610 FLOOD WARNING AND RESPONSE—Summary

Maximum credit: 395 points

612 Elements

a. **Flood threat recognition system (FTR):** Up to 75 points for a system that predicts flood elevations and arrival times at specific locations within the community.

b. **Emergency warning dissemination (EWD):** Up to 75 points for disseminating flood warnings to the public.

c. **Flood response operations (FRO):** Up to 115 points for implementation of specific tasks to reduce or prevent threats to health, safety, and property.

d. **Critical facilities planning (CFP):** Up to 75 points for coordinating flood warning and response activities with operators of critical facilities.

e. **StormReady community (SRC):** 25 points for designation by the National Weather Service as a StormReady community.

f. **TsunamiReady community (TRC):** 30 points for designation by the National Weather Service as a TsunamiReady community.

Credit Criteria

Credit criteria for this activity are described in Section 611.b.

a. The community must receive some credit in each of the elements FTR, EWD, FRO, and CFP in order to receive credit (including SRC or TRC credit) under this Activity.

b. The community must have a description of its flood hazard.

c. There must be a multi-level flood inundation map or series of related maps (e.g., surge and evacuation zones) that are tied to different levels of response as designated in the community's plan.

d. There must be an adopted flood warning and response plan that is associated with the maps in credit criterion (c)..

e. There must be one or more annual outreach projects on the flood warning and safety precautions.

f. There must be an annual exercise of the plan or an emergency operations center activation, with a lessons-learned report.

Each element has additional criteria specific to that element.

Impact Adjustment

The credits for FTR, EWD, and FRO are adjusted based on the number of buildings within the Special Flood Hazard Area affected by each element. There is no impact adjustment for CFP, SRC, or TRC.

Documentation Provided by the Community

Each element has a separate section describing needed documentation.

610 FLOOD WARNING AND RESPONSE

The OBJECTIVE of this activity is to encourage communities to ensure timely identification of impending flood threats, disseminate warnings to appropriate floodplain occupants, and coordinate flood response activities to reduce the threat to life and property. This activity focuses on the community's emergency management actions and plans, and efforts coordinated through the community's emergency manager. Therefore, the emergency manager should be the point of contact.

611 Background

With sufficient warning of a flood, a community and its floodplain occupants can take protective measures to mitigate potential damage. A flood threat recognition system integrated with an emergency response plan and a multi-level flood inundation map(s) enables emergency warning dissemination to the public and critical facilities. This is the basis of flood warning and response and is part of the emergency management preparedness cycle.

The National Weather Service (NWS) issues specific flood warnings for many locations along major rivers and coastlines. A community's ability to receive notifications 24 hours a day, seven days a week, and 365 days a year is crucial to utilization of such warnings. Many communities have their own flood threat recognition systems, which enable advance identification of floods on smaller rivers and streams. The full benefit of early flood warning is only realized if the community disseminates the warning to the general public and to critical facilities and has a flood warning and response plan that includes appropriate tasks, such as directing evacuation, sandbagging, and/or moving building contents above flood levels.

611.a. Activity Description

The maximum credit for Activity 610 is 395 points.

Credit is provided for a community that, at a minimum, has adopted a flood warning and response program that includes

- A flood threat recognition system that identifies an impending flood (credited under FTR),
- Methods to warn the public of the impending flood (credited under EWD),
- A plan for flood response operations (credited under FRO), and
- Coordination with critical facility operators (credited under CFP).

In addition to these four basic components of a local flood warning and response program, this activity credits two programs operated by the NWS that recognize communities that are

better prepared for flooding caused by storms: SRC—StormReady communities and TRC—TsunamiReady communities.

This activity is not intended to be a model for developing a flood warning or flood response program. Its objective is to credit a local program's potential impact on life, safety, and property damage. An effective emergency management flood warning or response program must be carefully prepared and tailored to the local flood hazards and the specific needs of the community.

611.b. Activity Credit Criteria

(1) The community must obtain some credit in the first four flood warning and response elements (FTR, EWD, FRO, and CFP) to receive any credit under this activity.

(2) The community must have a description of its flood hazard that includes information about

   (a) The nature of the community's flood hazard, such as flood depths, velocities, warning times, historical flood problems, and special flood-related hazards;

   (b) An inventory of the types of buildings (residential, commercial, etc.) exposed to flooding including an estimated number of the buildings, and an inventory of the land use (residential, agricultural, open space, etc.) of both developed and undeveloped places within the area(s) affected; and

   (c) An inventory of critical facilities and the expected impacts of flooding on health and safety, community functions, such as police and utility services, and the potential for secondary hazards.

   Local governments may have completed a risk assessment that meets this criterion as part of their floodplain management or hazard mitigation plan credited under Activity 510. If not, the community can complete the CRS Community Self Assessment described in Section 240 of the *CRS Coordinator's Manual.* The products from either of these efforts should provide the basis for the flood hazard description.

(3) The community must have a flood inundation map(s), also known as a flood stage forecast map. The map must show areas that are inundated by at least three different flood levels in riverine areas and/or two storm surge levels in coastal areas. If a community is only inundated by flash flooding, impact area maps based on cubic feet per second (cfs) alert levels, rainstorm thresholds, or flow depths are acceptable. Such maps must be used in planning the community's flood response when different flood levels or rainfall amounts are predicted. Examples of riverine, flash flood, and coastal maps are shown in Figure 610-1, Figure 610-2, and Figure 610-3, respectively. A community may show that only one flood level is appropriate for some areas of the community, such as for an area subject to shallow flooding.

