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National Flood Insurance Program Community Rating System

Coordinator's Manual

FIA-15/2017

Abbreviated Reference focused on Levee and Dam summary selections from the full version of this same manual. The contents in this reference are outlined in red in the contents page. There are many overlapping references in the full manual but this creates a concise summary for review.

Full Version: https://www.fema.gov/media-library-data/1493905477815-d794671adeed5beab6a6304d8ba0b207/633300_2017_CRS_Coordinators_Manual_508.pdf



FEMA

The photograph on the cover represents the ultimate floodplain, from a community's perspective: Nature follows its course with no threat to life or property. The waterfront is a community asset where people can relax and enjoy the view.

Cover photo courtesy of John Kinley

Burden Disclosure

Public reporting burden for this application is estimated to average 45 hours per response for the application process, 1.6 hours for the environmental and historic preservation certifications, and 4 hours for annual recertification. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and submitting the application and/or forms. This collection of information is voluntary. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing the burden to Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street., S.W., Washington, D.C. 20472, Paperwork Reduction Project (1660-0022).

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FOREWORD

The Community Rating System (CRS) is a national program developed by the Federal Emergency Management Agency (FEMA). The *CRS Coordinator's Manual* spells out the credits and credit criteria of the CRS for community activities and programs that go above and beyond the minimum requirements for participation in FEMA's National Flood Insurance Program. The *Coordinator's Manual* is available in Adobe pdf format at www.CRSresources.org.

Using the *CRS Coordinator's Manual*

The *Coordinator's Manual* is the guidebook for the CRS. It explains how the program operates, what is credited, and how credits are calculated. Although it is primarily a reference for CRS activities and credits, it can also help guide communities that want to design or improve their floodplain management programs.

If you want to know how the CRS works and how your community can benefit from participating in the program and reduce flood insurance premiums,

- Start with Section 110 for an overview of the program.
- Section 200 describes the procedures for applying, required activities, calculating credits, and advancing in the program. Be sure to review the prerequisites for participation in Section 211.

If you want to develop a comprehensive community floodplain management program,

- Start with the CRS Community Self Assessment, Section 240, to help evaluate your existing flood problems and identify potential future flood problems, and to identify appropriate measures to address them.
- Use the results of the CRS Community Self Assessment to determine what additional data you need about your flood problem areas. Developing new data can be credited under Activity 410 (Flood Hazard Mapping).
- Review how to prepare a floodplain management plan, following the 10-step process described in Activity 510 (Floodplain Management Planning). If you have developed a multi-hazard mitigation plan, Activity 510 can still assist you in developing a more comprehensive plan for flood damage reduction.
- To develop an overall public information program, see the section on the Program for Public Information in Activity 330 (Outreach Projects).

If you want to improve a specific aspect of your existing floodplain management efforts, the CRS has 19 credited activities and additional sections and appendices that provide supplementary guidance and references. Here is a guide to what they cover.

- Assessing your community’s flood problem: Section 240
- Mapping and flood data
 - Developing new maps and data: Activity 410
 - Maintaining and providing maps and data: Activity 440 and Activity 320
 - Providing the data to people: Activity 320
 - Mapping special flood-related hazards (e.g., tsunamis, migrating stream channels, coastal erosion): Activity 320 and Activity 410.
- Managing new development to minimize future damage
 - Preserving open space: Activity 420
 - Protecting natural floodplain functions: Activity 420 and Activity 510
 - Regulating development in the floodplain: Activity 430 and Activity 310
 - Regulating development in the watershed: Activity 450
 - Managing special flood-related hazards (e.g., tsunamis, migrating stream channels, coastal erosion): Activity 420 and Activity 430.
- Developing a floodplain management plan for your community: Activity 510
- Reducing flood losses to existing development
 - Acquiring or relocating flood-prone buildings out of harm’s way: Section 501, Activity 520, and Activity 530
 - Protecting flood-prone buildings in place: Activity 530
 - Improving your drainage system maintenance efforts: Activity 540
 - Addressing repetitively flooded properties: Activity 520 and Activity 530
- **Improving emergency preparedness and response**
 - **Flood warning and response planning: Activity 610**
 - **Warning and response for areas protected by a levee: Activity 620**
 - **Warning and response for areas downstream of a dam: Activity 630**
- Implementing public information activities
 - Developing a master public information program: Activity 330
 - Reaching out to people about floods and flood protection: Activity 330
 - Providing detailed information on the potential for flooding and protecting against flood damage: Activity 320, Activity 350, and Activity 360

- Libraries: Activity 350
- Websites: Activity 350
- Disseminating information on flood insurance: Activity 370 and Activity 330
- Assisting with real estate disclosure: Activity 340.

More about the *Coordinator's Manual*

This document uses some technical terms and acronyms. The terms are defined in the Glossary, Section 120. The acronyms are listed in Appendix A. The most common acronyms are

| | |
|------|--|
| NFIP | National Flood Insurance Program. |
| FEMA | The Federal Emergency Management Agency, part of the Department of Homeland Security. Most of the NFIP field work and community coordination is done by the 10 Regional Offices of FEMA. |
| CRS | Community Rating System. |
| FIRM | Flood Insurance Rate Map; published by FEMA and provided to communities. |
| SFHA | Special Flood Hazard Area; the floodplain delineated on the FIRM as A Zones and V Zones. |

Communities and other floodplain management professionals are encouraged to make suggestions on both the content and the form of the CRS. Send them to

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100 INTRODUCTION

This series presents an overview of the purpose, goals, and contextual background of the Community Rating System (CRS), the benefits of the program, and the community’s role and responsibilities. The activities that are credited under the CRS are listed here, along with the points that may be obtained for each activity, and a description of how those points are translated into CRS classifications and premium reductions. The last part of this series (Section 120) is a glossary of terms used throughout the *CRS Coordinator’s Manual*.

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110 PROGRAM OVERVIEW

111 Background

The National Flood Insurance Program (NFIP) provides federally backed flood insurance within communities that enact and enforce floodplain regulations. Since its inception in 1968, the NFIP has been very successful in helping flood victims get back on their feet. As of October 1, 2016, there were 5.1 million residential and commercial policies in force, with \$1.25 trillion in written coverage with annual premiums of about \$3.6 billion. From 1978 through March 2016, over 2.2 million losses were paid, totaling over \$54 billion.

To be covered by a flood insurance policy (for the structure and/or its contents), a property must be in a community that participates in the NFIP. To qualify for the NFIP, a community adopts and enforces a floodplain management ordinance to regulate development in flood hazard areas. The objective of the ordinance is to minimize the potential for flood damage to future development. Today, over 22,200 communities in 56 states and territories participate in the NFIP.

The NFIP has been effective in requiring new buildings to be protected from damage by a 1% chance flood, also known as the 100-year or base flood. However, flood damage still results from floods that exceed the base flood, from flooding in unmapped areas, and from flooding that affects buildings constructed before the community joined the NFIP.

Under the Community Rating System (CRS), communities can be rewarded for doing more than simply regulating construction of new buildings to the minimum national standards. Under the CRS, the flood insurance premiums of a community's residents and businesses are discounted to reflect that community's work to reduce flood damage to existing buildings, manage development in areas not mapped by the NFIP, protect new buildings beyond the minimum NFIP protection level, preserve and/or restore natural functions of floodplains, help insurance agents obtain flood data, and help people obtain flood insurance.

112 Goals

The goals of the NFIP are to provide flood insurance to property owners, to encourage flood loss reduction activities by communities, and to save taxpayers' money. As a part of the NFIP, the CRS provides both incentives and tools to further these goals.

The CRS recognizes, encourages, and rewards—by the use of flood insurance premium adjustments—community and state activities that go beyond the minimum required by the NFIP to

- Reduce and avoid flood damage to insurable property,
- Strengthen and support the insurance aspects of the NFIP, and
- Foster comprehensive floodplain management.

The purpose of the CRS is to support the NFIP. To do this, the CRS provides flood insurance premium rate reductions to policyholders in recognition of the fact that their communities implement activities that exceed the minimum NFIP requirements and that work toward the three goals of the CRS. Included in this support are measures that credit protection to life and property during a flood. A closer look at how communities can implement these three goals follows.

Goal 1. Reduce and avoid flood damage to insurable property.

The CRS supports the NFIP by working to minimize flood losses nationwide, both inside and outside of mapped floodplains. Communities are encouraged to reduce the exposure of existing buildings (and their contents) to flood damage, especially properties that are subject to repetitive flood losses. New buildings and their contents should be protected from known and future local flood hazards. Standards higher than those set out in the minimum criteria of the NFIP may be needed to accomplish these tasks. The CRS encourages communities to map and provide regulatory flood data for all their flood hazards. The data should be used in their regulatory programs and shared with all users and inquirers.

Goal 2. Strengthen and support the insurance aspects of the NFIP.

The CRS recognizes communities whose activities generate and contribute data that enable accurate actuarial rating of flood insurance. Communities are encouraged to implement mapping and information programs that help assess individual property risk and reduce repetitive flood losses. To help expand the policy base, communities should make their residents aware of their flood risk so that they purchase and maintain flood insurance policies.

Goal 3. Foster comprehensive floodplain management.

The CRS encourages communities to use all available tools to implement comprehensive local floodplain management programs, which ordinarily have concerns beyond the protection of insurable property. The CRS recognizes local efforts that protect lives; further public health, safety, and welfare; minimize damage and disruption to infrastructure and critical facilities; preserve and restore the natural functions and resources of floodplains and coastal areas; and ensure that new development does not cause adverse impacts elsewhere in the watershed or on other properties.

A community's staff should understand the physical and biological processes that form and alter floodplains and watersheds and take steps to deal with flooding, erosion, habitat loss, water quality, and special flood-related hazards. A comprehensive approach includes planning, public information, regulations, financial support, open space protection, public works activities, emergency management, and other appropriate techniques.

113 Credit Points and Credited Activities

To be recognized in the insurance rating system, local floodplain management activities must be described, measured, and evaluated by the CRS. The basic document detailing the program is the *CRS Coordinator's Manual*. It sets forth the procedures, creditable activities, and the credit points assigned to each activity, and gives examples of activities and how their credit is calculated.

113.a. Credit Points and Classification

A community receives a CRS classification based upon the total credit for its activities. There are 10 CRS classes. Class 1 requires the most credit points and gives the greatest premium reduction or discount. A community that does not apply for the CRS, or does not obtain the minimum number of credit points, is a Class 10 community and receives no discount on premiums. The qualifying community total points, CRS classes, and flood insurance premium discounts are shown in Table 110-1.

| Table 110-1. CRS classes, credit points, and premium discounts. | | | |
|--|---------------------------|--------------------------|---------------------|
| CRS Class | Credit Points (cT) | Premium Reduction | |
| | | In SFHA | Outside SFHA |
| 1 | 4,500+ | 45% | 10% |
| 2 | 4,000–4,499 | 40% | 10% |
| 3 | 3,500–3,999 | 35% | 10% |
| 4 | 3,000–3,499 | 30% | 10% |
| 5 | 2,500–2,999 | 25% | 10% |
| 6 | 2,000–2,499 | 20% | 10% |
| 7 | 1,500–1,999 | 15% | 5% |
| 8 | 1,000–1,499 | 10% | 5% |
| 9 | 500–999 | 5% | 5% |
| 10 | 0–499 | 0 | 0 |

SFHA: Zones A, AE, A1–A30, V, V1–V30, AO, and AH

Outside the SFHA: Zones X, B, C, A99, AR, and D

Preferred Risk Policies are not eligible for CRS premium discounts because they already have premiums lower than other policies. Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage.

Some minus-rated policies may not be eligible for CRS premium discounts.

Premium discounts are subject to change.

The flood insurance premium discount is based on whether a property is in or out of the Special Flood Hazard Area (SFHA), i.e., the zones beginning with the letter A and V as shown on the community's Flood Insurance Rate Map (FIRM). The premium discount for properties in the SFHA increases according to the community's CRS class. A community's classification is based on the community total points (symbolized as cT in the CRS calculations).

The discount for properties outside the SFHA is lower for Class 1–8 communities because premiums in these areas are already relatively low and can be lowered further through the Preferred Risk Policy. Also, most activities undertaken to qualify for those classes are implemented only in the floodplain. Because areas designated as A99 and AR Zones already receive an insurance premium reduction, these zones get the same premium reduction as non-SFHA areas.

113.b. Credited Activities

There are 19 creditable activities, organized under four categories, which are presented in the 300–600 series of the *Coordinator's Manual*. The *Coordinator's Manual* assigns credit points based upon the extent to which an activity advances the three goals of the CRS.

Public Information Activities (300 Series)

This series credits programs that advise people about the flood hazard, encourage the purchase of flood insurance, and provide information about ways to reduce flood damage. These activities also generate data needed by insurance agents for accurate flood insurance rating. They generally serve all members of the community.

Mapping and Regulations (400 Series)

This series credits programs that provide increased protection to new development. These activities include mapping areas not shown on the FIRM, preserving open space, protecting natural floodplain functions, enforcing higher regulatory standards, and managing stormwater. The credit is increased for growing communities.

Flood Damage Reduction Activities (500 Series)

This series credits programs for areas in which existing development is at risk. Credit is provided for a comprehensive floodplain management plan, relocating or retrofitting flood-prone structures, and maintaining drainage systems.

