

Visual 1.48



Key Points

Important points to consider when reviewing a "No-Rise" study and certification are:

- The certifying engineer has necessary expertise and is experienced in conducting hydrology and hydraulics studies.

- The hydraulic model used is the same model used to develop the current effective floodway.

- The study and analyses used are consistent with the accepted practice of engineering standards. For example:

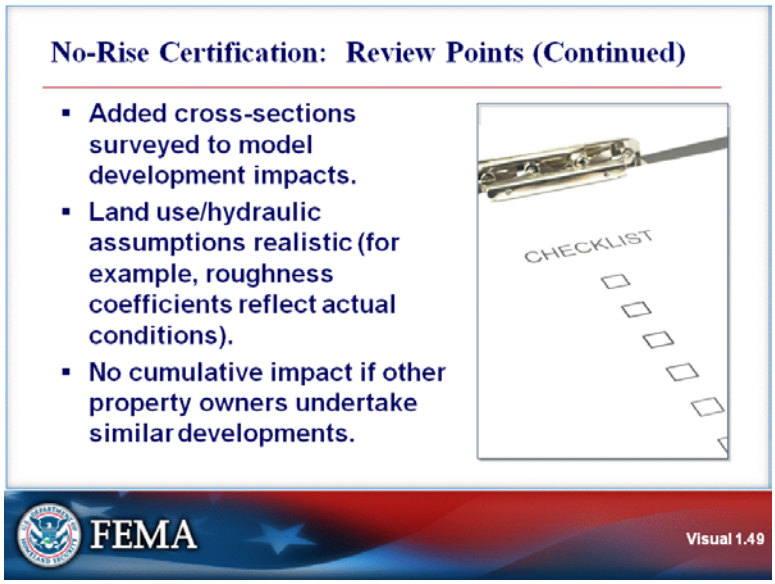
  - A smooth transition of flood flows between cross-sections.
  - Modeling parameters reflect existing and proposed conditions.
  - Adequate and appropriate number of cross-sections is included to incorporate proposed development.
  - The certifying professional holds an active license issued by your State to practice Civil Engineering.

Supporting documentation for a "No-Rise" certification should be reviewed by an engineer or other knowledgeable professional. If a community does not have engineering expertise, the State or FEMA's Regional Office can assist with the review.

Some States impose a deadline for local jurisdiction review and decision after submittal of a "No-Rise" certification. Communities facing deadlines should adopt procedures to conduct reviews within the required time period.

NO-RISE CERTIFICATION

Visual 1.49



Key Points

Additional points to consider when reviewing a "No-Rise" Certification are:

- The number and locations of added cross-sections surveyed to model development impacts are adequate.
- The land use and hydraulic assumptions are realistic. For example, do roughness factors reflect actual conditions?
- The cumulative impact if other property owners undertake similar developments.

Advice concerning evaluation of no-rise alternatives is:

- Maintain close communication between jurisdiction departments.
- Conduct outreach to developers, home/property owners, engineers, and surveyors.
- Make technical training opportunities available. For example, advertise FEMA trainings and request training from FEMA and the State.

NO-RISE CERTIFICATION

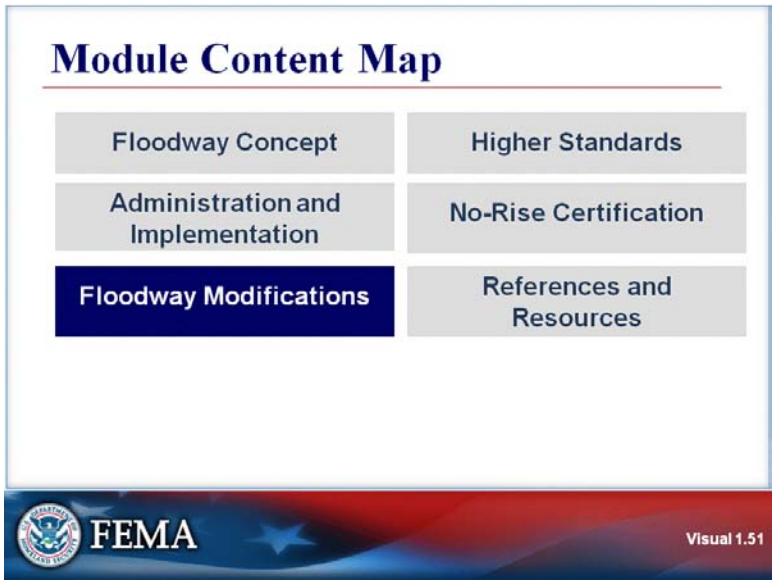
Visual 1.50

Key Points

Discussion Question: What have been your experiences with "No-Rise" certifications?