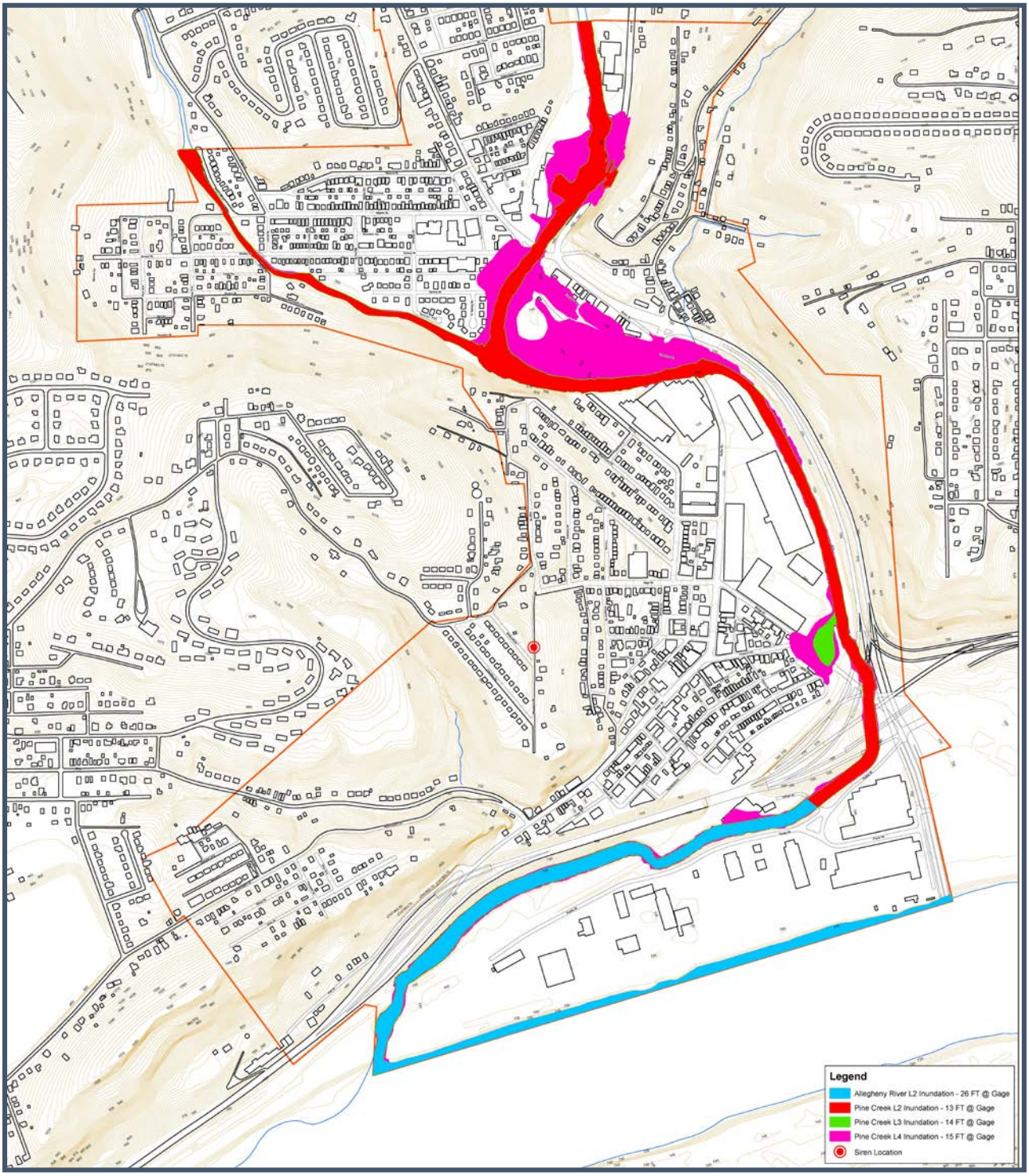

Figure 610-1. An example of a riverine flood inundation map.

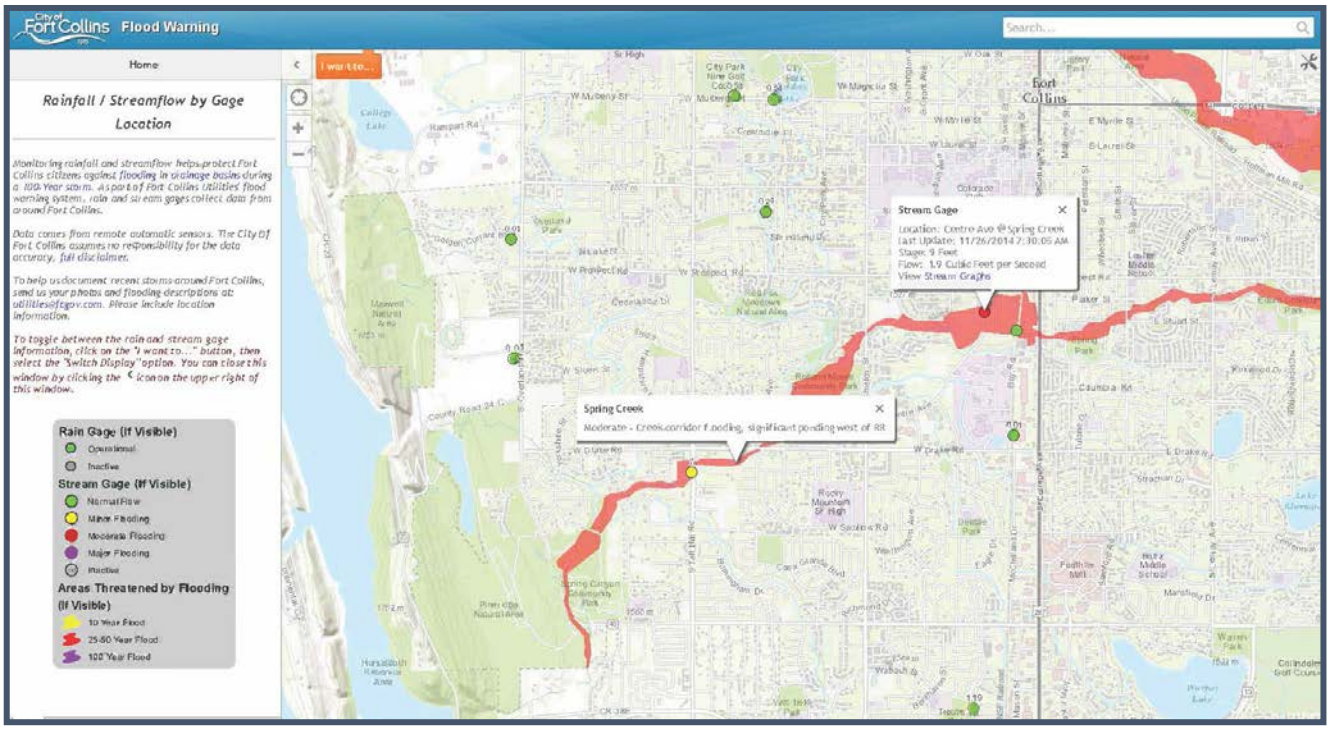

Figure 610-2. An example of a flash flood impact area map.

In large counties, there may not be detailed mapping and flood warning planning for the entire floodplain. In such cases, some counties designate the entire 100-year flood level as the initial area to be notified by the Emergency Alert System and other flood alerts and have detailed, multi-layered flood levels only in the populated areas. If the flood threat recognition system and flood response plan utilize such a scenario, they can be considered a creditable flood warning and response system.