Warning and Response (600 Series)

This series provides credit for measures that protect life and property during a flood, through flood warning and response programs. **There is credit for the maintenance of levees and for state regulatory programs for dams, as well as for programs that prepare for the potential failure of levees and dams.**

Some CRS activities may be implemented by the state or a regional agency rather than by the community. For example, some states have hazard disclosure laws that are creditable under Activity 340 (Flood Hazard Disclosure). A community in those states will receive those credit points when it applies for CRS credit and demonstrates that the law is effectively implemented within its jurisdiction. See also Section 231.c.

113.c. Activity Credit Points

The 19 activities and their credit points are shown in Table 110-2. Each activity has one or more elements. Elements are the basic credit level for the CRS. The element and activity scoring process is covered in Activity 220 (Credit Calculation).

The maximum credit points for each activity are shown in the second column. The maximum credit can be earned when all elements within an activity are being implemented and all credit criteria are met. In some activities, maximum credit cannot be provided unless credit has been earned in other activities. For example, additional credit is provided in some activities if the community has adopted a Program for Public Information under Activity 330 (Outreach Projects).

The third column and fourth columns in Table 110-2 show the estimated maximum credit and average credit points using a conservative model to convert the points received under the 2007 *Coordinator's Manual* to the new scoring in the 2013 and 2017 *Coordinator's Manuals*. The maximums and averages are based upon the number of applicants for each activity, not the total number of applicants for the CRS. The fifth column shows the percentage of all CRS communities that received credit for each activity as of May 2013.

Communities should note the average credits for these activities. They provide a better indication of what an applicant can expect for an activity than do the maximum points available.

A community must have at least 500 verified credit points to become a Class 9 or better. It must also meet the prerequisites for certain classes, as described in Section 211. As explained in Activity 230 (Verification), the final, or verified, credit is calculated by the ISO/CRS Specialist after a review of the documentation provided by the community and the community's implementation of its activities at the verification visit (explained in Section 232).

The CRS "Quick Check" is a tool that a community can use to assess its potential for receiving CRS credit for activities it is undertaking. The Quick Check can be found at www.CRSresources.org/200.

The Quick Check does not estimate credit for a community. However, by reviewing each element and going through the steps explained in Section 220, a community can assess its potentially creditable activities.

| Table 110-2. Credit points awarded for CRS activities.* | | | | |
|---|--------------------------------|------------------------------|------------------------------|---|
| Activity | Maximum Possible Points | Maximum Points Earned | Average Points Earned | Percentage of Communities Credited |
| 300 Public Information Activities | | | | |
| 310 Elevation Certificates | 116 | 116 | 38 | 96% |
| 320 Map Information Service | 90 | 90 | 73 | 85% |
| 330 Outreach Projects | 350 | 350 | 87 | 93% |
| 340 Hazard Disclosure | 80 | 62 | 14 | 84% |
| 350 Flood Protection Information | 125 | 125 | 38 | 87% |
| 360 Flood Protection Assistance | 110 | 100 | 55 | 41% |
| 370 Flood Insurance Promotion ⁵ | 110 | 110 | 39 | 4% |
| | | | | |
| 400 Mapping and Regulations | | | | |
| 410 Flood Hazard Mapping | 802 | 576 | 60 | 55% |
| 420 Open Space Preservation | 2,020 | 1,603 | 509 | 89% |
| 430 Higher Regulatory Standards | 2,042 | 1,335 | 270 | 100% |
| 440 Flood Data Maintenance | 222 | 249 | 115 | 95% |
| 450 Stormwater Management | 755 | 605 | 132 | 87% |
| | | | | |
| 500 Flood Damage Reduction Activities | | | | |
| 510 Floodplain Mgmt. Planning | 622 | 514 | 175 | 64% |
| 520 Acquisition and Relocation | 2,250 | 1,999 | 195 | 28% |
| 530 Flood Protection | 1,600 | 541 | 73 | 13% |
| 540 Drainage System Maintenance | 570 | 454 | 218 | 43% |
| | | | | |
| 600 Warning and Response | | | | |
| 610 Flood Warning and Response | 395 | 365 | 254 | 20% |
| 620 Levees | 235 | 207 | 157 | 0.5% |
| 630 Dams | 160 | 99 | 35 | 35% |
| <p>* Figures are based on communities that have received verified credit under the 2013 <i>CRS Coordinator's Manual</i> (about 43% of CRS communities), as of October 2016. The maximum possible points are based on the 2013 <i>Coordinator's Manual</i>. Growth adjustments are not included.</p> | | | | |

There are three important things to note when estimating credit:

1. Moving to a Class 6, 4, or 1 depends on both having adequate points AND meeting class prerequisites, as explained in Section 211.
2. Many CRS activities have an impact adjustment associated with them. An impact adjustment means that CRS credit is provided for the portion of the regulatory floodplain to which the creditable element is applied. For example, even though 1,450 maximum points are available for open space preservation (OSP), if a community has 20% of the regulatory floodplain as open space, then the credit will be 20% of the allowable credit, or 290 points. See Section 222.
2. Only the final, verified credit calculated by the ISO/CRS Specialist after the verification visit determines a community's total points. It is important that the community provide correct and complete materials to document its activities. Only through a review of the community's documentation can the ISO/CRS Specialist determine the credit points that should be provided.

A community should apply only for those activities it is actively undertaking and those it knows it can implement in accordance with the *Coordinator's Manual*. For example, no credit is provided for draft ordinances—regulations must have been enacted and enforced. Also, a community should not be overly ambitious in undertaking new activities for CRS credit at the risk of losing the credit later (at annual recertification or cycle verification visits) for activities it is unable to implement or continue.

113.d. Activities not Listed

The CRS activities are not design standards for local floodplain management. The *Coordinator's Manual* is an insurance tool that describes methods of calculating credit points for various community activities. The fact that the *Coordinator's Manual* does not list a specific credit for some activities does not mean that they should not be implemented by communities that need them.

An activity may deserve credit even if the *Coordinator's Manual* does not include it. The *Coordinator's Manual* cannot predict or list everything that can be done to support the goals of the CRS. Communities are always welcome to request credit for alternate approaches or innovations that are not included in the *Coordinator's Manual*. Similarly, communities can submit alternative approaches to the class prerequisites listed in Section 211.

Requests should be submitted to the ISO/CRS Specialist and should include documentation to support how the alternative approach or innovation meets the intent of, or is equivalent to, the prerequisite or the element and/or activity credited in the *Coordinator's Manual*.

Note that some activities are not directly recognized by the CRS for one of three reasons:

1. They do not directly affect buildings that can be insured under the NFIP (e.g., uninsurable items such as streets and land value);

2. They are recognized by other aspects of the flood insurance rating program (e.g., flood control projects that result in revised FIRMs reduce flood insurance premiums in protected areas); or
3. The impact of an activity cannot be measured for CRS credit (e.g., preserving floodplains for aesthetic reasons).

Credit criteria will change over time as experience is gained in implementing, observing, and measuring the activities and as new concepts in floodplain management come into common practice. As innovations arise, they will be considered for recognition under the CRS.

114 The Community's Role

114.a. Community Participation

Community participation in the CRS is voluntary. Any community in full compliance with the rules and regulations of the NFIP may apply for a CRS classification better than Class 10. A community may apply to participate in the CRS at any time.

The application procedures are simple: the community submits a letter of interest and shows that it is implementing activities that would receive at least 500 credit points. The documents go to the ISO/CRS Specialist for that state. The Regional Office of the Federal Emergency Management Agency (FEMA) must approve the submittal to ensure that the community is in full compliance with the minimum floodplain management criteria of the NFIP. See also Section 212.

Upon receiving FEMA approval, a community verification visit is scheduled by the ISO/CRS Specialist. At this verification visit, the ISO/CRS Specialist reviews all of the community's activities that may deserve credit, even those not in the community's submittal. All CRS credit is verified according to the credit criteria in the *Coordinator's Manual* in effect at the time of the visit. The verification process is discussed in Activity 230.

The ISO/CRS Specialist is an employee of Insurance Services Office, Inc. (ISO), FEMA's CRS management contractor. ISO has many years of experience collecting and processing data for more than 1,000 insurance companies. Among other services, ISO develops and provides advisory classifications for community fire protection and building code programs. ISO reviews CRS submittals, verifies communities' credit points, and performs program improvement tasks for FEMA.

After the verification visit, ISO submits its findings to FEMA. FEMA sets the CRS credit to be granted and notifies the community, the state, insurance companies, and other appropriate parties. The classification is effective on either May 1 or October 1, whichever comes first, after the community's activities are verified.

Each year the community must recertify that it is continuing to perform the activities for which it is receiving CRS credit. Recertification is an annual activity that includes progress reports for certain activities (see Section 213). A “cycle verification visit” takes place every few years and is conducted in the form of another verification visit to the community (see Section 232).

If a community is not properly or fully implementing the credited activities, its credit points, and possibly its CRS classification, will be revised. A community may add credited activities in order to improve its CRS classification. This is called a modification and is explained in Section 214.

Communities are encouraged to call on their ISO/CRS Specialist for assistance at any time. This can be especially helpful when they are considering a change to a credited activity or implementing a new program.

A week-long CRS course for local officials is offered free at FEMA’s Emergency Management Institute and has been field deployed to many states. The ISO/CRS Specialist, NFIP State Coordinator, and FEMA Regional Office have more information on this course, state workshops, and other CRS training opportunities.

114.b. Community Responsibilities

Once a community receives its initial classification in the CRS, it must continue to implement its credited activities to keep its classification. Specifically, a community is responsible for

- Designating a community CRS Coordinator—someone who is familiar with the community offices that implement CRS activities;
- Cooperating with the ISO/CRS Specialist and the verification procedures (Section 230);
- Recertifying each year that it is continuing to implement its activities (Section 213);
- Advising FEMA and its ISO/CRS Specialist of modifications to its activities (Section 214);
- Keeping elevation certificates, old FIRMs, and old Flood Insurance Studies for as long as the community is in the CRS;
- Keeping the records iterated in the activities’ documentation sections until they are reviewed at the verification visit;
- Ensuring that flood protection projects and drainage system maintenance activities are compliant with federal environmental and historic preservation requirements (Section 507); and
- Participating in the cycle verification process (Section 232).

Communities will receive periodic updates to the *Coordinator's Manual* and other CRS materials. They are encouraged to order the background publications (see Appendix C), attend CRS workshops, and ask their ISO/CRS Specialists for help understanding the CRS credit criteria for their current and planned activities.

115 Costs and Benefits

Communities should prepare and implement those activities which best deal with their local problems, whether or not they are creditable under the CRS. Few, if any, of the CRS activities will produce premium reductions equal to or greater than the cost of their implementation. In considering whether to undertake a new floodplain management activity, a community must consider all of the benefits the activity will provide (not just insurance premium reductions) in order to determine whether it is worth implementing.

115.a. Costs

No fee is charged for a community to apply for participation in the CRS. The only costs the community incurs are those of implementing creditable floodplain management activities and the staff time needed to document those activities and prepare for and participate in the recertification process and verification visits.

115.b. Benefits

There are many benefits to participating in the CRS. Most of them cannot be measured in direct dollar terms, so it is impossible to conduct a strict numerical comparison of the benefits with the costs of implementing the credited activities. Listed here are the benefits more commonly mentioned by community officials.

- (1) The benefit that attracts people to the CRS the most is the reduction in flood insurance premiums for their residents and businesses. The dollar savings varies according to the CRS class, the number of policies, and the amount of coverage. A community can obtain the current and potential dollar savings for all 10 classes from its ISO/CRS Specialist. These are known as the “what if” tables (see Figure 110-1).
- (2) Although the premium reduction attracts interest in the CRS, the most important benefits are the enhanced public safety, reduction in damage to property and public infrastructure, avoidance of economic disruption and losses, reduction in human suffering, and protection of the environment provided by the credited activities. Community officials agree that these programs are improved when changes are made to meet the CRS credit criteria.
- (3) Through the CRS a community can evaluate the effectiveness of its flood program against state and nationally recognized benchmarks.
- (4) Training and technical assistance in designing and implementing credited flood protection activities are available through the CRS at no charge.

| | | | | | |
|--|-----------------|--------------------------|---------------|------------------------|----------------|
| Community: WATSONVILLE, CITY OF | | State: CALIFORNIA | | | |
| County: SANTA CRUZ COUNTY | | CID: 060357 | | | |
| Current CRS Class = 7 [Printable Version] | | | | | |
| | | TOTAL | SFHA * | X-STD/AR/A99 ** | PRP *** |
| | PIF | 968 | 852 | 66 | 50 |
| | PREMIUM | \$1,013,842 | \$939,534 | \$58,120 | \$16,188 |
| | AVERAGE PREMIUM | \$1,047 | \$1,103 | \$881 | \$324 |
| CRS Class | | | | | |
| 09 | Per Policy | \$60 | \$65 | \$46 | \$0 |
| | Per Community | \$58,326 | \$55,267 | \$3,059 | \$0 |
| 08 | Per Policy | \$117 | \$130 | \$46 | \$0 |
| | Per Community | \$113,592 | \$110,533 | \$3,059 | \$0 |
| 07 | Per Policy | \$174 | \$195 | \$46 | \$0 |
| | Per Community | \$168,859 | \$165,800 | \$3,059 | \$0 |
| 06 | Per Policy | \$235 | \$259 | \$93 | \$0 |
| | Per Community | \$227,185 | \$221,067 | \$6,118 | \$0 |
| 05 | Per Policy | \$292 | \$324 | \$93 | \$0 |
| | Per Community | \$282,451 | \$276,333 | \$6,118 | \$0 |

Figure 110-1. The “what if” table.