FLOODWAY MODIFICATIONS

Visual 1.51

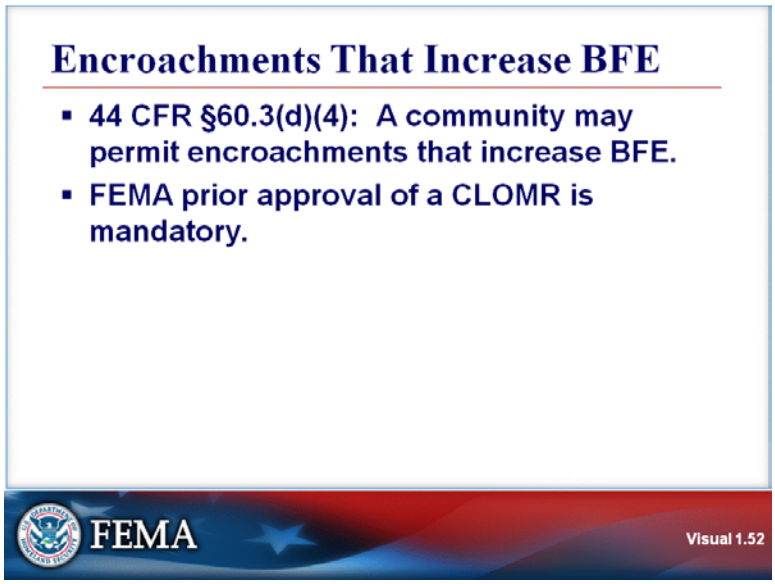


Key Points

The next section of this module will discuss Floodway Modifications.

FLOODWAY MODIFICATIONS

Visual 1.52



Key Points

If a no-rise cannot be achieved through the alternatives discussed earlier, the community can still allow the development provided that the community applies for a Conditional Letter of Map Revision and FEMA approves the application.

A CLOMR is mandatory if a development increases BFE. Subsequently, a LOMR must be applied for to effect the Flood Insurance Rate Map (FIRM) revision upon completion of development. This will also aid in keeping the effective hydraulic model up-to-date. Remember that CLOMR does not revise the FIRM.

Exceptional situations may exist when a single individual or a trust owns a very large area of land. Development may raise the BFE on an individual property without causing a BFE increase on others' so long as there are no insurable structures in the affected area.

Appropriate revisions to FIS and FIRM must be undertaken to reflect the actual flood risk in the area of BFE increase.

These revisions may also aid in keeping the FIS and the hydraulic models up-to-date.

FLOODWAY MODIFICATIONS

Visual 1.53

Key Points

44 CFR §60.3(d)(4) requires that communities apply for a Conditional Letter of Map Revision for any development in floodway that would cause base flood elevation increases, and receive FEMA approval prior to permitting development.

44 CFR §65.12 outlines procedures and requirements to prepare application packages for such requests.

44 CFR §65.3 specifies a timeframe for the community to notify and submit map revision requests when BFEs increase or decrease due to physical changes affecting flood conditions. The idea is to maintain flood risk data up-to-date. Insurance rates are based on current data.

The CLOMR application is the MT-2 form.

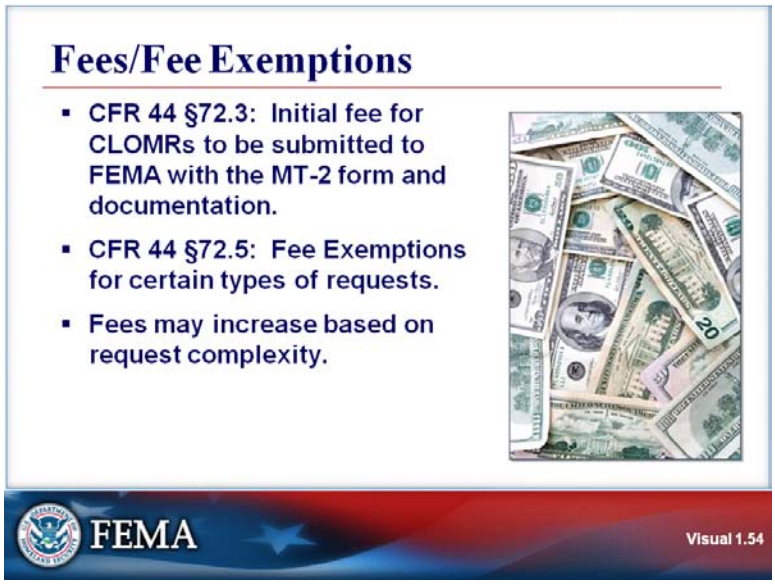
The community must adopt floodplain management ordinances incorporating the increased BFEs and/or revised floodway prior to approving the encroachments.

Upon development completion, the community must submit a LOMR request with certified as-built plans as soon as possible, but not later than 6 months.

It is critical to note that no variations can take place from the approved CLOMR.