(4) The community must have a flood warning and response plan that has been adopted by the community's governing body. A "flood warning and response plan" may have different names in different communities, such as "flood warning plan," "flood preparedness plan," or "flood annex" to a comprehensive emergency management plan. To qualify as a flood warning and response plan, the plan must

(a) Describe the methods and warning devices used to disseminate emergency warnings to the general public that are credited under EWD,

(b) Include specific flood response actions that are taken at the different flood levels or flash flood impact areas that are credited under FRO, and

(c) Be adopted by the community's governing body or by an office that has been delegated approval authority by the community's governing body.

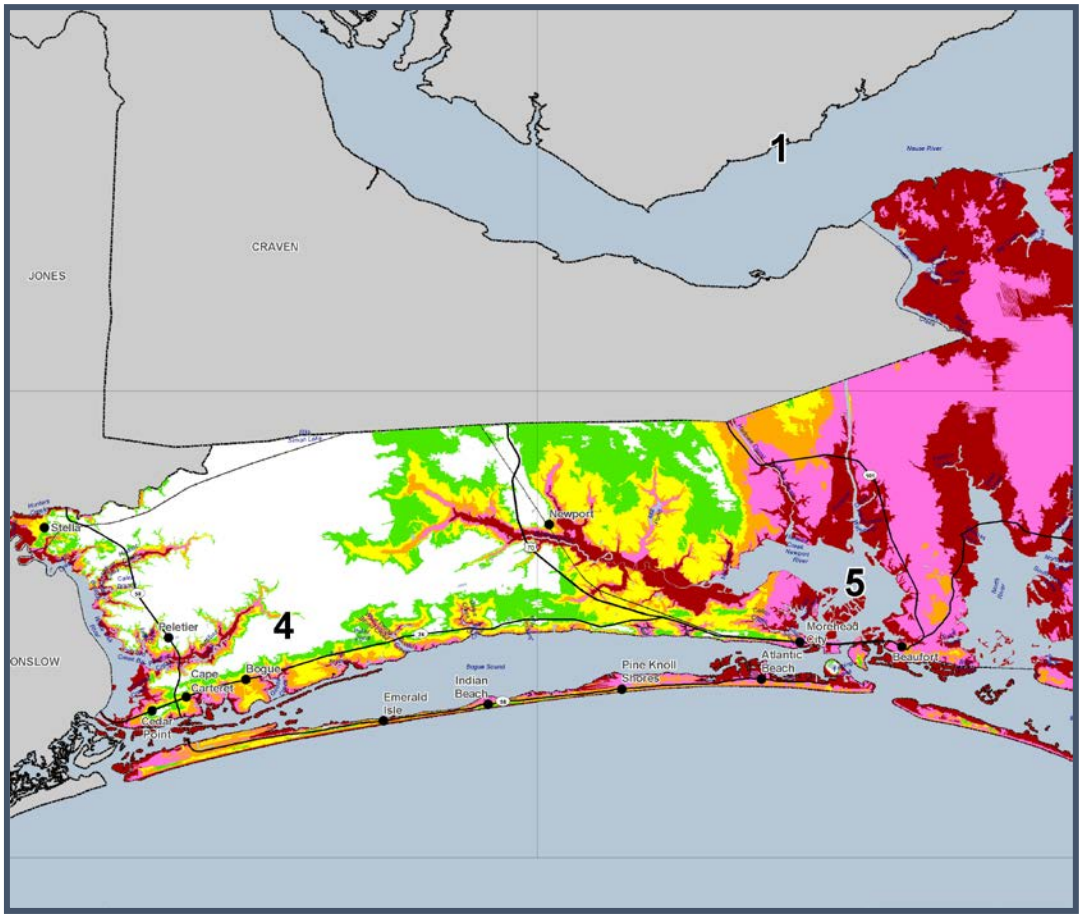

Figure 610-3. An example of a coastal flood inundation map.

(d) If the plan is prepared at the borough, county, or parish level, it must include or be adopted by the individual communities seeking CRS credit for it. Annexes, standard operating procedures (SOPs), standard operating guidance (SOGs), and other documents developed pursuant to the flood warning and response plan do not require formal adoption by the governing body. If the borough, county, or parish plan has been reviewed and the signatory community applies for credit under that previously reviewed flood warning program, then the following applies:

(i) If the "parent plan" has provided the required inundation mapping that covers the community's jurisdiction adequately, no additional map is needed.

(ii) The community must provide the number of structures used in calculating the sums in bSFHA, bFTR, bEWD and bFRO

(iii) The community must provide a list of all public and private critical facilities affected by flooding (or that are needed to be operational during a flood), including contact names and current phone numbers and other pertinent information, and the list must be updated annually.

(iv) The community must provide the adopted definition of critical facilities.

(v) The community must provide verification that the community participated in a drill/exercise or an actual activation of the plan within the past 12 months.

(vi) If credit was provided in EWD for a warning system or systems, then the community must provide verification that the community tested those systems within the past 12 months.

(5) The community must implement one or more outreach projects that tells its residents and businesses how they will be warned about a potential flood and the safety measures they should take during a flood. This outreach is for the purpose of shaping public actions, and can be done by using one or more of the following approaches:

(a) Sending an outreach project (e.g., a brochure, letter, or newsletter) each year to all residents and businesses in the community;

(b) Sending an outreach project each year to all residents and businesses in the floodplain where the warning program is in effect;

(c) Developing an appropriate approach as part of a Program for Public Information (PPI) credited under Activity 330 (Outreach Projects);

(d) If the community has at least three days of advance flood notification, such as coastal areas subject only to tropical storms and hurricanes or communities on large rivers, it may document that it provides repeated watch, warning, and safety information to all residents and businesses, beginning at least 72 hours in advance of the predicted flooding; or

(e) A community with more than one source of flooding (e.g., coastal and riverine) may need to use different types of projects to reach different audiences.

(6) There must be at least one exercise and evaluation of the flood warning and response plan each year that is compliant with the National Incident Management System (NIMS). This process is described in the Homeland Security Exercise Evaluation Program. The exercise can be for a flood, levee failure, dam failure, or hurricane. This criterion can be met if the plan is implemented in response to an actual flood-related event, or threat of a levee failure. In either case, there must be an evaluation of the performance of the plan and recommended changes that may be needed, as is usually documented in an after-action report. This criterion is part of the national emergency preparedness cycle

Annual Warning and Response Exercise

Activities 610 (Flood Warning and Response), 620 (Levees), and 630 (Dams) require an annual exercise of the warning and response plan. A flood, levee failure, dam failure, or hurricane exercise qualifies as an exercise for all three activities.