The table shows the community’s current and potential dollar savings in flood insurance premium reductions for various CRS classes. As a Class 7 community, Watsonville officials are saving their flood insurance policy holders nearly \$200 each year.

“PIF” means “policies in force”

- (5) Many communities initiate new public information activities when they join the CRS. These build a knowledgeable constituency within the community—people who become more interested in protecting themselves from flooding and in supporting the community’s floodplain management efforts.
- (6) Keeping its CRS credits has proven to be an effective motivator to continue implementing flood protection programs during the “dry years.” The fact that the community’s CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new development has been taken into account by many governing boards when considering such actions.
- (7) There is mutual support among CRS participants. Communities that participate in the CRS are joining the ranks of localities that have demonstrated a serious commitment to the health, safety, and welfare of their residents—and their floodplain and coastal resources. Across the nation, “CRS users groups” of representatives of counties, communities, and regional entities have formed to share

their experiences, support each other in advancing their floodplain management programs, and encourage other communities to participate in the program.

116 Other Program Priorities

116.a. Natural Floodplain Functions

Floodplains in riverine and coastal areas perform natural functions that cannot be replicated elsewhere. The CRS provides special credit for community activities that protect and/or restore natural floodplain functions, even though some of the activities may not directly reduce flood losses to insurable buildings. There are many reasons to protect floodplains in their natural state.

When kept open and free of development, floodplains provide the necessary flood water conveyance and flood water storage needed by a river or coastal system. When the floodplain is allowed to perform its natural function, flood velocities and peak flows are reduced downstream. Natural floodplains reduce wind and wave impacts and their vegetation stabilizes soils during flooding.

Floodplains in their natural state provide many beneficial functions beyond flood reduction. Water quality is improved in areas where natural cover acts as a filter for runoff and overbank flows; sediment loads and impurities are also minimized. Natural floodplains moderate water temperature, reducing the possibility of adverse impacts on aquatic plants and animals.

Floodplains can act as recharge areas for groundwater and reduce the frequency and duration of low flows of surface water. They provide habitat for diverse species of flora and fauna, some of which cannot live anywhere else. They are particularly important as breeding and feeding areas.

The CRS encourages state, local and private programs and projects that preserve or restore the natural state of floodplains and protect these functions. The CRS also encourages

Some Natural Functions of Floodplains

WATER RESOURCES

Natural Flood and Erosion Control

- Provide flood storage and conveyance
- Reduce flood velocities
- Reduce peak flows
- Reduce sedimentation

Water Quality Maintenance

- Filter nutrients and impurities from runoff
- Process organic wastes
- Moderate temperature fluctuations

Groundwater Recharge

- Promote infiltration and aquifer recharge
- Reduce frequency and duration of low surface flows

BIOLOGICAL RESOURCES

Biological Productivity

- Rich alluvial soils promote vegetative growth
- Maintain biodiversity
- Maintain integrity of ecosystems

Fish and Wildlife Habitats

- Provide breeding and feeding grounds
- Create and enhance waterfowl habitat
- Protect habitats for rare and endangered species

- *A Unified National Program for Floodplain Management*
FEMA-248 (1994)

communities to coordinate their flood loss reduction programs with other public and private activities that preserve and protect natural and beneficial floodplain functions. Credits for doing this are found in the following activities:

- Activity 320 (Map Information Service)—Credits advising people about areas that should be protected because of their natural floodplain functions.
- Activity 330 (Outreach Projects)—Credit is provided for outreach projects that include descriptions of the natural functions of the community’s floodplains.
- Activity 350 (Flood Protection Information)—Credit points are available for a website that provides detailed information about local areas that should be protected for their natural floodplain functions and how they can be protected.
- Activity 420 (Open Space Preservation)—Extra credit is provided for open space areas that are preserved in their natural state; have been restored to a condition approximating their pre-development natural state; or have been designated as worthy of preservation for their natural benefits, such as being designated in a habitat conservation plan.
- Activity 430 (Higher Regulatory Standards)—Regulations that protect natural areas during development or that protect water quality are credited.
- Activity 440 (Flood Data Maintenance)—Adding layers to the community’s geographic information system (GIS) with natural floodplain functions (e.g., wetlands, designated riparian habitat, flood water storage areas) is credited.
- Activity 450 (Stormwater Management)—Erosion and sediment control, water quality, and low-impact development techniques minimize the impacts of new development. These measures are credited, along with regulations that require the maintenance of natural flow regimes.
- Activity 510 (Floodplain Management Planning)—Extra credit is provided for plans that address the natural resources of floodplains and recommend ways to protect them.
- Activities 520 (Acquisition and Relocation), 530 (Flood Protection), and 540 (Drainage System Maintenance) credit flood loss reduction measures such as capital improvement programs and drainage improvement projects. No such programs or projects can be credited unless a thorough environmental review is conducted and documented.

116.b. All-Hazards Mitigation

All communities are threatened by a variety of natural and technological hazards. The staff and programs that address flooding may also be responsible for protecting the community from damage due to earthquakes, hurricanes, landslides, drought, hazardous materials incidents, and terrorism. Similarly, the staff members that work in programs related to other hazards may be implementing activities that could support floodplain management

programs. Floodplain management programs are synonymous with flood mitigation programs.

FEMA supports an all-hazards approach to mitigation, as does the CRS. It makes economic sense that mitigation programs address as many hazards as are appropriate. An all-hazards approach also ensures that staff, programs, construction standards, and public information messages are consistent and mutually supportive.

The CRS has become an important tool for mitigation as well as a mechanism for integrating mitigation with flood insurance. This is consistent not only with grading systems that have been successfully employed for many years in the insurance industry, but also with industry initiatives for relating insurance premiums to local efforts to reduce losses due to natural hazards. For example, adoption and enforcement of strong building codes as measured by the insurance industry's Building Code Effectiveness Grading Schedule integrates building code enforcement into the industry's premium rates.

The CRS has served as a model for all-hazards, pre-disaster mitigation. Local officials have reported that the CRS was the blueprint for organizing their program to build a more disaster-resistant community.

This edition of the *Coordinator's Manual* highlights many opportunities for expanding a flood-only orientation to address other hazards.

- The 300 series of public information activities credits advising people about the risk of flooding and other hazards and the mitigation measures they can take to protect their property;
- Under Activity 340 (Hazard Disclosure), disclosure of other hazards (DOH) credits advising potential purchasers of property that there may be other hazards that could affect the property, such as erosion, subsidence, or flooding from a dam failure (Section 342.d);
- Section 401 has an overview of the additional credits that are provided for managing seven special flood-related hazards:
 - Uncertain flow paths (alluvial fans, moveable bed streams, and other floodplains within which the channel moves during a flood);
 - Closed-basin lakes;
 - Ice jams;
 - Land subsidence;
 - Mudflow hazards;
 - Coastal erosion; and
 - Tsunamis.
- Activity 420 (Open Space Preservation) encourages communities to keep hazardous areas open and undeveloped;

- Credit is provided for the International Series of building codes (which have improved protection standards for flooding, wind, and other hazards over previous model codes) in Activity 430 (Higher Regulatory Standards), Section 432.h;
- Activity 430 (Higher Regulatory Standards) also credits extending V-Zone standards for coastal storm surge and wind protection farther inland to include coastal A Zones (Section 432.k);
- In Activity 440 (Flood Data Maintenance), additional credit is provided for showing areas subject to other natural hazards, such as landslides and stream migration in the GIS or data base management program;
- Under Activity 450 (Stormwater Management), management of runoff, erosion and sediment control, and water quality and low impact development requirements to minimize the impacts of new development are credited.
- More credit is available for including other hazards in a mitigation plan that qualifies for a floodplain management plan under Activity 510 (Floodplain Management Planning); and
- Local warning and public information activities directed toward storms and tsunamis are credited under the StormReady and TsunamiReady elements in Activity 610 (Flood Warning and Response).

116.c. Future Conditions and Impacts of Climate Change

The CRS recognizes that floodplains and watersheds change over time, driven by many natural and manmade changes. Good floodplain management acknowledges this, and includes thinking about how floodplains might look in the future under different scenarios. Increased impervious surfaces in developing watersheds, new fill in floodways, rising sea levels, changes in natural functions, and many other factors contribute to the character of the future with which floodplain managers must cope.

The *Coordinator's Manual* incorporates additional acknowledgement of—and credit for—community efforts to anticipate the future insofar as it relates to flood risk and natural floodplain functions and climate resilience, and to take actions that can mitigate any adverse impacts that could materialize.

- Credit is provided in Section 322.c for communities that provide information about areas (not mapped on the FIRM) that are predicted to be susceptible to flooding in the future because of climate change or sea level rise.
- To become a Class 4 or better community, a community must (among other criteria) demonstrate that it has programs that minimize increases in future flooding.
- To achieve CRS Class 1, a community must receive credit for using regulatory flood elevations in the V and coastal A Zones that reflect future conditions, including sea level rise.

- Credit is provided in Section 342.d when prospective buyers of a property are advised of the potential for flooding due to climate changes and/or sea level rise.
- Credit is provided in Section 412.d when the community's regulatory map is based on future-conditions hydrology, including sea level rise.
- Credit is provided in Section 432.k when a community accounts for sea level rise in managing its coastal A Zones.
- Credit is provided in Section 452.a if a community's stormwater program regulates runoff from future development.
- Credit is provided in Section 452.b for a community whose watershed master plan manages future peak flows so that they do not exceed present values.
- Credit is provided in Section 452.b for a coastal community whose watershed master plan addresses the impact of sea level rise.
- Credit is provided in Section 512.a, Steps 4 and 5, for flood hazard assessment and problem analysis that address areas likely to flood and flood problems that are likely to get worse in the future, including (1) changes in floodplain development and demographics, (2) development in the watershed, and (3) climate change or sea level rise.

Guidance on the sea level rise projections that are to be used for the purpose of CRS credit can be found in Section 404.

120 GLOSSARY

Unless otherwise noted, all terms used by the Community Rating System (CRS) are the same as those defined in the National Flood Insurance Program Rules and Regulations (44 *Code of Federal Regulations* §59.1).

A Zone: See “Zone A.”

Activity: A floodplain management activity for which Community Rating System credit has been established.

Allowable surcharge: The acceptable limit of increased flood elevation in the floodway due to obstruction of the floodway fringe.

Alluvial fan: An area at the base of a valley where the slope flattens out, allowing the flood water to decrease in speed and spread out, dropping sediment over a fan-shaped area. Credit for managing alluvial fan hazards is discussed in Section 400.

B Zone: See “Zone B.”

Base flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the “100-year” or “1% chance” flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding.

BFE: Base flood elevation. The elevation of the crest of the base or 1% annual chance flood (also known as the 100-year flood).

Building: For CRS purposes, the definition of what constitutes a building is based on whether the structure is insurable. It must meet the following criteria, which are taken from the definition in the National Flood Insurance Program’s *Flood Insurance Manual* for insurance agents. A “building” is

A structure with two or more outside rigid walls and a fully secured roof, that is affixed to a permanent site; or

A manufactured home (a “manufactured home,” also known as a mobile home, is a structure built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation); or

A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community’s floodplain management and building ordinances or laws.

“Building” does not mean a gas or liquid storage tank or a recreational vehicle, a park trailer, or other similar vehicle, except as described above.

C Zone: See “Zone C.”

CBRA: The Coastal Barrier Resources Act of 1982 (pronounced “cobra”).

CEO: The Chief Executive Officer of a community, i.e., the official who is charged with the authority to implement and administer laws, ordinances, and regulations for the community. The CEO may be a mayor, city or county manager, county executive, chair or president of a county council, etc. The head of a department is not considered a CEO.

Coastal: Relating to the coastlines and bays of the tidal waters of the United States or the shorelines of the Great Lakes. Under the Community Rating System, there are five coastal areas eligible for creditable coastal activities: the coastlines and bays of the Arctic Ocean, Atlantic Ocean, Pacific Ocean, Gulf of Mexico, Bering Sea, and Great Lakes. The term does not include riverine areas.

Coastal A Zone: Those parts of a community’s coastal floodplain that are subject to waves with heights of between 1.5 and 3 feet during a 1% annual chance storm. The exact boundary of a Coastal A Zone is determined by the community, as described in Section 432.k, although the Federal Emergency Management Agency may provide a proposed boundary or “limit of moderate wave action” (LiMWA) on Flood Insurance Rate Maps.

Coastal Barrier Resources System: A set of “undeveloped coastal barriers” and “otherwise protected areas” along the U.S. coast (including the Great Lakes) designated by Congress under the Coastal Barrier Resources Act of 1982 (CBRA). Most expenditures of federal funds are prohibited within the Coastal Barrier Resources System.