FLOODWAY MODIFICATIONS

Visual 1.54



Key Points

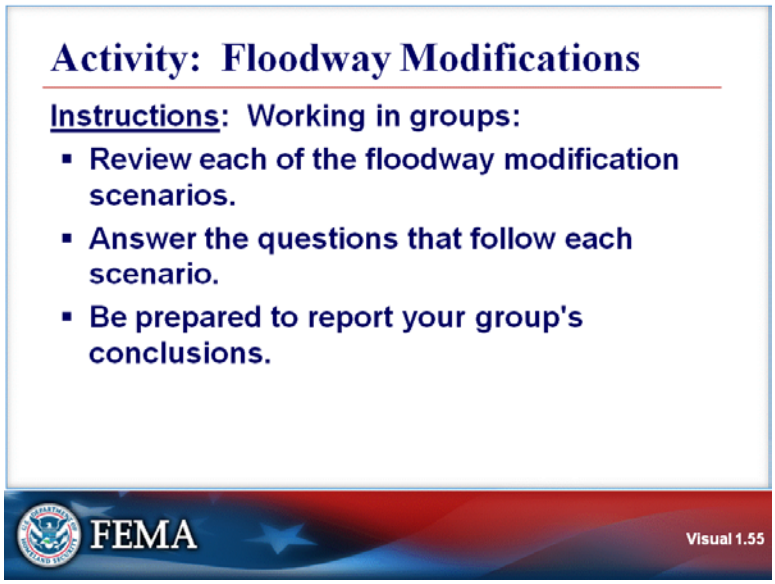
Generally, fees are set and published in the Federal Register.

The initial processing fees for LOMRs and CLOMRs are all flat fees, except for requests based on structural measures on alluvial fans. The current initial fee is $5,600 plus $60 per hour for review time.

Details can be accessed at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm.

FLOODWAY MODIFICATIONS

Visual 1.55



Key Points

Activity Purpose: The purpose of this activity is to allow participants to evaluate actual no-rise situations and recommend appropriate action by the Floodplain Manager.

Instructions: Working as a group:

1. Review the each of the floodway modification scenarios.
2. Answer the questions that follow each scenario.
3. Be prepared to report your group's conclusions.

The scenarios start on the following page.

FLOODWAY MODIFICATIONS

Floodway Modification Scenarios:

1. A developer submitted a no-rise certification to a community for a new culvert to access a proposed subdivision. The engineer's analysis showed:

   - Effective Model: BFE 400.1'
   - Duplicate Effective Model: BFE 400'
   - Existing Condition Model: BFE 396' (4' lower due to more accurate topography)
   - Proposed Condition Model: BFE 399'

   The engineer compared the Proposed Condition Model BFE to the Effective Model BFE. Because the Proposed Model BFE was lower, he/she submitted a sealed no-rise certification to the community, which was accepted at face value. The project actually would cause a 3-foot rise in BFE.

   The culvert was constructed and the developer continued construction for the subdivision. This is now a violation.

   What should the Floodplain Manager do?

FLOODWAY MODIFICATIONS

Floodway Modifications Scenario: (Continued)

2. A developer wants to place fill in the floodway to build condominiums.

   The no-rise analysis shows the BFEs increased by 0.5 foot, which will increase the flood levels on three adjacent structures.

   What options does the developer have?

FLOODWAY MODIFICATIONS

Visual 1.56

Key Points

Even if the applicant is a city, if the project affects adjacent county property, the city must notify affected property owners in the county.

Individual legal notices should include the impacts of the proposed project, including:

- Whether the BFE is increased or decreased.
- Whether the property now is going to be in the floodway or floodway fringe area.

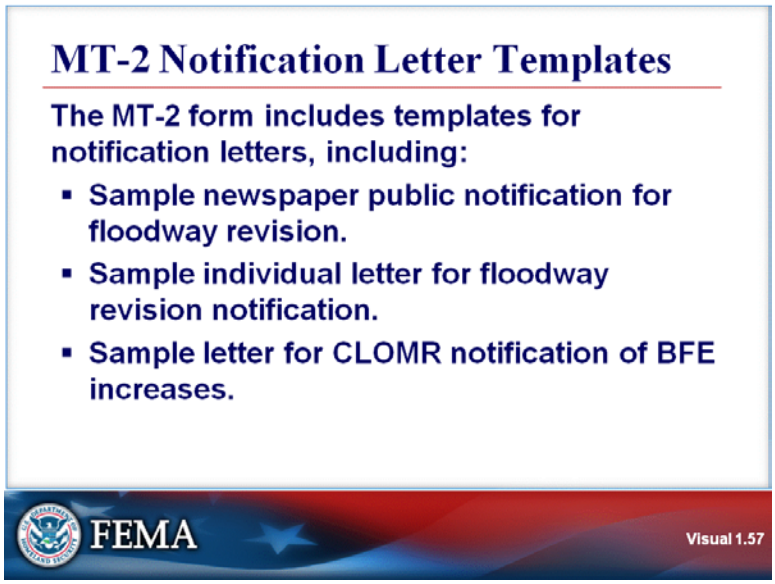
In the public notices, separate the change due to the modeling version or updated topography and the change due to the impact of the project.