An after-action report/improvement plan for the warning and response plan must include

- A description of the exercise;
- An evaluation of the
  - Threat recognition procedures,
  - Warning dissemination,
  - Response operations; and
- Recommended changes to the plan.

The exercise requirement can also be met if the community responds to an actual flood or threat of a levee or dam failure, provided that the items listed above are discussed in an after-action (or similar) report.

612 Elements

612.a. Flood threat recognition system (FTR)

The maximum credit for this element is 75 points.

FTR credit is based on the level of service provided by the community's flood threat recognition system. Level 1 is a manual flood threat recognition system, Level 2 is an automated flood alarm threat recognition, and Level 3 is an automated flood threat warning system. Devices such as ALERT (Automated Local Evaluation in Real Time) and ALERT 2 precipitation gages, river gages, and tidal gages are used to provide data that can range from flash flood warning to the timing of potential flood level crests, areal impacts, and storm surge heights. From these data, maps can be developed and response actions identified. The data allow the flood threat recognition system credited in FTR to be linked to the flood response operation, credited in FRO.

A flood threat recognition system provides the community with the notification that a flood is imminent. The amount of lead time needed between the recognition of a flood, the ability to forward a timely alert to the public and to critical facilities and with special-needs registrants, and the successful response to a flood warning are factors in determining the level of flood threat recognition system that is necessary. This serves to tie FTR and emergency warning dissemination (EWD) together.

Designing an effective flood threat recognition system also depends on knowing what areas of the community are the most vulnerable; what sensor locations will best serve the vulnerable areas; the type and frequency of measurements that are needed; budgetary constraints; and operational costs. These systems will vary in their level of sophistication.

The flood threat recognition system's level of service is a function of the distribution of gages, population density, and other factors.

(a) **Level 1: Manual flood threat recognition systems.** A manual system relies on a person to interpret the data received from river and/or tide gages, often using paper tables or graphs. In many cases, the gage data are collected and reported manually, usually by volunteers.

(b) **Level 2: Automated flood alarm systems.** These systems issue a signal when a flood threatens. When water reaches a certain height on a river or tide gage, an alarm is sent to the monitoring location. Unlike automated flood warning systems (credited as Level 3), Level 2 systems do not predict flood heights or provide any data other than the current water level.

(c) **Level 3: Automated flood warning systems.** These systems provide information such as the timing and potential crest of an oncoming flood. On larger rivers, they may be operated by the NWS and the U.S. Geological Survey. Where there are flash floods on smaller rivers, a local ALERT system or IFLOWS (Integrated Flood Observing and Warning System) may be established.

In coastal areas, the systems use models like the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) model. These models determine surge heights and delineate the areas of the community that are subject to inundation during a particular category of storm in real time.

A community may determine that different levels of service are appropriate for different sources of flooding in the community (e.g., riverine, flash flood, and coastal) and may receive FTR credit for more than one system. The credit calculation is based on the levels of service and the number of buildings that benefit from the service.

Credit Criteria for FTR

(1) The activity credit criteria in Section 611.b must be met.

(2) The community must have a Level 1, Level 2, or Level 3 flood threat recognition system that provides early notice of a flood for at least one location within the community. The system must be able to receive or provide flood warnings 24 hours a day, 7 days a week, and 365 days a year. A community may have different levels of service for different sources of flooding, and in different locations in the community.

(3) Each flood threat recognition system must be correlated to a flood inundation or evacuation map, so that the emergency manager can see what areas will be affected by the predicted flood. Generally, this is done by showing areas affected by different flood levels on a map using the same terminology as the flood threat recognition system. An example of this is the riverine map shown in Figure 610-1, which is keyed to the river stages reported by the river gage.

Credit Points for FTR

FTR = EITHER:

(1) 25 points, for a Level 1 manual system, OR

(2) 50 points, for a Level 2 automated flood alarm system, OR

(3) 75 points, for a Level 3 automated flood warning system

Example 612.a-1.

A community has a NWS river gage at a bridge in the center of town. Data from the gage are automatically transmitted to the NWS Weather Forecast Office and River Forecast Center. The NWS offices process the data and issue notices that include predicted flood crest levels and times. The police department monitors the notices 24 hours a day, seven days a week. FTR = 75

Impact Adjustment for FTR

The impact adjustment for the activity is described in Section 613.

Documentation for FTR Provided by the Community

(1) At each verification visit,

(a) The needed documentation is assembled by the ISO/CRS Specialist and provided to the technical reviewer for this activity. There is a checklist to help the emergency manager identify all the needed documentation (available at www.CRSresources.org/600).

(i) A copy of the community's flood hazard description (credit criterion (2) in Section 611.b).

(ii) A copy of the flood inundation or evacuation map or maps (credit criterion (3) in Section 611.b).

(iii) A copy of the flood warning and response plan and documentation that it has been adopted. If the plan was approved by an office that has been delegated approval authority by the community's governing body, a copy of the delegation authorization. The plan must be marked to show where the credited items appear (credit criterion (4) in Section 611.b).

(iv) A description of the flood threat recognition system. The description must identify the rivers, streams, and coastal floodplains where flood stage forecasts are prepared and each forecast point. If the community has its own gage system, such as an ALERT system, the description must include the locations of the stream and precipitation gages.

(v) If the community has its own gage system, such as an ALERT system, a copy of the maintenance procedures for the system and records showing that the system is being maintained.

(vi) An impact adjustment map showing the area(s) affected by each element and documentation showing how the numbers of buildings used in the calculations were determined.

(2) At the verification visit and with the annual recertification,

(a) A copy of the outreach material used to tell people how they will be warned and the safety measures they should take (credit criterion (5) in Section 611.b). If the outreach material is also credited under Activity 330 (Outreach Projects), a separate submittal is not needed, provided that the other document (including a PPI, if used) is annotated to show where the Activity 610 outreach topics are covered.

(b) A description of the flood exercise, drill, or response to an actual emergency or disaster response conducted during the previous year (credit criterion (6) in Section 611.b). The description must include a list of who participated, lessons learned, and any recommendations for changes to the system. A copy of the after-action report or any similar report for any actual response is required.