Coastal erosion: Coastal erosion is the wearing away of land masses caused primarily by waves on the two oceans, the Gulf of Mexico, the Bering Sea, or the Great Lakes, and major embayments to these bodies of water.

Coastal erosion-prone area: The coastal areas within which waves are anticipated to cause significant erosion and shoreline retreat within the next 60 years.

Coastal high hazard flooding: A condition of flooding subject to high velocity waters, including, but not limited to, hurricane wave wash or tsunamis. Coastal high hazard flooding is mapped as a Zone V or “limit of moderate wave action” on a Flood Insurance Rate Map. Coastal flooding without the high velocity hazard is mapped as a Zone A.

Community: A city, village, town, county, township, parish, borough, Indian tribe or authorized tribal organization, Alaska Native village or authorized native organization, or other local government with the statutory authority to enact floodplain regulations and participate in the National Flood Insurance Program.

Contour: A line of equal elevation on a topographic (contour) map.

Conveyance system: For purposes of the CRS, the conveyance system includes the channels that need to be maintained in order to prevent damage to buildings or roads and

other infrastructure from smaller, more frequent storms. Components of the conveyance system include the structures and the channel segments throughout the system (e.g., bridges, culverts, and segments of open channel) through which water flows.

Critical facility: A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include health and safety facilities, utilities, government facilities, and hazardous materials facilities. For the purposes of a local regulation, a community may also use the International Codes' definition for Category III and IV buildings.

CRS: Community Rating System.

CRS classification: A rating of a community's floodplain management program according to the *CRS Coordinator's Manual*. The premium rate credits for each class are listed in Table 110-1. A community that has not applied for Community Rating System classification is a Class 10 community.

CRS Coordinator: A local official designated by the community's Chief Executive Officer to coordinate the community's Community Rating System activities and work with FEMA and the Insurance Services Office, Inc. to document and verify the community's program.

CRS Coordinator's Manual: A publication for local officials that describes the procedures, credit criteria, and activities credited by the Community Rating System. It is available from FEMA or Insurance Services Office, Inc.

Cycle: A periodic review, scoring, and verification of a community's Community Rating System activities, normally done on a 3- or 5-year cycle.

D Zone: See "Zone D."

Datum: A reference surface used to ensure that all elevation records are properly related. Many communities have their own datum, developed before there was a national standard. The National Flood Insurance Program previously used the National Geodetic Vertical Datum (NGVD) of 1929, but all recent Flood Insurance Rate Maps have used the North American Vertical Datum (NAVD) of 1988. Both datum planes express elevations in relation to sea level. The Flood Insurance Rate Map indicates the datum that applies to the community.

Debris: Trash, junk, litter, discarded remains of something destroyed, landscape waste, or vegetation that may reduce the conveyance capacity of a channel or the storage or infiltration capacity of a basin.

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

Digital Flood Insurance Rate Map (DFIRM): All new FIRMs are prepared as a GIS-based map of a community's flood hazards. All new maps are based upon this digital platform and communities may use these maps instead of paper maps for regulatory purposes. See FIRM.

Discharge: The amount of water that passes a point in a given period of time. Rate of discharge is usually measured in cubic feet per second (cfs).

Drainage system: For the purposes of the CRS, a community's drainage system consists of all natural and manmade watercourses, conduits, and storage basins that must be maintained in order to prevent flood damage to buildings from smaller, more frequent storms.

Element: A discrete piece of a floodplain management program that is credited as part of a Community Rating System activity.

FEMA: The Federal Emergency Management Agency. Most of the National Flood Insurance Program field work and community coordination is done by the 10 FEMA Regional Offices, which are listed at <https://www.fema.gov/fema-regional-contacts>.

FIRM: Flood Insurance Rate Map. An official map of a community, on which FEMA has delineated both the Special Flood Hazard Areas and the risk premium zones applicable to the community. Most FIRMs include detailed floodplain mapping for some or all of a community's floodplains. In most cases, the date of the first FIRM issued to a community is the date the community entered the Regular Program of the National Flood Insurance Program.

Flood Insurance Study: A report published by FEMA for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A Flood Insurance Rate Map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area.

Floodproofing: Protective measures added to or incorporated in a building that is not elevated above the base flood elevation to prevent or minimize flood damage. "Dry floodproofing" measures are designed to keep water from entering a building. "Wet floodproofing" measures minimize damage to a structure and its contents from water that is allowed into a building.

Floodway: The channel of a river and the portion of the overbank floodplain that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation by a designated height. The National Flood Insurance Program regulations allow construction in the floodway provided that it does not obstruct flood flows or increase flood heights.

Floodway fringe: The portion of the Special Flood Hazard Area lying outside of the floodway.

Freeboard: A margin of safety added to the base flood elevation to account for waves, debris, miscalculations, lack of data, or changes in climate.

Green infrastructure: Because of the wide interpretation given to this term, the CRS does not use the words “green infrastructure” in its credit criteria. However, the CRS does provide credit for designated open space corridors or connected networks of wetlands, woodlands, wildlife habitats, wilderness, and other areas that support native species, maintain natural ecological processes, and sustain air and water resources. In some areas, these features are called “green infrastructure.”

High-hazard-potential dam: Dams assigned the high-hazard-potential classification are those whose failure or mismanagement will probably cause loss of human life.

Hydrology: The science dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.

I-Codes: The series of building codes published by the International Code Council.

ICC: Increased Cost of Compliance coverage, a flood insurance claim provision that helps fund the cost of bringing a flood-damaged building into compliance with floodplain management standards.

ISO: The Insurance Services Office, Inc., a corporation that conducts verification of community CRS credit and program improvement tasks for FEMA.

ISO/CRS Specialist: An Insurance Services Office, Inc., technician responsible for reviewing community requests for Community Rating System classification and verifying implementation of activities credited by the CRS. The name and telephone number of the ISO/CRS Specialist for a state can be found at www.CRSresources.org/100.

ISO/CRS Technical Reviewer: An Insurance Services Office, Inc. technician or contractor responsible for reviewing community requests for Community Rating System credit for select activities. The reviews conducted by the ISO/CRS Technical Reviewer are provided to the ISO/CRS Specialist.

Levee: A manmade structure, usually an earthen embankment, designed and constructed using sound engineering practices to contain, control, or divert flood waters in accordance with a designated risk reduction level.

Levee system: The levee structure itself, plus all appurtenant facilities, such as pump stations, closure devices, etc., that are needed to contain, control, or divert flood waters in accordance with a designated risk reduction level. For CRS purposes, credit is based on local activities related to the entire levee system, not just to the levee structure.

Limit of moderate wave action: The inland limit of the area affected by waves greater than 1.5 feet (also known as “LiMWA”). The LiMWA is determined based on the landward limit of the 1% annual chance coastal flood that can support a 1.5-foot wave. New coastal FIRMs will show the LiMWA as an informational layer on the FIRM. The area between this inland limit and the V-Zone boundary is also known as the Coastal A Zone. It is typically those parts of a community’s coastal floodplain, inland from the mapped V Zone (or shoreline if there is no mapped V Zone), that are subject to the damaging effects of waves, velocity flows, erosion, scour, or combinations of these forces. The area may be delineated on a Flood Insurance Rate Map.

Low-impact development (LID): According to the U.S. Environmental Protection Agency, “an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible and treat stormwater as a resource rather than a waste product. LID practices include bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.” (www.epa.gov/owow/NPS/lid/)

NAVD: North American Vertical Datum of 1988. The national datum that is replacing NGVD to set flood and ground elevations for the Flood Insurance Rate Maps.

Natural floodplain functions:

- a. The functions associated with the natural or relatively undisturbed floodplain that moderate flooding, retain flood waters, reduce erosion and sedimentation, and mitigate the effects of waves and storm surges from storms; and
- b. Other significant beneficial functions, which include maintenance of water quality, recharge of groundwater, and provision of fish and wildlife habitat.

NFIP: National Flood Insurance Program.

NGVD: National Geodetic Vertical Datum of 1929, the national datum previously used by the National Flood Insurance Program. It was known formerly as the “Mean Sea Level Datum of 1929 (MSL).”

Ponding: A flooding condition in low-lying areas caused when runoff drains to a location that has no ready outlet. Pondered water usually remains until it evaporates, seeps into the ground, or is pumped out.

Post-FIRM building: For insurance rating purposes, a post-FIRM building is one that was constructed or substantially improved after December 31, 1974, or after the effective date of the initial Flood Insurance Rate Map of a community, whichever is later. A post-FIRM building is required to meet the National Flood Insurance Program's minimum Regular Program flood protection standards.

Pre-FIRM building: For insurance rating purposes, a pre-FIRM building is one that was constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Map of the community, whichever is later. Most pre-FIRM buildings were constructed without taking the flood hazard into account.

Registered design professional: An individual who is registered or licensed to practice his or her respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed. The CRS considers "registered design professionals" to include licensed professional engineers, structural engineers and architects, and registered land surveyors.

Regular Program: Also called the Regular Phase. The phase of community participation in the National Flood Insurance Program that begins on the effective date of the community's first Flood Insurance Rate Map or when the community adopts an ordinance that meets the minimum requirements of the NFIP and adopts the technical data provided with the FIRM, whichever is earlier. Nearly all communities participating in the NFIP are in the Regular Program.

Regulatory floodplain: For purposes of the Community Rating System, the regulatory floodplain is the flood-prone land area that is subject to a community's floodplain development or floodplain management regulations. The regulatory floodplain includes, at a minimum, the Special Flood Hazard Area (SFHA) (see definition), but may also incorporate other areas outside the SFHA that are also subject to a community's floodplain development or floodplain management regulations.

Repetitive loss community: For purposes of the Community Rating System, a community with one or more repetitive loss properties.

Repetitive loss property: A property for which two or more National Flood Insurance Program losses of at least \$1,000 each have been paid within any 10-year rolling period since 1978.

Retrofitting: Modifications made to an existing building or nearby grounds to protect it from flood damage. Retrofitting techniques include elevation, dry and wet floodproofing, and protection from sewer backup.

Riparian ecosystem: A distinct association of flora, fauna, and soil occurring along a river, stream, lake, ocean, or other body of water and dependent upon high water tables and occasional flooding to maintain its viability. These areas often exhibit high biological productivity and species diversity. Although riparian ecosystems are closely associated with a body of water, they may extend beyond the Special Flood Hazard Area.

Riverine: Of or produced by a river or stream. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Sand dunes: Naturally occurring accumulations of sand that form ridges or mounds landward of a beach.

Sensitive area: An area defined by state or local regulations as deserving special protection because of its unique natural features or its value as habitat. A sensitive area is subject to more restrictive development regulations than other floodplains or wetlands. Although sensitive areas are often closely associated with a body of water, they may extend beyond the Special Flood Hazard Area.

Severe Repetitive Loss property: As defined in the Flood Insurance Reform Act of 2004, those 1–4 family properties that have had four or more claims of more than \$5,000 or two to three claims that cumulatively exceed the building’s value. For the purposes of the CRS, non-residential buildings that meet the same criteria as for 1–4 family properties are considered Severe Repetitive Loss properties.

SFHA: Special Flood Hazard Area (see definition).

Sheet flow: A condition of flooding where there is moving water but no identifiable channel. Flooding depths are usually shallow (less than 3 feet). Sheet flow may have a high velocity, as on alluvial fans.

Special Flood Hazard Area (SFHA): The base floodplain delineated on a Flood Insurance Rate Map that a community must regulate under the requirements of the National Flood Insurance Program. The SFHA is mapped as a Zone A (see definition). In coastal situations, Zone V (see definition) is also a part of the SFHA. The SFHA is included in a community’s regulatory floodplain (see definition).

Special flood-related hazards: For the purposes of the Community Rating System, the term includes terrain features or special hazards that accompany or aggravate flooding, as listed in Section 401.

Stakeholders: Floodplain residents, business leaders, insurance agents, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, landowners, developers, and others who are affected by flooding or whose actions can help prevent or reduce flood losses.

Storage basins: For the purposes of the CRS, storage basins include all constructed storm-water runoff detention or retention facilities located on public or private property. These include onsite detention, retention, or infiltration facilities that are required for new development.

Substantial damage: Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damage condition would equal or exceed 50% of the market value of the building before the damage occurred.

Substantial improvement: Any reconstruction, rehabilitation, addition, or other improvement to a building, the cost of which equals or exceeds 50% of the market value of the building before the start of construction of the improvement.

Surcharge: An increase in flood elevation due to obstruction of the floodplain that reduces its conveyance capacity.

Tsunami: A wave caused by an underwater earthquake, landslide, or volcano that can raise water levels on the ocean shore to levels higher than the base flood elevation. Tsunamis are discussed in more detail in Section 401.

Uncertain flow paths: Channels that move during a flood, including alluvial fans and moveable bed streams. They are discussed in more detail in Section 400.

V Zone: See “Zone V.”

Variable: A term used in the formulae for calculating Community Rating System credit. For each element, there are one or more variables, which often include the acronym for the element.

X Zone: See “Zone X.”

Zone A: The Special Flood Hazard Area (except coastal V Zones) shown on a community’s Flood Insurance Rate Map. There are seven types of A Zones:

A: SFHA where no base flood elevation is provided.

A#: Numbered A Zones (e.g., A7 or A14), SFHA where an older FIRM shows a base flood elevation in relation to a national datum.