There are examples of notification letters in MT-2 form.

CLOMR applicants must provide documentation to FEMA that the proposed development meets Endangered Species Act (ESA) requirements.

FLOODWAY MODIFICATIONS

Visual 1.57



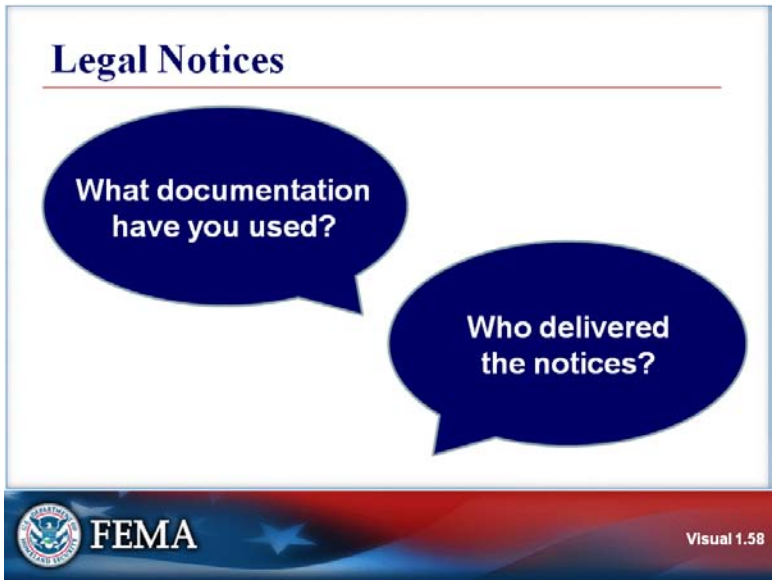
Key Points

Below is the text of sample public notification for floodway revision, to be used by the community when placing a notice in the newspaper.

> The {insert community name} {insert appropriate community department for floodplain management}, in accordance with National Flood Insurance Program regulation 65.7(b)(1), hereby gives notice of the {insert community designation Township's / Village's / Borough's / County's} intent to revise the floodway, generally located between {insert general location of floodway revision}. Specifically, the floodway shall be revised from a point {describe downstream limit of floodway revision} to a point {describe upstream limit of floodway revision}. As a result of the floodway revision, the floodway shall {widen and/or narrow} with a maximum widening of {insert maximum widening} feet at a point approximately {insert location of widening} and/or a maximum narrowing of {insert maximum narrowing} feet at a point approximately {insert location of narrowing}.
>
> Maps and detailed analysis of the floodway revision can be reviewed at the {insert location} at {insert location address}. Interested persons may call {insert community contact name or position} at {insert contact phone number} for additional information from … to … {insert dates during which community contact person can be contacted}.

FLOODWAY MODIFICATIONS

Visual 1.58



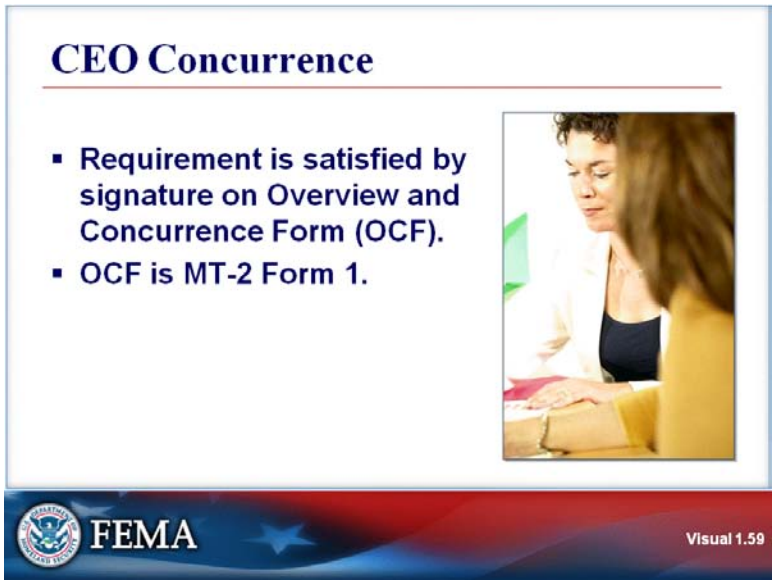
Key Points

Discussion Question: What documentation have you used?

Discussion Question: Who delivered the notices?

FLOODWAY MODIFICATIONS

Visual 1.59



Key Points

If a community does not want to sign a community acknowledgement form, it is very important to contact the State and FEMA Region, which will need to coordinate with the community and the applicant.