NOTE: *There is a checklist to help the emergency manager identify all needed documentation, available at www.CRSresources.org/600.*

612.b. Emergency warning dissemination (EWD)

The maximum credit for this element is 75 points.

EWD credit is provided for emergency warning alerts and messages that are disseminated to the public when a flood is imminent. The public is most influenced by the multiple alerts and notifications produced by the emergency manager. Therefore, emergency warning procedures and messages must be planned in order to reduce time of issuance and increase public protective actions. The message content and frequency of issuance greatly influence desired behavior. Multiple channels of alerts and notifications must be employed to reach the maximum number of people and facilities.

Flood warning dissemination provides a critical linkage between the recognition of an impending flood and the community's response to the emergency. New message distribution technology includes the third-generation Emergency Alert System, which includes the Federal Emergency Management Agency's (FEMA's) Integrated Public Alert Warning System (known as IPAWS); the NWS's InteractiveNWS (known as iNWS), Wireless Emergency Alerts (known as WEAs); and various vendor-developed Short Message Service (known as SMS) systems to subscribers.

Once the flood threat recognition system alerts local emergency managers to which areas will be flooded and when, warnings should be issued to the affected populations. The response gap or time delay that takes place between an individual's receiving an alert and taking action can be reduced by pre-scripted messages. The messages that need to be conveyed and the appropriate times to deliver them should be thought out in advance, as part of the flood warning and response plan. Anticipating and targeting potentially impacted people is vital to any alert notification system, pre-planning prevents poor performance.

A community that has created a comprehensive emergency plan will likely receive credit for multiple sub-elements in EWD when it has made the arrangements to execute the plan. For example, a community may have a reverse telephonic notification system (EWD6) that uses pre-scripted messaging templates for a variety of possible flooding events (EWD1) that inform the public of the pending threat and actions to be taken (EWD2). In the planning process the community recognized that some of the population would not receive the land-line phone call, so a geocoded cell phone registry of those located in community (EWD8) was established. At public gathering locations or areas with poor cell coverage, the community installed outdoor public address systems (EWD3). The community also worked with the NWS to ensure that flood threats for the community are accurately represented on the NWS/AHPS web site and in EAS announcements (EWD5).

The warning messages should state when flooding is predicted to occur, its expected severity, and appropriate response actions (e.g., evacuation routes, safe shelters, protective actions). As noted earlier, these messages should be predetermined (use of templates or pre-scripted messages) in order to shorten the time between the agency's awareness of the threat and the issuance of the first alert to the public. Good messages not only consider those in immediate danger, but also those in adjacent areas who might be subject to related impacts from the threat.

Credit Criteria for EWD

(1) The activity credit criteria in Section 611.b must be met.

(2) The warning must reach people in a timely manner. For example, television or radio announcements are not credited in areas subject to flash flooding during the night.

More than one notification channel should be used to reach desired populations and facilities in a timely manner. Some examples are shown in the box.

(3) For those warning systems requiring specialized equipment, such as sirens and SMS-related products, the equipment and procedures must be tested at least annually. Equipment that is used routinely throughout the year, such as television notices and message boards, do not need testing records for CRS credit.

Examples of Warning Notification Channels

- Broadcast sirens or fixed-siren system
- Route Alerting
- Loudspeakers and public address systems
- Reverse telephone distribution systems
- Television (broadcast and message scrolls)
- Dedicated tone alert radios and NOAA weather radios
- Text and telephone alerts
- Radio
- Message boards
- Social media

Credit Points for EWD

EWD = the total of the following, up to the maximum of 75 points

EWD1 = 10 points, if the flood warning and response plan includes pre-scripted messages or message templates and guidance for staff to quickly issue appropriate flood warnings

EWD2 = 10 points, if the public messages include information and instruction on the expected elevation of the flood waters or storm surge, or the impact of flash flooding, and instructions on when to evacuate

EWD3 = 10 points, if an outdoor voice-sound system or fixed-siren system is used that covers the community's jurisdiction

EWD4 = EITHER:

(a) 5 points, if the plan identifies the primary and support agencies responsible for door-to-door or mobile public address warning; OR

(b) 15 points, if the plan identifies the routes, procedures, responsible staff, and equipment necessary for door-to-door or mobile public address warning

EWD5 = 10 points, if the Emergency Alert System through all channels/stations with pre-scripted draft messages is used

EWD6 = 15 points, if telephone warning/enhanced telephone notification is used

EWD7 = 10 points, if television broadcast or message scroll notifications are implemented by the community

EWD8 = 15 points, if the community uses other forms of public notification for emergency warnings, such as geocoded alert notification products and social media coordination of emergency-related topics

EWD9 = 10 points, if tone alert radios or NOAA Weather Radios either provide a system of notification to or are physically located within the schools, hospitals, nursing homes, prisons, and similar facilities that need flood warning

EWD10 = 10 points, if the flood inundation or evacuation map or series of maps used to meet the credit criteria in Section 611.a are posted online.

The procedures and messages should be coordinated with the public information activities credited under flood response preparation (FRP) under Activity 330 (Outreach Projects).

Example 612.b-1.

A community's emergency response plan describes its warning dissemination system. The city receives credit under the following sections under EWD.

EWD1: The plan includes pre-scripted messages and guidance on what warnings to issue, and to whom, when the river is predicted to reach different stages. [10 points]

EWD3: When the flood threat recognition system shows that the river is expected to exceed a flood stage of 30 feet, the police dispatcher sounds the sirens, which are located throughout the community. [10 points]

EWD4: The Police Department sends squad cars along streets in accordance with its plan to warn residents with its public address system. [15 points]

EWD5: The police dispatcher also activates the Emergency Alert System and advises area radio stations about the hazard, and pre-scripted messages are used. [10 points]

EWD6: The guidance authorizes the police dispatcher to initiate the enhanced telephone notification system. [15 points]

EWD7: The local cable television system programming is overridden with scripted warning messages developed for different flood

stages identified in the plan. The messages identify evacuation routes. [10 points]

EWD8: The community uses a geocoded alert subscriber system as an additional public notification for its emergency warnings and the EOC administers the social media coordination of emergency related topics. [15 points]

EWD9: All schools are notified by the school district after the district office receives a flood warning via NOAA Weather Radio receivers. Identified hospitals, nursing homes, and other group facilities for the care of the elderly that need flood warning have NOAA Weather Radio receivers. [10 points]

Different messages are used based on the predicted flood stage. Flood stage messages are evaluated each year based on changes in local conditions such as new construction and lessons learned from the annual exercises.