AE: SFHA where base flood elevations are provided. AE-Zone delineations are used on newer FIRMs instead of A# Zones.

AO: SFHA with sheet flow, ponding, or shallow flooding. Base flood depths (feet above grade) are provided.

AH: Shallow flooding SFHA. Base flood elevations in relation to a national datum are provided.

AR: A temporary designation for an area where a flood control system that no longer provides protection from the base flood is expected to be improved so it will provide protection to the base flood again in the future. This zone is considered part of the Special Flood Hazard Area or “regulatory floodplain,” but properties in this zone do not receive the “in SFHA” CRS premium discount (see Table 110-1).

A99: A mapped floodplain that will be protected by a federal flood protection system where construction has reached specified statutory milestones. This zone is considered part of the Special Flood Hazard Area or “regulatory floodplain,” but properties in this zone do not receive the “in SFHA” CRS premium discount (see Table 110-1).

Zone B: Area of moderate flood hazard, usually depicted on older Flood Insurance Rate Maps as between the limits of the base and 500-year floods of the primary source of flooding. B Zones may have local, shallow flooding problems. B Zones are also used to designate areas protected by levees and base floodplains of little hazard, such as those with average depths of less than 1 foot.

Zone C: Area of minimal flood hazard, usually depicted on older Flood Insurance Rate Maps as above the 500-year flood level of the primary source of flooding. C Zones may have local, shallow flooding problems that do not meet the criteria to be mapped as a Special Flood Hazard Area, especially ponding and local drainage problems.

Zone D: Area of undetermined but possible flood hazard.

Zone V: The Special Flood Hazard Area subject to coastal high hazard flooding. There are three types of V Zones: V, V#, and VE, and they correspond to the A-Zone designations.

Zone X: Newer Flood Insurance Rate Maps show Zones B and C (see above) as Zone X. The shaded Zone X corresponds to a Zone B and the unshaded Zone X corresponds to a Zone C.

620 LEVEES—Summary

Maximum credit: 235 points

622 Elements

- a. **Levee maintenance (LM):** Up to 95 points if the levee system is maintained and operated according to a written maintenance plan. There are no credit points for levees that are recognized on the community's adopted Flood Insurance Rate Map (FIRM), although documentation of annual inspection and maintenance is a prerequisite for any credit under this activity.
- b. **Levee failure threat recognition system (LFR):** Up to 30 points for having a system to advise the emergency manager when there is a threat of a levee's failure or overtopping.
- c. **Levee failure warning (LFW):** Up to 50 points for disseminating the warning to the public.
- d. **Levee failure response operations (LFO):** Up to 30 points for response actions to be undertaken to reduce or prevent threats to health, safety, and property.
- e. **Levee failure critical facilities planning (LCF):** Up to 30 points for coordination of actions with operators of critical facilities.

Credit Criteria

Credit criteria for this activity are described in Section 621.b.

- a. Credit is limited to levee systems that were designed and constructed as levee systems and are operated and maintained by a public agency.
- b. The community must submit a map showing the location of each levee and the areas that would be flooded if the levee were to fail or be overtopped.
- c. Annual inspections of the levee system must be conducted according to a written maintenance plan.
- d. The community must implement an annual outreach project to the residents and businesses in the area(s) that would be inundated if a levee were overtopped.
- e. To receive Activity 620 credit for LFR, LFW, LFO, and LCF, the community must receive some LM credit.
- f. To receive Activity 620 credit other than LM credit, the community must receive some credit in all four levee warning and response elements (LFR, LFW, LFO, and LCF), and
 - (1) There must be a levee failure flood warning and response plan that has been adopted by the community's governing body; and
 - (2) There must be an annual exercise of the plan and a lessons-learned report.

Each element has additional criteria specific to that element.

Impact Adjustment

The credits for LM, LFR, LFW, and LFO are adjusted based on the number of buildings affected by each element. There is no impact adjustment for LCF.

Documentation Provided by the Community

Each element has a separate section describing needed documentation.

620 LEVEES

The OBJECTIVE of this activity is to encourage communities to properly inspect and maintain levees and to identify impending levee failures in a timely manner, disseminate warnings to appropriate floodplain occupants, and coordinate emergency response activities to reduce the threat to life and property. This activity focuses on the community's emergency management actions and plans. Therefore, the emergency manager should be the point of contact, and he or she should coordinate with the agency responsible for the levee.

621 Background

The failure or overtopping of a levee poses extreme hazards to buildings, infrastructure, and people on the landward side of the levee.

Flood waters near a levee breach usually move at a much greater velocity than the water within the channel. The combination of high-velocity flows and rapidly rising water makes evacuation and other responses difficult or impossible. Sound emergency response plans for levee failures are critical, especially if evacuation routes would be restricted or severed.

Up to a certain point, a levee usually will prevent flooding to properties on its landward side. However, regardless of the design standard used, levees can and do fail. Someday there will be a flood that exceeds the levee's ability to hold flood waters, and when a levee is overtopped it is far more likely that it will suffer a catastrophic breach or failure as well. Even well-maintained levees can fail for a variety of reasons.

By doing everything possible to reduce the chance of levee failure and by being prepared for an event that could lead to a levee failure, a community can reduce the potential hazards to life, health, and property.

621.a. Activity Description

The maximum credit for Activity 620 is 235 points.

The items credited by this activity include

- Proper maintenance of the levees (credited under LM),
- A system to advise local emergency managers of a potential levee failure or overtopping (credited under LFR),
- A warning system for people on the landward side of the levee (credited under LFW),

Definition of a Levee

A levee is a structure, usually an earthen embankment, designed and constructed using sound engineering practices, to contain, control, or divert flood waters in accordance with a designated risk reduction level.

See Section 120 (Glossary).

- A plan of action to minimize the threat to life and property during the flood (credited under LFO), and
- Coordination with critical facility operators (credited under LCF).

For levee maintenance credit, a community must implement a levee maintenance plan, create and maintain an inventory of levees, identify the vulnerable population and at-risk structures, and conduct an annual outreach project to advise the vulnerable population.

Levee maintenance (LM) credit is a prerequisite for the four emergency preparedness and response elements (LFR, LFW, LFO, and LCF), which are based on the community's adopted levee failure warning and response plan. This activity is not intended to be a model for developing a levee failure warning and response plan or program. As with the rest of the Community Rating System (CRS) activities, its objective is to provide a way to measure a local program's potential impact on life safety, health, and property damage. An effective program needs to be carefully prepared and tailored to the local hazards and the specific needs of the community.

Emergency Action Plans and Levee Failure Warning and Response Plans

A levee EMERGENCY ACTION PLAN is prepared and implemented by the LEVEE OWNER OR OPERATOR. It includes actions such as closing openings and patrolling for problems along the levee. It may have another name, such as a levee operations plan.

A LEVEE FAILURE WARNING AND RESPONSE PLAN is prepared and implemented by the LOCAL EMERGENCY MANAGEMENT AGENCY. It specifies actions to take to protect people and property in the flood-prone area, such as ordering an evacuation.

621.b. Activity Credit Criteria

Credit for this activity is based on levee systems, i.e., the levee structure plus all appurtenant facilities, such as pump stations and flood walls, that are needed to control flood waters. To receive credit under this activity,

- (1) The levee system(s) for which the community requests credit (or qualification for credit) must have been designed and constructed as a levee (see Section 120, Glossary). Structures such as road and railroad embankments that divert flood waters are not considered "levees" for the purposes of this activity unless it can be documented that they were intended to be levees and were designed and constructed accordingly.
- (2) The levee system(s) for which the community requests credit (or qualification for credit) must be operated and maintained by a public agency. This could be a federal or state agency, a levee district, an office or department of the community, or other public entity.

Non-Levee Structures

Non-levee structures, such as roads and railroad embankments, pose the same hazards as levees and are more likely to fail. Communities are urged to mitigate these hazards by paying special attention to emergency preparedness and response for buildings on the landward side of these structures.

- (3) The community must submit a map showing the location of each levee or levee system and the areas that would be flooded if the levee or levee system were to be overtopped or fail

and an inventory of the buildings and critical facilities that would be flooded upon overtopping or failure. For each levee or levee system, the following information must be submitted:

- (a) The elevation at which the levee is expected to be overtopped or the expected breach elevation. Newer levee systems may include extra levee height to ensure overtopping at a predefined location. Older designs often use freeboard, which may vary along the system;
- (b) A map of the levee or levee system and the area(s) affected should the levee(s) fail or be overtopped. If there are no detailed levee breach maps or levee failure studies, then the map would show the area below the expected overtopping elevation. Guidance for this mapping can be found in Section 621.c;
- (c) An inventory of the types of buildings (residential, commercial, etc.) exposed to flooding should the levee(s) be overtopped or fail, with an approximate count of the number of buildings and an inventory of the land use (residential, agricultural, open space, etc.) of developed and undeveloped areas in the area(s) affected should the levee(s) fail or be overtopped; and
- (d) A list of the critical facilities that would be flooded or otherwise affected by a failure or by the overtopping of the levee (see Section 622.e, LCF1).

This credit criterion is a prerequisite for Class 4 communities.

- (4) The community must have a levee maintenance plan that includes annual inspections and an emergency action plan for the levee system(s), and the plans must meet the credit criteria for LM. There are no LM CREDIT POINTS for levees shown on the effective FIRM as providing protection (e.g., accredited levees), or levees owned and operated by a federal agency, but all levees must qualify for LM credit in order for the community to receive credit for the rest of the elements in this activity.


Dear Property Owner:


Your property is located behind a State-Federal project levee. According to our records, your property located at _____ may be exposed to potential flood risk from the _____. Your property may also be at risk for flooding from other sources not identified in this notice, such as creeks and local storm drains.

Visit www.water.ca.gov/myfloodrisk and enter your property address to find the areas subject to flooding if State-Federal project levees should fail, and to get information on the condition of the levees.

Be aware of your flood risk and be prepared. Read this notice for important information about purchasing flood insurance, emergency planning, and protecting your property.

Consider these facts:

Click Here To Enter Your Property Address 



Excerpt from the annual outreach project sent by the California Department of Water Resources to residents of leveed areas.

(5) The community must implement one or more annual outreach projects to the residents and businesses in the area(s) expected to be inundated by a flood that overtops a levee. The project(s) must tell people about their risk of flooding, how they will be warned of a levee-failure flood, the safety measures they should take during a flood (e.g., evacuation procedures and routes), and the benefits of purchasing flood insurance. This can be done by using one or more of the following approaches:

- (a) Sending an outreach project (e.g., a letter, brochure, or newsletter) each year to all properties with insurable buildings in the area(s) subject to a flood that overtops the levee, or
- (b) Developing an appropriate approach as part of a Program for Public Information credited Activity 330 (Outreach Projects).

(6) To receive credit beyond LM credit, the community must obtain some credit in all four levee failure warning and response elements (LFR, LFW, LFO, and LCF).

(7) The community must have a levee failure flood warning and response plan that has been adopted by the community's governing body to receive LFR, LFW, LFO and LCF credit. The levee failure flood warning and response plan should be part of, and must meet the same criteria as, the community's flood warning and response plan described in Section 611.b(4).

(8) There must be at least one exercise or drill of the levee failure warning and response plan each year. This can be an exercise 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 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 done in an after-action report.

Annual Warning and Response Exercise

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

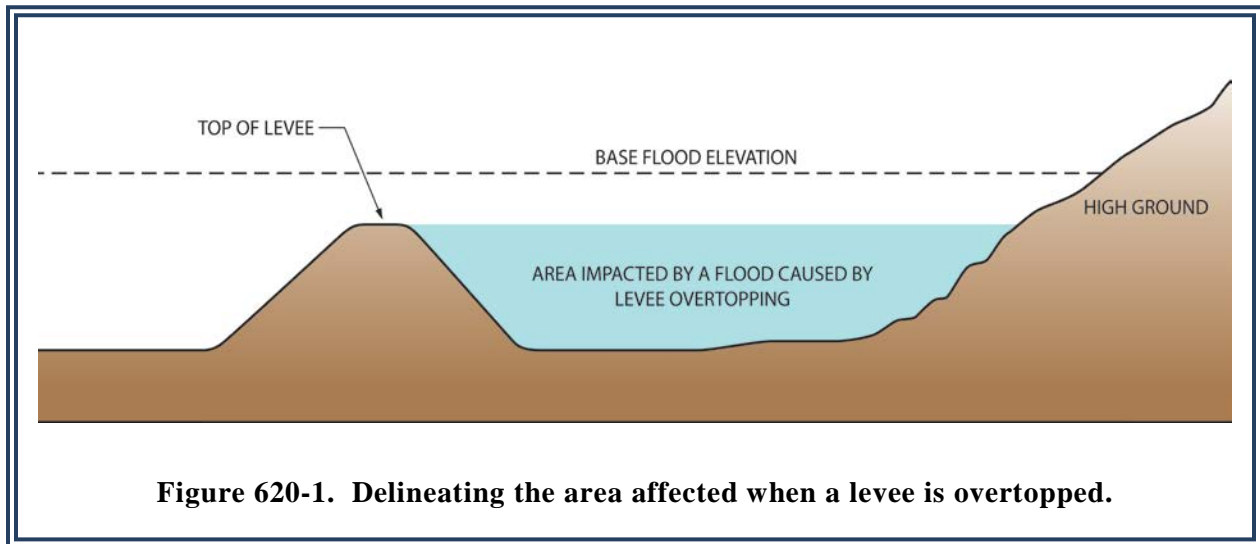
An evaluation of the performance of the warning and response plan must include

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

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

621.c. Map of the Affected Area

Credit criterion Section 621.(b)(3)(b) calls for a map that is used to identify the area affected should the levee fail, be breached, or be overtopped. This map is central to CRS credit for this activity. It can help determine the building inventory (Section 621.(b)(3)(c)), the addresses that get the outreach project (Section 621.b(5)), and the impact adjustment factors (Section 623).