CLOMRs sometimes will be processed if the applicant makes a case that the community is unresponsive.

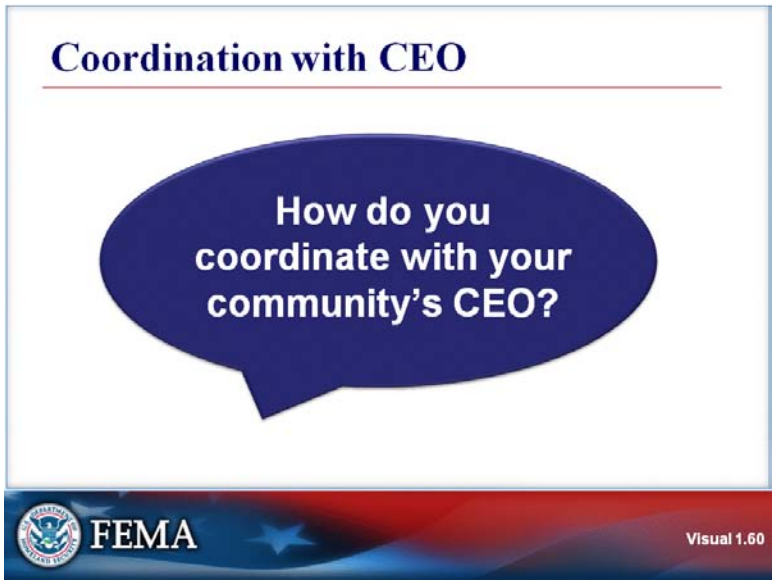
In an actual situation, the community did not feel comfortable signing the MT-2 form stating the property would be reasonably safe from flooding.

- The community opposed the CLOMR.
- The CLOMR was processed and approved despite the community's objections.
- The developer only had to show proof to FEMA that the community was provided with the MT-2 package so the responsible entity could sign on the Overview and Concurrence Form (OCF).

The OCF form includes an assurance that the CLOMR meets the requirements of the Endangered Species Act.

FLOODWAY MODIFICATIONS

Visual 1.60

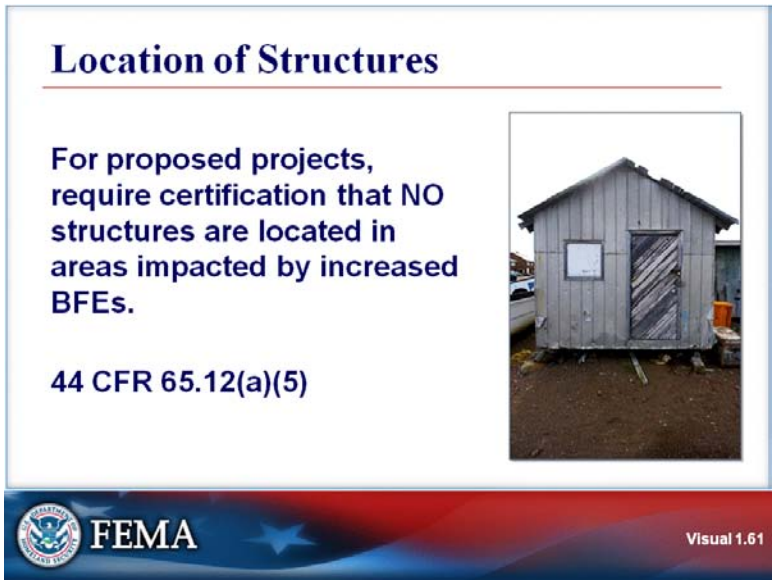


Key Points

Discussion Question: How do you coordinate with your community's CEO?

FLOODWAY MODIFICATIONS

Visual 1.61



Key Points

Land can be affected by floodway modification, but no insurable structures can be located in areas that would experience increased BFEs.

To assure that no insurable structures are affected, the Floodplain Manager should do the following:

- If there are Elevation Certificates (ECs) of an existing insured structure, compare proposed BFE increase to existing Lowest Floor Elevations (LFEs) and Lowest Adjacent Grades (LAGs) to determine impact.
- Map the new floodplain and floodway boundaries and identify the structures affected by the increases in the BFEs.