Sirens are tested on the first Monday of each month. The Emergency Alert System is tested every six months. Maintenance of the sirens and communications equipment is provided for by contracts with the manufacturers. Community-operated SMS products are tested annually. The squad cars are used daily, so there is no special testing or maintenance documentation needed for them.

EWD = 10 + 10 + 10 + 10 + 15 + 10 + 15 + 10 = 90

Because the maximum value for EWD is 75, EWD = 75.

Impact Adjustment for EWD

The impact adjustment for the activity is described in Section 613.

Documentation for EWD Provided by the Community

(1) At each verification visit,

(a) A copy of the flood warning and response plan, marked to show where the EWD-credited items appear in the plan.

(b) Copies of any written warning materials, such as handouts or the flood inundation map credited under EWD 10.

(c) [For EWD1, 2, 5, 6, or 7] A copy of the pre-scripted messages.

(d) [For EWD3] The impact adjustment map, showing the siren locations and their effective coverage areas.

(e) [For EWD6] A copy of the description of a publicly owned call warning system or a copy of the contract with a private provider.

(f) [For EWD7] A copy of the documentation concerning the community-operated television channel or cable television agreement and override procedures.

(g) [For EWD8] A description of the capability and use of other forms of public notification.

(2) At the verification visit and with the annual recertification,

(a) The description of the flood exercise, drill, or response to an actual emergency or disaster response conducted during the previous year that notes experiences and lessons learned about the warning dissemination measures. If the community is covered by a borough, county, or parish emergency management agency exercise, drill or response, then documentation of its participation must be included.

NOTE: *There is a checklist to help the emergency manager identify all needed documentation, available at www.CRSresources.org/600.*

612.c. Flood response operations (FRO)

The maximum credit for this element is 115 points.

FRO credit is based on the extent of coverage and level of detail that the community's flood warning and response plan provides for the flood response operations.

The NIMS requires local governments to validate the inventory of response assets using FEMA's Resources Typing Standards. Department heads and other emergency response team members should know what kinds of resources they have available. This should be compared with the resources needed. Shortfalls may require negotiating agreements with private suppliers or other jurisdictions.

Flood warning and response planning must identify every opportunity to prevent loss of life and property damage during a flood. Using information from the flood inundation maps, the planning team should think about how flooding would occur—what areas will be affected and when. Through this brainstorming, the team can decide what actions and resources will become necessary.

Developing scenarios can assist this process by helping the community determine what actions it must plan for, and what resources it is likely to need. Scenarios are produced by thinking through what will happen in the community during a flood (e.g., where will the water go, who will get flooded, who will lose access because of high water, what critical facilities will be affected). By accounting for the local geography, the specific characteristics of the community's residents, and other factors, scenarios help with the design of the response operations so that the threats to life and property at identified flood levels or flood impact areas can be minimized.

The flood warning and response plan must include appropriate actions to be implemented at the different flood levels shown on the flood inundation map or series of maps. For each action that needs to be taken, the plan must assign a person or office. See the examples below.

Examples.

- River at elevation 733 feet: notification phase
  - Activate the emergency operations center (emergency manager),
  - Monitor water levels (engineering),
  - Etc.
- River at elevation 736 feet: 25 homes and businesses affected
  - Close [*list the names*] streets or bridges (police),
  - Shut off power to threatened areas (utility company),
  - Etc.
- River at elevation 738 feet: 350 homes and businesses affected
  - Close [*list the names*] streets or bridges (police),
  - Pass out sand and sandbags at [*list the locations*] (public works),
  - Relocate equipment in Fire Station #4 to high ground (fire department),
  - Release children from [*name*] school (school superintendent),
    Open evacuation shelters (Red Cross),
  - Establish security and other protection measures (police/sheriff).
  - Etc.

Credit Criteria for FRO

(1) The activity credit criteria in Section 611.b must be met.

(2) For full credit for flood response operations, the plan needs to

(a) Describe the actions to be taken,

(b) Identify the office or official responsible for the action,

(c) Define the time needed to carry out the activity, and

(d) Contain other critical information that designated agencies and organizations will need in order to perform their assigned responsibilities.

General statements or an assignment of responsibilities with no specifics about what is to be done are not credited.

(3) Bonus credit is provided under FRO5 if there is a list of the personnel, equipment, facilities, supplies, and other resources needed to complete each task. For full credit the list must identify what is available within the community and what is needed from private suppliers or other jurisdictions.

(4) FRO5 also provides bonus credit for preparing for mitigation opportunities that may arise in the aftermath of a disaster—a time when hazard awareness is high, funds are more likely to be available, and disruption of the status quo makes it possible to rethink the design and location of facilities and infrastructure. This should be coordinated with the public information activities credited under flood response preparations (FRP) under Activity 330 (Outreach Projects), which encourages owners to take mitigation measures during repairs.

(5) FRO6 provides bonus credits for identifying response and recovery measures to take that support property protection, such as providing a high-ground site for relocated vehicles, helping move building contents, and distributing sandbags.

Credit Points for FRO

FRO = the sum of the following, up to the maximum of 115 points:

FRO1 = 15 points, if the community has developed scenarios that review how flood incidents might develop at the different levels shown on the flood inundation map

FRO2 = Up to 35 points, if the plan identifies flood response tasks and responsible community staff and other public and private organizations with responsibilities related to the flood tasks in the plan, the estimated equipment, supplies, and time required for each response task and the sources of necessary resources

FRO2 = the sum of the following:

(a) 5 points, for identified flood response tasks and responsible staff,

(b) 10 points, for an estimate of the number of personnel needed for each task,

(c) 5 points, for an estimate of the time required for each response task, and

(d) 15 points, for a list of equipment and supplies expected to be needed and how they will be obtained

FRO3 = 25 points, if specific actions are keyed to the different flood levels shown on the flood inundation map or maps used for credit under Section 611.b(3)

FRO4 = 10 points, for maintaining a data base of people with special needs who require evacuation assistance when a flood warning is issued and for having a plan to provide transportation to secure locations

FRO5 = Up to 15 points, if the plan includes instructions for

- When and how returning evacuees can reoccupy their damaged homes and businesses,
- Permit requirements during the recovery phase,
- Implementing the community hazard mitigation plan's identified flood loss mitigation measures on community properties, and
- Promoting flood loss mitigation measures for private property

FRO6 = 20 points, if the plan identifies actions that support property protection measures that could be carried out during response and recovery phases

Example 612.c-1.