This map is not necessarily the map (or series of maps) the community uses in its flood warning and response plan, which is credited in Sections 622(b)–(d). A community should develop a warning and response plan based on different flood level scenarios, including levee breaks at elevations lower than the overtopping level.

The criteria for an affected area map is the same for levees that have been accredited and those that have not been recognized on a Flood Insurance Rate Map (FIRM). There are two ways the map can be prepared:

- (1) If the community or levee agency has an engineering study that identified the area affected by a levee breach or overtopping, that map can be used. Note that such studies often have more than one scenario. The total area flooded by all the scenarios should be used for the affected-area map.
- (2) In the absence of an engineering study on areas that would be flooded by a levee failure or levee overtopping, the affected area is all land below the elevation of the top of the levee. Figure 620-1 identifies such an area where the top of the levee is lower than the base flood elevation. Where the top of the levee is higher than the base flood elevation, the same approach is used and the affected area would be larger than the Special Flood Hazard Area.

Communities that have levee breach analyses are encouraged to use the larger levee overtopping area to determine the addresses for the outreach project. It is a safer standard for identifying the properties potentially affected by a worst case/deepest flooding situation.

622 Elements

622.a. Levee maintenance (LM)

The maximum credit for this element is 95 points.

LM credit is provided for the levee system's maintenance program and emergency action plans.

A levee system (the levee structure plus all appurtenant facilities) is only as good as its weakest part. An operations and maintenance plan needs to include an inspection process that identifies openings or potential weak points in the levee. Equipment to close these openings needs to be checked and tested and instructions that define roles and responsibilities need to be put in place before the levee is threatened by a flood. All of these items are vital to good maintenance and are credited in this element.

LM credit is provided in two ways:

- (1) LM1 credit is provided for the annual inspection and maintenance of the levee system to identify and correct problems as required in a maintenance plan; and
- (2) LM2 credit is provided for the levee agency's emergency action plan. This credit is for having a written operations plan or manual that describes what must be done when a flood occurs by the agency that owns the levee. The plan may be in the same document as the LM1 maintenance plan.

Levees that are shown by the Federal Emergency Management Agency (FEMA) on the effective FIRM as providing protection to the base flood (e.g., accredited levees) are not eligible for CREDIT POINTS under LM, because they are already required to have an adequate maintenance program as a condition of being shown on the FIRM as providing protection. There are no LM credit points for a levee owned or operated by a federal agency. However, communities can receive credit points for their levee failure warning and response plans (LFR, LFW, LFO, and LCF credit) for the areas protected by accredited or federally owned or operated levees.

To receive credit points for a levee failure warning and response plan, the levee must be shown to "qualify" for LM credit. All levees must "qualify," but the credit points for LM are limited to non-accredited and non-federal levees.

Credit Criteria for LM

- (1) The activity credit criteria in Section 621.b must be met.
- (2) The community must receive some credit for both LM1 and LM2 to receive any LM credit.
- (3) To qualify for LM1 credit, the levee system maintenance must
 - (a) Ensure that the levee system's stability, height, and overall integrity are maintained. Encroachments must be controlled to ensure that they do not compromise the levee's

integrity, hinder operations and maintenance, and/or diminish the ability to engage in flood fighting activities. Maintenance programs must correct problems posed by existing encroachments.

- (b) Provide written operations and maintenance procedures that include
 - (i) Annual inspections of the condition of the levee system (i.e., the levee structure, pump stations, closure devices, etc.);
 - (ii) The maintenance activities to be performed;
 - (iii) The frequency of their performance; and
 - (iv) The person responsible for their performance (by name or title).
- (c) Perform and document annual inspections and needed maintenance of levees and floodwalls, as well as pumps, interior drainage systems, closures, penetrations, and transitions that provide for system integrity.
- (4) To qualify for LM2 credit, the emergency action plan must have a written operations plan or manual that describes what must be done by the agency that owns the levee when a flood occurs. It must include
 - (a) A list of all actions that need to be taken at different flood levels, including
 - (1) Procedures to notify the local emergency managers of a potential problem,
 - (2) All openings and closures that need to be closed and the location of the equipment and materials to effect the closure, and
 - (3) Periodic patrols of the levee to detect problems such as erosion and seepage;
 - (b) The person or office responsible for their performance (by name or title);
 - (c) Annual inspections of all equipment and material needed for the plan, such as vehicles and stockpiled sandbags; and
 - (d) Annual tests of all closures, pumps, and other equipment needed to implement the emergency action plan. Any equipment that is used routinely throughout the year, such as vehicles and drainage pumps, do not need testing records for CRS credit.

The plan may be in the same document as the LM1 maintenance plan.
- (5) The community's levee maintenance program must be compliant with applicable federal environmental and historic preservation laws and executive orders (see Section 507). The community and/or levee owners must complete CC-620EHP, Certification of Compliance with Environmental and Historic Preservation Requirements for Levee Maintenance, which can be found in Appendix F of downloaded

**Environmental Protection and
Historic Preservation**

Because it is a FEMA program, the CRS must ensure that activities for which it provides credit are compliant with applicable federal environmental and historic preservation laws and executive orders. Section 507 expands on this requirement and presents a summary of FEMA's policy. Figure 500-5 lists the federal programs that should be considered during project development.

from www.CRSresources.org/200. Credit is not provided if levee maintenance procedures are not compliant with applicable federal laws and executive orders.

Credit Points for LM

$$LM = LM1 + LM2$$

LM1 = up to 50 points, for the levee system maintenance;

LM2 = up to 45 points, for the levee system emergency action plans.

Impact Adjustment for LM

The impact adjustment for the activity is described in Section 623.

Documentation for LM Provided by the Community

(1) At each verification visit,

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

(b) The map and inventory of buildings described in credit criterion (3) in Section 621.b.

(c) The LM1 maintenance procedures described in credit criterion (3)(b) in Section 622.a, or documentation that the procedures have been approved by FEMA as meeting PM 63 requirements or approved by the U.S. Army Corps of Engineers.

(d) The LM2 emergency action plan described in credit criterion (4) in Section 622.a, or documentation the plan has been approved by FEMA as meeting PM 63 requirements or approved by the Corps of Engineers.

(e) Completed Community Certifications of Compliance with Environmental and Historic Preservation Requirements for Levee Maintenance (CC-620EHP) from all levee owners, which can be found in Appendix F.

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

(a) Documentation that all levees to be credited have been inspected during the previous year and are being maintained in accordance with the procedures and standards of the LM1 maintenance plan (credit criterion (3)(c) in Section 622.a).

(b) Records showing the most recent annual inspection of all equipment and material needed for the LM2 emergency action plan (credit criterion (4)(c) in Section 622.a).

(c) Records showing the most recent annual test of all closures, pumps, and other equipment needed to implement the LM2 emergency action plan (credit criterion (4)(d) in Section 622.a).

- (d) A copy of the outreach materials used to advise people of the levee failure hazard and ways to protect themselves from flooding (credit criterion (5) in Section 621.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 620 outreach topics are covered.

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

622.b. Levee failure threat recognition system (LFR)

The maximum credit for this element is 30 points.

LFR credit is provided for monitoring flood conditions near the levee. LFR credit is separate from flood threat recognition credit in Activity 610 (FTR), but the levee failure threat recognition system should be closely coordinated with the FTR system.

The more lead time that a community has, the more that can be done to reduce hazards associated with a flood. Although a levee may fail suddenly, overtopping is more predictable. There may be some advance indications of a potential levee failure, such as seepage and sand boils. Therefore, there are two key aspects of a levee failure threat recognition system that would provide the early notification needed by emergency managers to issue timely warnings and implement their flood response operations.

- (1) Monitoring flood conditions (LFR1): When flood levels reach (or are predicted to reach) certain heights, specific actions should be initiated, such as mobilizing patrols or opening the emergency operations center.
- (2) Monitoring levee conditions (LFR2): This is done with patrols (on the ground or from the air) and checking known problem sites during a flood.

Credit Criteria for LFR

- (1) The activity credit criteria in Section 621.b must be met.
- (2) The threat recognition procedures must be in the levee failure warning and response plan or a related document (credit criterion (7) in Section 621.b).
- (3) To receive LFR credit, some credit points must be obtained under both LFR1 and LFR2.
- (4) For monitoring flood conditions and LFR1 credit:
 - (a) The community and the levee owner must have a flood threat recognition system that monitors conditions. This would be a system that provides early notification of rising waters that may threaten the levee's integrity. The system must meet the credit criteria of FTR in Activity 610 (Flood Warning and Response). A National Weather Service flood potential outlook or flood watch would also be sufficient.
 - (b) Additional credit is provided for redundant or backup monitoring systems along a levee that send a signal to the emergency manager if water is rising on the landward side of

the levee. This system could use automated flood alarms or automated flood warning systems, or it could rely on trained spotters.

- (c) The equipment used for the flood monitoring must be tested at least annually. For CRS credit, testing records are not needed for equipment that is used routinely throughout the year, such as radios and vehicles.
- (5) For LFR2 credit, the community and/or the levee owner must initiate the monitoring of levee conditions when certain, pre-defined flood conditions are present, and
- (a) The monitoring procedures must cover
 - Levee patrol staffing and assigned sections of the levee system,
 - How and when the patrol teams are activated,
 - What the patrols are to look for in the different sections,
 - Methods and frequency for reporting, and
 - How the community's emergency managers are kept posted on the situation.
 - (b) The procedures for monitoring levee conditions must be exercised at least once each year, in accordance with credit criterion (8) in Section 621.b.

Credit Points for LFR

LFR = the total of LFR1 and LFR2, up to the maximum of 30 points

LFR1 = the sum of

- (a) 10 points, for monitoring flood conditions, and
- (b) 5 points, for monitoring flood conditions along the levee

LFR2 = up to 15 points, for monitoring levee conditions

Impact Adjustment for LFR

The impact adjustment for the activity is described in Section 623.

Documentation for LFR Provided by the Community

(1) At each verification visit,

- (a) The levee failure warning and response plan or related document that describes the threat recognition procedures (credit criterion (2) in Section 622.b) and credit criterion (7) in Section 621.b. The plan or related document must be marked to show where the credited items appear.
- (b) 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 (credit criteria (3)(b) and (3)(c) in Section 621.b and Section 623 impact adjustment).

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

- (a) Records showing the most recent annual test of all equipment and material needed for the system (credit criterion (4)(c) in Section 622.b).
- (b) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year (credit criterion (8) in Section 621.b). The exercise must include the procedures for monitoring levee conditions, if they are credited.

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

622.c. Levee failure warning (LFW)

The maximum credit for this element is 50 points.

LFW credit is provided for disseminating warnings of a potential levee failure to the public. The warning program for LFW credit should be closely coordinated with the flood warning dissemination activities credited in Section 612.b (EWD).

Once the levee failure flood threat recognition system tells local emergency managers what will be flooded and when, warnings should be issued to the affected populations. The messages that need to be conveyed and the timing for delivering them should be thought out in advance, as part of the levee failure warning and response plan.

The messages should state when flooding is predicted to occur, its expected severity, and appropriate response actions (e.g., evacuation routes, safe shelters, protective actions). The messages should be drafted in coordination with the messages and projects credited under flood response preparations (FRP) under Activity 330 (Outreach Projects).

Special warning arrangements for schools, nursing homes, and other critical facilities are also credited under LCF.

In general, this warning and protective action notification process (using pre-scripted message templates) falls into three time periods:

- (a) **Warning delay time** is the period between the time at which a threat is first detected or an emergency manager is first notified of the threat and the time at which the first alert/warning is issued.
- (b) **Warning diffusion time** is the period between the issuance of the first alert/warning and the time at which people receive the alert/warning.
- (c) **Protective action initiation time** is the period after people receive the first alert/warning up to the point at which they begin protective action. During this period, most people take a range of actions to prepare to implement a protective action and may receive subsequent warning messages.

Credit Criteria for LFW

- (1) The activity credit criteria in Section 621.b must be met.
- (2) The warning procedures must be included the levee failure warning and response plan or a related document (credit criterion (7) in Section 621.b).
- (3) The warning must reach people in a timely manner, especially because there may not be much lead time between a sudden levee failure and the moment when water reaches homes and businesses. For example, television or radio announcements are not credited if they are the only approach used because the failure may occur during the night.
- (4) For those warning systems requiring specialized equipment, such as sirens, 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, does not need testing records for CRS credit.