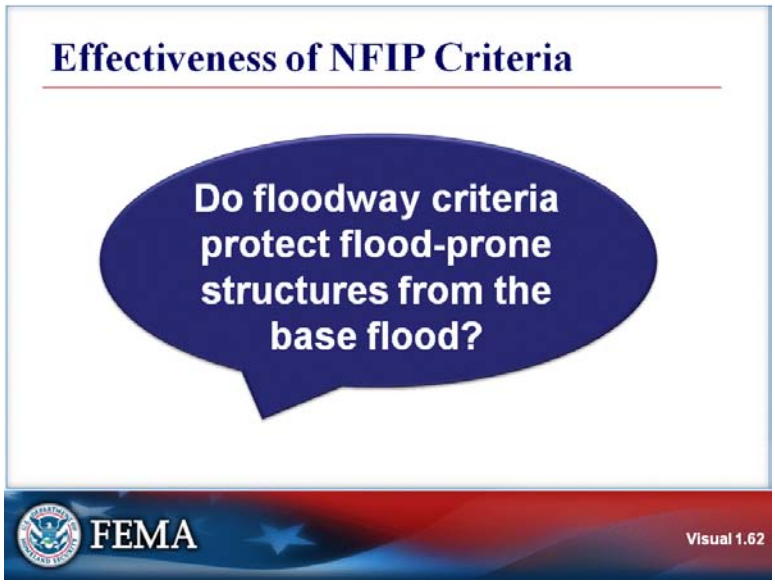
A CLOMR cannot be issued even if the structure is on pilings, even though the proposed BFE increase might be only a few inches on the pilings and not to the lowest floor. The structure is considered affected.

The CLOMR can be processed with structures impacted as long as acceptable mitigation measures are taken. Acceptable measures generally consist of buying and demolishing the structures.

If CLOMR requestors submit proof of structure acquisition and demolition, the CLOMR will be processed with a commentary on the measures.

FLOODWAY MODIFICATIONS

Visual 1.62

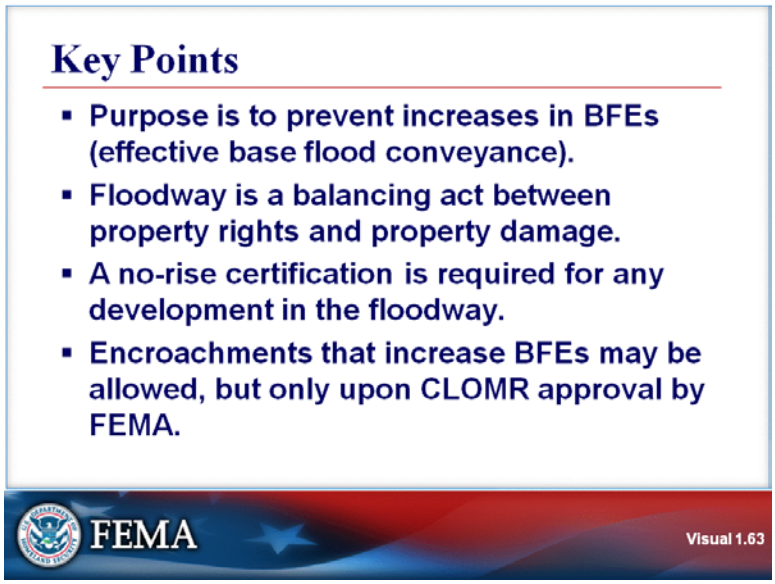


Key Points

Discussion Question: Do floodway criteria protect flood-prone structures from the base flood?

FLOODWAY MODIFICATIONS

Visual 1.63



Key Points

The purpose of the floodway is to prevent increases in BFEs.

- To avoid such BFE increases, part of the floodplain is kept free from encroachments.
- Naturally, it makes sense to reserve a deeper and faster flowing part of the floodplain, thus providing effective conveyance of the base flood without causing flood damage to the built environment.

Floodways are a compromise between property rights and community flood safety.

It is important to:

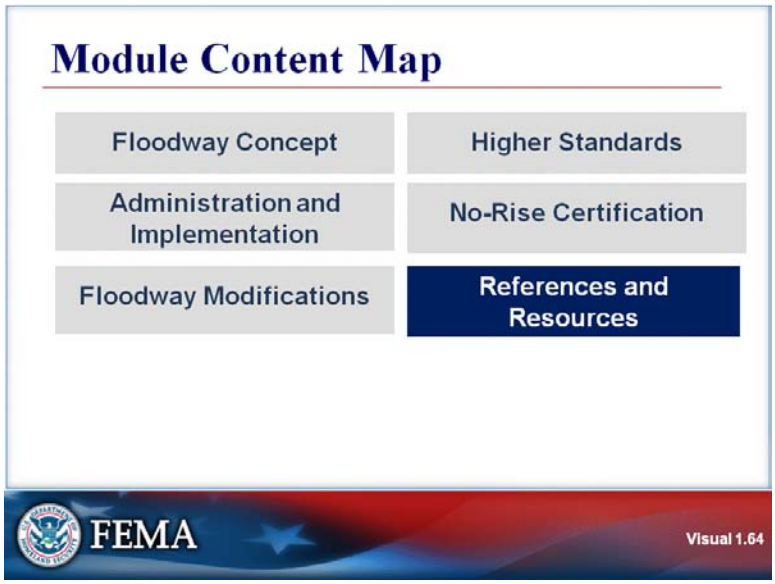
- Understand the requirements for no-rise certifications and to be prepared to deal with no-rise hydrology and hydraulics studies conducted to support them.