A community's emergency response plan includes the following flood response information. The city receives credit under the following sections under FRO:

FRO1 The plan includes various scenarios based upon different inundation levels on the flood inundation map. [15 points]

FRO2 Various public and private organizations are listed, along with their flood response assignments. The plan lists the staff, equipment, and supplies needed for each response task and the time required for each task. Assets are identified by departments using NIMS resource typing standards. [35 points]

FRO3 The tasks are tied to specified flood levels or gage heights of the river. [25 points]

FRO5 Instructions for the return of evacuees to affected areas are also in the plan, including credential instructions and area security assignments. Substantial damage assessments are prescribed before repair permits can be issued [10 points, partial credit under FRO5]

FRO = 15 + 35 + 25 + 10 = 85

Impact Adjustment for FRO

The impact adjustment for FRO is described in Section 613.

Documentation for FRO Provided by the Community

(1) At each verification visit,

(a) A copy of the flood warning and response plan, marked to show where the FRO-credited items appear.

(b) Copies of the appropriate documents, for the credited items that are not in the flood warning and response plan.

NOTE: *There is a checklist to help the emergency manager identify all needed documentation, available at www.CRSresources.org/600.*

(2) With the annual recertification,

(a) The description of the flood exercise, drill, or response to an actual emergency or disaster response conducted during the previous year, which notes experiences with, and lessons learned from, the flood response operations portion of the plan. If the community is covered by a borough, county, or parish emergency management agency exercise, drill, or response, then documentation of its participation must be included.

612.d. Critical facilities planning (CFP)

The maximum credit for this element is 75 points.

CFP credit is provided for coordinating the community's warning and response program with its critical facilities.

By definition, "critical facilities" are critical to the community. For CRS credit purposes, critical facilities are defined in Section 120. There are usually two kinds of critical facilities that a community should address with regard to flooding:

- Facilities that are vital to flood response activities or crucial to the health and safety of the public before, during, and after a flood, such as a hospital, emergency operations center, electric substation, police station, fire station, nursing home, school, vehicle and equipment storage facility, or shelter; and
- Facilities that, if flooded, would make the flood problem and its impacts much worse, such as a hazardous materials facility, power generation facility, water utility, or wastewater treatment plant.

Coordinating the flood warning and response planning with these facilities will allow more timely and effective protection of them and more rapid response and community recovery.

Critical facilities may need special early warning. Every facility should have its own individual flood warning and response plan. Not only will this make them better prepared, but also it will reduce the workload on emergency response teams because the critical facilities will be performing some or all of the response themselves.

Credit Criteria for CFP

(1) The activity credit criteria in Section 611.b must be met.

(2) CFP1 is a prerequisite for any CFP credit.

(3) For CFP1, the community's flood warning and response plan must list the facilities considered critical in a flood. This can be in a separate document or SOP. In general, facilities not subject to flooding do not need to be addressed, although in some cases loss of access can cause a critical situation. There may also be facilities in flood-free sites that are needed to support the flood response effort (e.g., sandbag suppliers and shelters for evacuees). The list must be updated at least annually.

The community must also contact the facilities to determine if they need any special warning arrangements. For example, a factory where there is a lot of noise may need a direct telephone call because no one would hear a siren. Another facility may need an earlier notice because it needs more time to get ready.

The community does not need to provide a special warning to all critical facilities, only those that need one.

(4) For CFP2, additional credit is provided if flood warning and response plans have been developed, reviewed, or accepted by the community for individual critical facilities.

(5) If there are no critical facilities that can be affected by flooding, the community must provide documentation stating this and provide a copy of the community's adopted definition of critical facilities.

Credit Points for CFP

CFP = the sum of the following, up to 75 points:

CFP1 = up to 25 points, if the flood warning and response plan includes

(a) contact information, including the names and phone numbers of the operators of all public and private critical facilities affected by flooding, and

(b) arrangements for special warnings or early notifications directly to those critical facilities that need advanced warning

CFP2 = up to 50 points, if critical facilities listed under CFP1 have their own flood warning and response plans that have been developed, reviewed, or accepted by the community. The credit is prorated based on the percentage of affected critical facilities that have creditable plans

Example 612.d-1.

A community's multi-hazard plan lists all critical facilities in the community, their operators, and their telephone numbers. The list is updated by the emergency manager every six months. There are three critical facilities affected by flooding: the public works garage, a church, and a school. The first is in the floodplain and the last two are adjacent to the floodplain but are needed as shelters as described in the flood warning and response plan. The community's plan includes providing special warnings to these three facilities. CFP1 = 25 points

CFP = 25 + 0 = 25

Impact Adjustment for CFP

There is no impact adjustment for CFP.

Documentation for CFP Provided by the Community

(1) At each verification visit,

(a) A list of all public and private critical facilities affected by flooding or needed to be operational during a flood, with the contact information and agreed-upon warning needs.

(b) [For CFP2] The list of critical facilities marked to identify those that have developed their own flood warning and response plans that have been reviewed and accepted by the community. The ISO/CRS Specialist will ask for samples of the plans for review.

(c) If there are no critical facilities that can be affected by flooding, the community must provide a letter on community letterhead stating that information, and a copy of the community's adopted definition of critical facilities.

NOTE: *There is a checklist to help the emergency manager identify all needed documentation, available at www.CRSresources.org/600.*

(2) With the annual recertification,

(a) A page from the latest list of the critical facilities provided for CFP1 that must be updated at least annually.

612.e. StormReady community (SRC)

The maximum credit for this element is 25 points.

SRC credit is provided to communities that have received a StormReady designation from the NWS.

StormReady is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather—from tornadoes to tsunamis. The program encourages communities to take a new, proactive

approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.

To be officially StormReady, a community must

- Establish a 24-hour warning point and emergency operations center;
- Have more than one way to receive severe weather warnings and forecasts and to alert the public;
- Create a system that monitors weather conditions locally;
- Promote the importance of public readiness through community seminars; and
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises (see www.weather.gov/stormready/).

There are more than 2,000 StormReady communities in the United States. StormReady credits communications and educational requirements that go beyond the elements credited by the CRS. Because of the advantages of being a StormReady community, this element provides credit to encourage communities to qualify.

Credit Criteria for SRC

(1) The activity credit criteria in Section 611.b must be met.

(2) The community must be designated as a StormReady community by the NWS, either by the inclusion of its name on the StormReady website or by being named in the award letter from the regional NWS office.

Credit Points for SRC

SRC = 25, for being designated by the NWS as a StormReady community and meeting all credit criteria

Impact Adjustment for SRC

There is no impact adjustment for SRC.