Credit Points for LFW

LFW = the total of the following, up to the maximum of 50 points

LFW1 = 5 points, if the plan includes pre-scripted messages and guidance for staff to quickly issue appropriate warnings keyed to specific triggers, such as when the river reaches a certain level, or when sand boils appear

LFW2 = 5 points, if the public messages include information on the expected elevation of the flood waters and instructions on when to evacuate

LFW3 = 10 points if an outdoor voice-sound system or fixed siren system is used

LFW 4 = EITHER

(a) 2 points if the plan identifies the primary and support agencies responsible for door-to-door or mobile public address warning, OR

(b) 10 points, if the plan identifies the routes, procedures, staff, and equipment necessary for door-to-door or mobile public address warning

LFW 5 = 10 points, if the Emergency Alert System through all channels/stations with pre-scripted draft messages is used

LFW 6 = 10 points, if telephone warnings to residents and businesses are used

LFW 7 = 10 points, if all schools, hospitals, nursing homes,

prisons, and similar facilities that need flood warning have NOAA Weather Radio receivers and at least one other automated backup system for receiving flood warnings, provided that the community has coordinated with NOAA and there are arrangements for issuing warnings about levee failures

Impact Adjustment for LFW

The impact adjustment for the activity is described in Section 623.

Documentation for LFW Provided by the Community

(1) At each verification visit,

- (a) The levee failure warning and response plan or related document that describes the emergency warning procedures (credit criterion (2) in Section 622.c and credit criterion (7) in Section 621.b). The plan or related document must be marked to show where the credited items appear.

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

- (a) Records showing the most recent annual test of all equipment and material needed for the system (credit criterion (4) in Section 622.c).
- (b) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year (credit criterion (8) in Section 621.b). The exercise must include the procedures for warning people credited under this element.

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

622.d. Levee failure response operations (LFO)

The maximum credit for this element is 30 points.

LFO credit is provided for the development of levee failure response operations that identify flood response scenarios, responsibilities, special need populations, and necessary resources. The operations should be closely coordinated with the flood response operations credited in Section 611.c (FRO).

The National Incident Management System (NIMS) requires local governments to validate the inventory of response assets using FEMA 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.

Levee failure response operations need to be spelled out in the levee failure warning and response plan. They include appropriate actions to be implemented when flooding due to the

levee failure threatens or actually occurs. The actions are conducted by the community and other cooperating agencies and organizations.

Developing scenarios can help this process. Scenarios are produced by thinking through what will happen in the community if a levee fails or is overtopped. For example, where will the water go? who will get flooded? who will lose access because of high water? and which critical facilities will be affected? These sorts of questions, and the scenarios developed by thinking about them, help with the design of the response operations to minimize the threats to life and property at those flood levels.

Two types of operations should be in the plan.

- (1) Levee protection operations: These are actions taken to prevent or limit a levee's failure due to flood waters and/or from overtopping. The levee agency is usually the lead on levee protection operations, but the community likely will need to provide resources and support. These actions are often called "flood fighting" and can include
 - Sandbagging the top of the levee,
 - Sandbagging and other measures to restrict sand boils, and
 - Measures taken to limit erosion on the toe of the levee.
- (2) Community protection operations: These are actions to minimize the loss of life and property damage in the area flooded when the levee fails or is overtopped. They should be similar to, and even a part of, the flood response operations credited in Section 612.c (FRO). They can include
 - Ordering an evacuation of the threatened area,
 - Controlling traffic in and out of the flooded area, and
 - Opening evacuation shelters.

Credit Criteria for LFO

- (1) The activity credit criteria in Section 621.b must be met.
- (2) The levee failure response operations actions must be in the levee failure warning and response plan or a related document (credit criterion (7) in Section 621.b).
- (3) Levee protection operations actions must be closely coordinated with the levee emergency action plan credited under Section 622.a (LM2).
- (4) Credit is based on the extent and level of detail that the levee failure warning and response plan provides for the response operations. General statements or an assignment of responsibilities with no specifics about what is done are not credited. For full credit for LFO, 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 need in order to perform their assigned responsibilities.
- (5) LFO4 credit is provided 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.

Credit Points for LFO

LFO = the total of the following, up to the maximum of 30 points

LFO1 = 10 points, if the community has developed scenarios that review what could happen if the levee were to fail or be overtopped by a flood

LFO2 = 10 points, if the plan identifies response tasks and responsible community staff and other public and private organizations with responsibilities related to the response tasks in the plan

LFO3 = 5 points, for maintaining a data base of people with special needs who require evacuation assistance when a levee failure warning is issued and for having a plan to provide transportation to secure locations

LFO4 = the sum of the following:

- (a) 5 points, if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task, and
 - (b) 5 points, for identification of the sources of necessary resources
-

Impact Adjustment for LFO

The impact adjustment for the activity is described in Section 623.

Documentation for LFO Provided by the Community

- (1) At each verification visit,
 - (a) The levee failure warning and response plan or related document that describes the operations and actions credited above (credit criterion (2) in Section 622.d) and credit criterion (7) in Section 621.b). The plan or related document must be marked to show where the credited items appear.

- (2) At each verification visit and with the annual recertification,
- (a) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year (credit criterion (8) in Section 621.b). The exercise must include the actions credited under this element.

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

622.e. Levee failure critical facilities planning (LCF)

The maximum credit for this element is 30 points.

LCF credit and planning should be closely tied to the critical facilities coordination done under Section 612.d (CFP).

LCF1 credit is provided for having information in the community's levee failure response plan about all critical facilities that could be affected by a levee failure. In general, facilities not subject to flooding during a levee failure 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.

Additional credit is provided in LCF2 if levee failure warning and response plans for individual critical facilities have been developed, reviewed, or accepted by the community.

Credit Criteria for LCF

- (1) The activity credit criteria in Section 621.b must be met.
- (2) LCF1 is a prerequisite for any LCF credit.
- (3) For LCF1 credit, the community's levee failure response plan must list the facilities considered critical in a levee failure emergency. The community must contact the facilities to determine whether they need any special warning arrangements. The community does not need to provide a special warning to all critical facilities, only to those identified in the levee warning and response plan as needing one.

There is no impact adjustment for LCF1. The community must include all critical facilities affected by a levee failure on its list.

- (4) For LCF2 credit, levee failure warning and response plans must have been developed, reviewed, or accepted by the community for individual critical facilities.

Credit Points for LCF

LCF = the total of the following

LCF1 = up to 15 points, if the adopted plan includes

- (a) a list of the facilities considered critical in a levee failure emergency (5 points)
- (b) contact information, including the names and phone numbers of the operators of all public and private critical facilities affected by levee failure (5 points)
- (c) arrangements for issuing special warnings or early notifications directly to those critical facilities that need advance warning (5 points)

LCF2 = up to 15 points, if critical facilities listed under LCF1 have their own levee failure 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

Impact Adjustment for LCF

There is no impact adjustment for LCF.

Documentation for LCF Provided by the Community

(1) At each verification visit,

- (a) A list of all public and private critical facilities that would be affected by levee failure or that would need to be operational during a levee-failure flood.
- (b) Contact information (names and phone numbers) of the operators of the facilities on the above ((1)(a)) list.
- (c) The above ((1)(a)) list of critical facilities, marked to identify those needing special warning or advance notification.
- (d) [For LCF2 credit] The above ((1)(a)) 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.

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

- (2) With the annual CRS recertification,
- (a) A page from the latest list of the critical facilities provided for LCF1, which must be updated at least annually.
 - (b) A copy of the annual exercise of the plan and a lessons-learned report.

623 Impact Adjustment

There is no impact adjustment for LCF. The community must include all critical facilities affected by a levee failure on its list.

The credit points for LM, LFR, LFW, and LFO are adjusted based on the number of buildings affected by the element. Determining these adjustments requires identifying the area affected and then counting the buildings within that area. **Identifying the affected area is described in Section 621.c, Map of the Affected Area.**

Counting buildings for an impact adjustment is discussed in Section 302.

$$(1) r_{LM} = \frac{b_{LM}}{b_{LF}}$$

$$(2) r_{LFR} = \frac{b_{LFR}}{b_{LF}}$$

$$(3) r_{LFW} = \frac{b_{LFW}}{b_{LF}}$$

$$(4) r_{LFO} = \frac{b_{LFO}}{b_{LF}}, \text{ where}$$

b_{LM} = the number of buildings in the area affected by a flood resulting from a failure of the levee being maintained,

b_{LFR} = the number of buildings that benefit from the levee failure threat recognition system,

b_{LFW} = the number of buildings that benefit from the levee failure flood warnings,

b_{LFO} = the number of buildings in the area covered by the levee failure response operations actions, and

b_{LF} = the total number of buildings in the community affected by levee failure as shown on the affected-area map (Section 621.c)

b_{LFO} cannot be greater than b_{LFW}
 b_{LFW} cannot be greater than b_{LFR}

bLFR cannot be greater than bLM
rLM cannot be greater than 1.0

624 Credit Calculation

$$c620 = (LM \times rLM) + (LFR \times rLFR) + (LFW \times rLFW) \\ + (LFO \times rLFO) + LCF1 + LCF2$$

625 For More Information

- a. Additional information, documentation checklists, reference materials, and examples can be found at www.CRSresources.org/600.
- b. Levee mapping and public information materials are available on FEMA's website, <http://www.fema.gov/living-levees-its-shared-responsibility>.
- c. Each district of the Corps of Engineers has expertise in levee construction, maintenance, and flood fighting. See www.usace.army.mil/Locations.aspx.
- d. The California Department of Water Resources has special programs for leveed areas in the Central Valley, including an outreach project. www.water.ca.gov/myfloodrisk.
- e. The American Society of Civil Engineers (ASCE) has a booklet for residents in leveed areas, "So, You Live Behind a Levee!" it is available at <http://ascelibrary.org/doi/book/10.1061/9780784410837>.

626 Related Activities under the Community Rating System

- A community that develops an appropriate approach to the outreach to residents required in Section 621.b(5) as part of a Program for Public Information can be credited under Activity 330.
- LFR is similar to element FTR under Activity 610 and to 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.
- LFW is similar to element EWD under Activity 610 and element DFW under Activity 630. It credits a flood warning dissemination system that provides a critical linkage between the recognition of an impending flood and the community's response to the emergency. The three warning dissemination systems should be closely coordinated.

- LFO is similar to element FRO under Activity 610 and element 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.
- LCF is similar to credits under Activity 610 and 630 because it requires the maintenance of a current list of critical facilities in potential levee inundation areas, the maintenance of up-to-date contact information for each critical facility, and having plans for warning each critical facility in a timely manner.
- Documentation of the annual exercise is a prerequisite for Activities 610, 620, and 630. One exercise can meet the requirements for all three activities.

630 DAMS—Summary

Maximum credit: 160 points

632 Elements

- a. **State dam safety program (SDS):** Up to 45 points based on the credit for the state's program.
- b. **Dam failure threat recognition system (DFR):** Up to 30 points for having a system to advise the emergency manager when there is a threat of a dam failure.
- c. **Dam failure warning (DFW):** Up to 35 points for disseminating the warning to the public.
- d. **Dam failure response operations (DFO):** Up to 30 points for planning and practicing specific tasks to be undertaken to reduce or prevent threats to health, safety, and property.
- e. **Dam failure critical facilities planning (DCF):** Up to 20 points for coordination of dam failure warning and response activities with operators of critical facilities.

Credit Criteria

Overall criteria for this activity are described in Section 631.b.

- a. There must be at least one insurable building within the community that is subject to inundation from the failure of a high-hazard-potential dam for SDS and other credit under this Activity.
- b. The community must have a description of the dam failure threat and a dam failure inundation map.
- c. To receive any Activity 630 credit other than SDS, the community must receive some credit in each of the elements DFR, DFW, DFO, and DCF.
- d. There must be an adopted dam failure warning and response plan.
- e. There must be one or more annual outreach projects on the warning and safety precautions.
- f. There must be an annual exercise of the plan with a lessons-learned report.

Each element has additional criteria specific to that element.

Impact Adjustment

There is no impact adjustment for the state dam safety program (SDS). The credit for DFR, DFW, and DFO is adjusted based on the number of buildings in the community that would be affected by the failure of a high-hazard-potential dam. There is no impact adjustment for DCF.

Documentation Provided by the Community

Each element has a separate section describing needed documentation.

630 DAMS

The OBJECTIVES of this activity are to encourage states to provide dam safety information to communities and to encourage communities, in turn, to provide timely identification of an impending dam failure, disseminate warnings to those who may be affected, and coordinate emergency response activities to reduce the threat to life and property.

This activity focuses on public safety and the community's emergency management actions and plans. Therefore, the local emergency manager must be the point of contact and he or she should coordinate with the dam owner(s).

Every dam has an inherent risk of failure, a fact not generally recognized by the public. The risk associated with dams tends to change along with the evolving environment that surrounds them.

631 Background

The legal definition of a “dam” for regulatory purposes varies from state to state. A dam may be as low as 5 feet, with an impoundment of no more than 5 acre-feet of water, or it may be 100 feet high, creating a recreational reservoir. For the purposes of this activity, a “dam” is a structure regulated by the state's dam safety office.

This activity focuses less on the dam structure itself and more on the impact of a flood that would result from a breach or failure of that structure.