- Understand the requirements when a proposed floodway encroachment increases BFEs and to be able to guide permit applicants through the process.

When potential floodway violations are identified through the Letter of Map Change (LOMC) review, the FEMA Regional Offices are notified of such violations. The FEMA Regional Office and/or the State then will try to resolve the issue. Further LOMC review is suspended until the violation is remedied.

REFERENCES AND RESOURCES

Visual 1.64

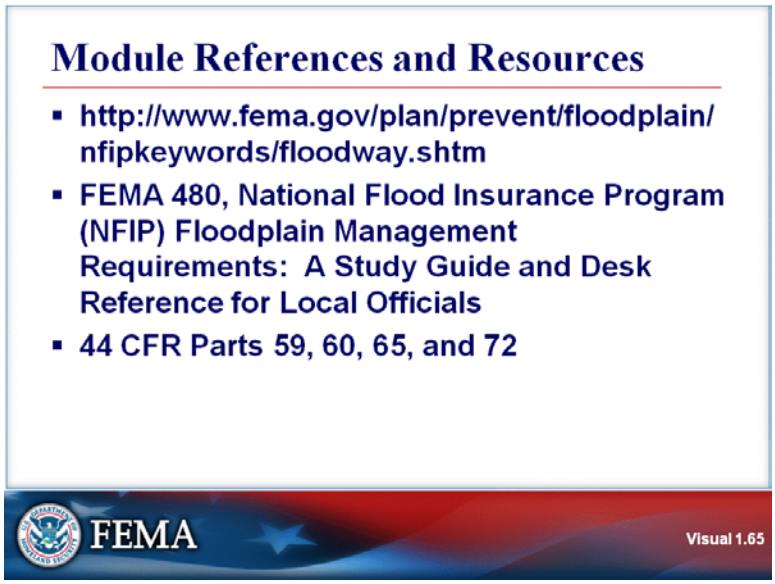


Key Points

The final section of this module will provide references for floodway information.

REFERENCES AND RESOURCES

Visual 1.65



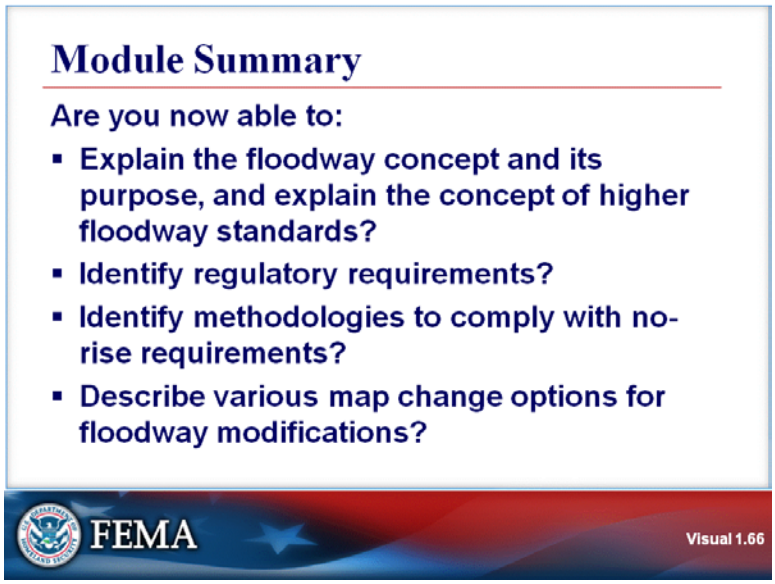
Key Points

Resources for floodway information include:

- http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/floodway.shtm
- FEMA 480, National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials
- 44 CFR Parts 59, 60, 65, and 72.

MODULE SUMMARY

Visual 1.66



Key Points

After completing this module, are you able to:

- Explain the floodway concept and its purpose, and explain the concept of higher floodway standards?
- Identify regulatory requirements?
- Identify methodologies to comply with no-rise requirements?
- Describe various map change options for floodway modifications?

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Appurtenant structure: a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.

Area of future-conditions flood hazard: the land area that would be inundated by the 1-percent-annual-chance (100-year) flood based on future-conditions hydrology.

Base flood: the flood having a one percent chance of being equaled or exceeded in any given year.

BFE: Base Flood Elevation

CEO: Chief Executive Officer of a community, the official of the community who is charged with the authority to implement and administer laws, ordinances, and regulations for that community.

CLOMR: Conditional Letter of Map Revision: an official determination by FEMA that a proposed structure would not be inundated by the 1-percent-chance flood if built as proposed.

CLOMR-F: Conditional Letter of Map Revision (based on fill): an official determination by FEMA that a proposed structure that would be elevated by fill would not be inundated by the 1-percent-chance flood if built as proposed.