Documentation for SRC Provided by the Community

No documentation is required from the community. Credit is based on the list of StormReady communities posted on the NWS website, www.weather.gov/stormready/.

612.f. TsunamiReady community (TRC)

The maximum credit for this element is 30 points.

TRC credit is provided to communities that have received a TsunamiReady designation from the NWS.

The TsunamiReady program is the NWS's counterpart to StormReady for communities that are exposed to a tsunami hazard. There are over 100 TsunamiReady communities in the

country. A community can participate in both programs and receive credit for both elements, SRC and TRC.

Credit Criteria for TRC

(1) The activity credit criteria in Section 611.b must be met.

(2) The community must be designated as a TsunamiReady community by the NWS either by the inclusion of its name on the TsunamiReady website or by being named in the award letter from the regional NWS office.

(3) The community must meet the CRS tsunami hazards mapping requirements of element MTS, Mapping tsunami hazards, in Section 412.f(2) of the *Coordinator's Manual*.

(4) The community must have adopted a tsunami hazards operations plan that describes the actions the community is to take upon receiving a tsunami warning.

Credit Points for TRC

TRC = 30, for being designated by the NWS as a TsunamiReady community and meeting all credit criteria

Impact Adjustment for TRC

There is no impact adjustment for TRC.

Documentation for TRC Provided by the Community

(1) At each verification visit,

(a) A copy of the tsunami hazards map and a description of how it was prepared; and

(b) A copy of the tsunami emergency operations plan.

No documentation is required of communities to demonstrate their TsunamiReady credit. Credit is confirmed based on the list of TsunamiReady communities posted on the NWS website, www.tsunamiready.noaa.gov.

613 Impact Adjustment

The credit points for FTR, EWD, and FRO are adjusted based on the number of buildings affected by the element. Determining these adjustments usually will require identifying the area affected and then counting the buildings within that area.

(1) $rFTR = \frac{bFTR}{bSF}$

(2) $rEWD = \frac{bEWD}{bSF}$

(3) $rFRO = \frac{bFRO}{bSF}$, where

bFTR = the number of buildings that benefit from the level of the flood threat recognition system,

bEWD = the number of buildings that benefit from the flood emergency warnings,

bFRO = the number of buildings in the area covered by the flood response operations, and

bSF = the number of buildings in the Special Flood Hazard Area, and

bFRO cannot be greater than bEWD
bEWD cannot be greater than bFTR
rFTR cannot be greater than 1.00

See Section 301 for more information on counting buildings for impact adjustments. Note that bSF includes all buildings in the Special Flood Hazard Area (SFHA), but bFTR, bEWD, and bFRO can include buildings outside the SFHA that benefit from the flood warning and response plan. The maximum impact adjustment is 1.0. For example, a community with a plan for up to a category 5 hurricane may be providing a safety benefit for many buildings on ground higher than that flooded by the base flood.

In general, bFTR = bEWD = bFRO, because the flood warning and response plan will provide the same level of services to the same areas. There may be cases in which the flood threat recognition system covers a larger area than a detailed flood warning and response plan, so their impact adjustments are calculated separately.

Example 613-1.

The community in the previous examples has a warning and response program for its major river. It does not have a program for three small streams that affect a portion of its SFHA. There are 452 buildings within the community's SFHA. Its flood warning and response plan covers the 410 buildings that are in the major river's floodplain.

bFTR, bEWD, and bFRO = 410 bSF = 452

$rFTR = \frac{bFTR}{bSF} = \frac{410}{452} = 0.91$ $rEWD = \frac{bEWD}{bSF} = \frac{410}{452} = 0.91$

$rFRO = \frac{bFRO}{bSF} = \frac{410}{452} = 0.91$

614 Credit Calculation

The credit points for each element are multiplied by the impact adjustment ratios and the products are totaled.

c610 = (FTR x rFTR) + (EWD x rEWD) + (FRO x rFRO) + CFP1 + CFP2 + SRC + TRC

Example 614-1.

The community's flood warning and response program is described in the previous sections' examples.

FTR = 75 rFTR = 0.91

EWD = 75 rEWD = 0.91

FRO = 65 rFRO = 0.91

CFP1 = 25 CFP2 = 0

SRC = 25

TRC = 0

c610 = (FTR x rFTR) + (EWD x rEWD) + (FRO x rFRO) + CFP1 + CFP2 + SRC + TRC

c610 = (75 x 0.91) + (75 x 0.91) + (65 x 0.91) + 25 + 0 + 25 + 0

= 68.25 + 68.25 + 59.15 + 25 + 25 + 0

= 245.65 = 246 (rounded)

615 For More Information

a. Additional information, documentation checklists, reference materials, and examples can be found at www.CRSresources.org/600.

b. *Flood Warning Systems Manual*. National Weather Service Manual 10-942. Operations and Services Hydrologic Services Program, NWSPD 10-9. 2010. Silver Spring, MD: Department of Commerce, NOAA, www.nws.noaa.gov/os/water/ahps/resources/Flood_Warning_Systems_Manual.pdf.

c. CPG 101: *Developing and Maintaining State, Territorial, Tribal and Local Government Emergency Plans*. March 2009. Washington, D.C.: Federal Emergency Management Agency. www.fema.gov/pdf/about/divisions/npd/CPG_101_V2.pdf.

616 Related Activities under the Community Rating System

- Developing an appropriate outreach approach to the residents as required in Section 611.b(5) as part of a Program for Public Information can be credited under Activity 330 (Outreach Projects).
- FTR is similar to element LFR under Activity 620 and element DFR under Activity 630. It credits a system that provides the community with the earliest possible notification that a flood is imminent. The three threat recognition systems should be closely coordinated.
- EWD is similar to element LFW under Activity 620 and element DFW under Activity 630. It credits a flood warning dissemination system that provides a critical link between the recognition of an impending flood and the community's response to the emergency. The three warning dissemination systems should be closely coordinated.
- FRO is similar to element LFO under Activity 620 and DFO under Activity 630. It identifies opportunities to prevent loss of life and property damage during a flood. The three response operations plans should be closely coordinated.
- FRO6 credit should be coordinated with the public information activities credited as flood response preparations (FRP) under Activity 330 (Outreach Projects), regulations under Activity 430 (Higher Regulatory Standards), and mitigation measures under Activity 530 (Flood Protection).
- Documentation of the annual exercise is a prerequisite for Activities 610, 620, and 630. One exercise can meet all three activities' requirement.