Community: any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village or authorized native organization, which has authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction.

Cross-section: a study site on a waterway; a line developed from topographic information at which a computation of flood flow has been made to establish a potential flood elevation.

CRS: Community Rating System.

Development: any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

Discharge: the amount of flow through a cross-section area times the average velocity, usually expressed in cubic feet per second (cfs).

FIRMette: a portion of a Flood Insurance Rate Map printed using FEMA's online Map Service Center.

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

Flood Hazard: potential for inundation with risk to life, health, property, and natural value.

Flood Insurance: the insurance coverage provided under the National Flood Insurance Program.

Flood Insurance Rate Map (FIRM): an official map of a community, on which are delineated both the special hazard areas and the risk premium zones applicable to the community, including a graphical representation of Special Flood Hazard Areas, flood hazard risk zones, 0.2-percent-chance floodplain areas, and other flood-related information.

Flood Insurance Study (FIS): the examination, evaluation, and determination of flood hazards performed for a community. The FIS contains the information found during the study of the community's flooding sources including study methodology, source data, discharges, water surface elevations, flood profiles, and references.

Floodplain or floodprone area: any land area susceptible to being inundated by water from any source (see definition of Flood or Flooding).

Floodplain management: the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain management regulations: zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such State or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

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

Flood protection system: those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Floodway – see regulatory floodway.

Floodway encroachments: any types of development that become obstructions to flow.

Floodway fringe: the area of the floodplain not within the regulatory floodway boundaries. The floodway fringe plus the floodway is the floodplain.

Freeboard: a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Future-conditions flood hazard area, or future-conditions floodplain – see Area of Future-Conditions Flood Hazard.

Future-conditions hydrology: the flood discharges associated with projected land-use conditions based on a community's zoning maps and/or comprehensive land-use plans, and without consideration of projected future construction of flood detention structures or projected future hydraulic modifications within a stream or other waterway, such as bridge and culvert construction, fill, and excavation.

HEC-RAS: Hydrologic Engineering Center-River Analysis System, software package developed by the U.S. Army Corps of Engineers for conducting hydraulic analyses.

Highest adjacent grade: the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

LOMA or Letter of Map Amendment: an official determination by FEMA that an existing structure or parcel of land that has not been elevated by fill would not be inundated by the 1-percent-chance flood.

LOMR: a letter issued by FEMA to revise the FIRM and/or FIS report for a community to change BFEs, floodplain and floodway boundary delineations, and coastal hazard areas.

LOMR-F: Letter of Map Revision (based on fill): an official determination by FEMA that an existing structure or parcel of land that was elevated by fill would not be inundated by the 1-percent-chance flood.

Lowest Floor (LF): the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Section 60.3.

Manning formula: a method for calculating flow in an open channel, based on average flow velocity, surface roughness of the channel and overbanks, the hydraulic radius, wetted perimeter, and slope.

National Geodetic Vertical Datum (NGVD): elevation reference marks used in flood studies and FIRMs, which may use either the National Geodetic Vertical Datum (NGVD) of 1929 or North American Vertical Datum of 1988 (NAVD 88).

National Flood Insurance Program (NFIP): Federal insurance program under which floodprone 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.

No-rise certification: an engineering analysis supported by technical data and signed by a registered professional engineer certifying that development will not cause a rise in the Base Flood Elevation, floodway elevations, and floodway location and widths.

North American Vertical Datum of 1988 (NAVD 88): elevation reference marks used in flood studies and FIRMS, which may use either the National Geodetic Vertical Datum (NGVD) of 1929 or NAVD 88.

1-percent flood—also termed the 100-year flood; see base flood.

Overview and Concurrence Form (OCF): MT-2 Form 1, signed by the community Chief Executive Officer to concur that a structure proposed in a CLOMR will be reasonably safe from flooding if built as proposed. The form includes an assurance that the CLOMR meets the requirements of the Endangered Species Act.

Reasonably safe from flooding: base flood waters will not inundate the land or damage structures to be removed from the SFHA and that any subsurface waters related to the base flood will not damage existing or proposed buildings.

Regulatory floodway: the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Riverine: relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

SFHA: Special Flood Hazard Area.

State: any State, the District of Columbia, the territories and possessions of the United States, the Commonwealth of Puerto Rico, and the Trust Territory of the Pacific Islands.

Surcharge: The difference in peak water surface elevation in a floodway during the 1-percent-annual-chance flow and the base flood elevation for no floodway condition.

Variance: a grant of relief by a community from the terms of a floodplain management regulation.

Violation: the failure of a structure or other development to be fully compliant with the community's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Section 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

Water surface elevation: the height, in relation to the North American Vertical Datum of 1988 (NAVD 88), National Geodetic Vertical Datum (NGVD) of 1929, (or other datum, where specified) of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.