Unlike levees, dams do not need flood conditions to fail. They can be breached with little or no warning and send a wall of water downstream. The combination of high velocity, great depth, and short notice has proven particularly deadly and destructive. The most-recognized way to minimize the dam failure hazard is to enforce dam construction and maintenance standards, usually through a state dam safety program.

In addition to dam failures, normal operations of dams may cause unusual flooding situations downstream. Dams normally have operations plans to deal with unusual circumstances, including excessive runoff into the dam and the occasional need to lower the reservoir level.

Because of the threat of flooding from dam failure or dam operations, the Community Rating System (CRS) credits cooperation among state dam safety officials, dam owners and operators, and local emergency managers. Credit is for state and local dam safety programs that

- Help make the needed information available,
- Improve communications among operators of the dams and downstream communities, and
- Develop warning and response plans for dam failures.

The credit is keyed to addressing the areas at risk from the failure of a high-hazard-potential dam. A “high-hazard-potential dam” is one for which failure or operational errors will probably cause loss of human life downstream. Communities must contact their state dam safety office to determine if they are affected by such a dam.

Communities are encouraged to address other dams whose failure could cause loss of life or property damage.

This activity is not intended to be a model for developing a dam failure warning and response plan program. As with the rest of the CRS activities, its objective is to provide a simple way to measure a local program’s potential impact on life safety, health, and property damage. An effective program needs to be carefully prepared and tailored to the local hazards and the specific needs of the community.

631.a. Activity Description

The maximum credit for Activity 630 is 160 points.

This activity provides credit to communities that would be affected by the failure of an upstream high-hazard-potential dam. State definitions of a high-hazard-potential dam vary, and may include potential damage to buildings or property. However, all state definitions of high-hazard-potential dams include or refer to probably loss of life if there is a failure of the dam.

Credit is provided under five elements:

- The state’s dam safety program that sets construction, maintenance, and data provision standards for dams (credited under SDS),
- A system to advise local emergency managers of a potential dam failure (credited under DFR),
- A warning system for the areas downstream of the dam (credited under DFW),
- A plan of action to minimize the threat to life and property during the flood (credited under DFO), and
- Coordination with critical facility operators (credited under DCF).

High-hazard-potential Dams

“Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.”

—*Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams*, 2004, by the Interagency Committee on Dam Safety

631.b. Activity Credit Criteria

These activity credit criteria apply to all Activity 630 elements except SDS (Section 632.a).

- (1) There must be at least one insurable building within the community subject to inundation due to the failure of a high-hazard-potential dam.

(2) The community must submit a description of the dam failure threat, including the following for each high-hazard-potential dam that affects the community. The first three items should be available from the state's dam safety office. If they are not available from the state or the owner of the dam, the community may have to develop the information and document it.

(a) A general description of the dam, including its distance upstream from the community;

(b) A dam failure inundation or evacuation map;

(c) Dam failure flood hazard data, including the arrival time of flood waters at different locations and peak elevations of the dam failure flood;

(d) An inventory of the types of buildings (residential, commercial, etc.) exposed to dam failure flooding with an approximate count of the number of buildings and an inventory of the land use (residential, agricultural, open space, etc.) of developed and undeveloped areas within the dam failure inundation or evacuation area for each high-hazard-potential dam;

(e) A list of the critical facilities that would be flooded or otherwise affected by a failure of the dam; and

(f) The expected impacts of dam failure 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 dam failure flood hazard description.

This credit criterion is a prerequisite for Class 4 communities.

(3) The community must obtain some credit in all four dam failure warning and response elements (DFR, DFW, DFO, and DCF) in order to receive any credit for its local dam failure warning and response planning.

(4) To receive DFR, DFW, DFO, and DCF credit, the community must have a dam failure warning and response plan that has been adopted by the community's governing body. The plan should be part of, and must meet the same criteria as, the community's flood warning and response plan described in Section 611.b(4).

(5) To receive DFR, DFW, DFO, and DCF credit, the community must implement one or more annual outreach projects to the residents and businesses in the area(s) expected to be inundated by a dam failure of an identified high-hazard-potential dam. The project(s)

must tell people of their risk of flooding, how they will be warned of a dam failure flood, and the safety measures they should take during a flood (e.g., evacuation

procedures and routes). This 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 area(s) subject to dam failure flooding; or
 - (c) Developing an appropriate approach as part of a Program for Public Information credited under Activity 330 (Outreach Projects).
- (6) To receive DFR, DFW, DFO, and DCF credit, there must be at least one exercise or drill of the dam failure warning and response plan each year. This can be an exercise for a flood, levee failure, dam failure, or hurricane. This criterion would be met if the plan is implemented in response to an actual flood or actual threat of a dam 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 done in an after-action report.

Annual Warning and Response Exercise

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

An evaluation of the performance of 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 actual threat of a levee or dam failure, provided that the items listed above are discussed in an after-action (or similar) report.

632 Elements

632.a. State dam safety program (SDS)

The maximum credit for this element is 45 points.

SDS credit is provided for the state's dam safety program to a community that would be affected by the failure of an upstream high-hazard-potential dam. Credit is based on

- The assessment of the condition of dams in the state,
- Risk communication and public awareness, and
- Promotion of emergency action plans by operators of the dams.

All of these are designed to encourage states to provide needed flood threat data to communities and to encourage operators of the dams to cooperate with local emergency management planning.

Credit Criteria for SDS

- (1) The SDS credit earned by the state dam safety office is provided to all communities that would be affected by a flood from the failure of a high-hazard-potential dam. **This must be documented with a description and a map.**
- (2) The community must meet state dam safety standards to receive credit for this element. If the community owns or regulates the construction, operation, or maintenance of any dams, the community's dams and/or its dam safety program must meet the state standards for dam safety.
- (3) If the state's SDS credit changes, the community's credit for SDS will be updated at the next verification visit or modification.

Credit Points for SDS

SDS = up to 45 points for communities affected by high-hazard-potential dams

Impact Adjustment for SDS

There is no impact adjustment for SDS.

Documentation for SDS 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 needed documentation, available at www.CRSresources.org/600.
 - (b) A map and description of the threat from failure of high-hazard-potential dams (credit criterion (2) in Section 631.b).**

632.b. Dam failure threat recognition system (DFR)

The maximum credit for this element is 30 points.

DFR credit is provided for primary and secondary threat recognition procedures. This credit is separate from flood threat recognition credit in Activity 610 (FTR), but the dam failure threat recognition system should be closely coordinated with the FTR system.

The more lead time that a community has, the more that can be done to protect people from a flood. Although a dam may be breached suddenly, the flood waters may not reach the community for some time. This credit is for a system that advises the community if a breach is likely or is occurring, giving the community and residents time to respond.

- (1) Primary dam failure threat recognition (DFR1): Credit is provided for primary threat recognition procedures in which the operator of the dam notifies local emergency

managers of a potential or actual dam breach. This could be based on a predetermined reservoir level, water flowing over the spillway, structural problems discovered in the dam, or other cause for alarm.

- (2) Secondary dam failure threat recognition (DFR2): Additional credit is provided for a backup system that includes sensors or cameras on the dam and/or a gage, camera, or other river-level monitoring system located between the dam and the community. This information must be directly available to the emergency manager.

Credit Criteria for DFR

- (1) The activity credit criteria in Section 631.b must be met.

- (2) For DFR1 and DFR2:

- (a) The threat recognition procedures must be in the dam failure warning and response plan or a related document (credit criterion (4) in Section 631.b).
- (b) The threat recognition system must be monitored by the operator and/or the local emergency manager (or office on behalf of the emergency manager) 24 hours a day, seven days a week.
- (c) The equipment used must be tested at least quarterly. Equipment that is used routinely throughout the year, such as a telephone, does not need testing records for CRS credit.

- (3) DFR1 credit is a prerequisite for DFR2 credit.

- (4) For DFR1 credit, the primary dam failure threat recognition procedures must include

- (a) Procedures and predetermined conditions for when the operator of the dam notifies local emergency managers of a potential or actual dam breach; and
- (b) At least quarterly communication checks between the operator of the dam and emergency services officials.

- (5) For DFR2 credit, the secondary dam failure threat recognition backup system must be directly available to the emergency manager.

Credit Points for DFR

DFR = the total of the following, up to the maximum of 30 points

DFR1 = up to 20 points, for the primary dam failure threat recognition system

DFR2 = up to 10 points, for the secondary dam failure threat recognition system

Impact Adjustment for DFR

The impact adjustment for the activity is described in Section 633.

Documentation for DFR Provided by the Community

(1) At each verification visit,

(a) The dam failure warning and response plan or related document that describes the threat recognition procedures (credit criterion (2)(a) in Section 632.b and credit criterion (4) in Section 631.b). The plan must be marked to show where the credited items appear.

(b) 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 (credit criteria (2)(b) and (2)(d) in Section 631.b and Section 633 impact adjustment).

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

(a) Records of the quarterly test of all equipment and material needed for the system (credit criterion (2)(c) in Section 632.b) and the quarterly communication checks between the operator of the dam and emergency services officials (credit criterion (3)(b) in Section 632.b).

(b) A copy of the outreach material used to advise people of the dam failure hazard and of ways to protect themselves from flooding (credit criterion (5) in Section 631.b). If the outreach material is also credited under Activity 330 (Outreach Projects), a separate submittal is not needed provided the other document (including a PPI, if used) is annotated to show where the 630 outreach topics are covered.

(c) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year (credit criterion (6) in Section 631.b). The exercise must include the dam failure threat recognition procedures.

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

632.c. Dam failure warning (DFW)

The maximum credit for this element is 35 points.

DFW credit is provided for disseminating the warning of a potential dam failure to the public through messages and other notification systems. This warning program for DFW credit should be closely coordinated with the flood warning dissemination activities credited in Section 612.b (EWD).

The inability of dams to fully protect any downstream development and population often is not known by those at risk, nor is it publicized by the community. The emergency management staff faces the task of convincing citizens that very real residual risks exist, which can greatly affect their lives and property. Risk awareness within the community can be limited by political constraints or by the security concerns of dam-owing agencies—both of which seriously limit lifesaving opportunities.

Once the dam failure flood threat recognition system tells local emergency managers what will be flooded and when, warnings should be issued to the affected populations. The messages that need to be conveyed and the time at which they should be delivered should be thought out in advance, as part of the dam failure warning and response plan.

The messages should state when flooding is predicted to occur, its expected severity, and appropriate response actions (e.g., evacuation routes, safe shelters, or protective actions).

Special warning arrangements for schools, nursing homes, and other critical facilities are credited under DCF.

Credit Criteria for DFW

- (1) The activity credit criteria in Section 631.b must be met.
- (2) The warning procedures must be included in the dam failure warning and response plan or a related document (credit criterion (4) in Section 631.b).
- (3) The warning must reach people in a timely manner, especially because there may not be much time between a sudden dam failure and the point at which the water reaches homes and businesses. For example, television or radio announcements are not credited if they are the only approach used because the failure may occur during the night. The messages should be drafted in coordination with the messages and projects credited under flood response preparations (FRP) in Activity 330 (Outreach Projects).
- (4) For those warning systems requiring specialized equipment, 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.

Credit Points for DFW

DFW = the total of the following, up to the maximum of 35 points:

DFW1 = 5 points, if the plan includes pre-scripted messages and guidance for staff to quickly issue appropriate warnings

DFW2 = 5 points, if the public messages include information on the expected elevation of the flood waters, and instructions on when to evacuate

DFW3 = 10 points, if an outdoor voice-sound system or fixed siren system is used

DFW4 = EITHER:

- (a) 2 points, if the plan identifies the primary and support agencies responsible for door-to-door or mobile public address warning; OR

- (b) 10 points, if the plan identifies the routes, procedures, responsible staff, and equipment necessary for door-to-door or mobile public address warning

DFW5 = 10 points, if the Emergency Alert System through all channels/stations with pre-scripted draft messages is used

DFW6 = 10 points, if telephone warnings to residents and businesses are used

DFW7= Up to 10 points, if schools, hospitals, nursing homes, prisons, and similar facilities that need flood warning have NOAA Weather Radio receivers and at least one other automated backup system for receiving flood warnings, provided that the community has coordinated with the National Oceanic and Atmospheric Administration (NOAA) and there are arrangements for issuing warnings about dam failures

Impact Adjustment for DFW

The impact adjustment for the activity is described in Section 633.

Documentation for DFW Provided by the Community

(1) At each verification visit,

- (a) The dam failure warning and response plan or related document that describes the emergency warning procedures (credit criterion (2) in Section 632.c and credit criterion (4) in Section 631.b). The plan or related document must be marked to show where the credited items appear.

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

- (a) Records showing the annual test of all equipment and material needed for the system (credit criterion (4) in Section 632.c).
- (b) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year (credit criterion (6) in Section 631.b). The exercise must include the procedures for warning people credited under this element.

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

632.d. Dam failure response operations (DFO)

The maximum credit for this element is 30 points.

DFO credit is provided for the development of dam failure response operations that identify flood response scenarios, responsibilities, special need populations, and necessary resources. The actions undertaken that receive DFO credit should be closely coordinated with the flood response operations credited in Section 612.c (FRO).

The National Incident Management System (NIMS) requires local governments to validate the inventory of response assets using Federal Emergency Management Agency (FEMA) 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.

Dam failure response operations need to be spelled out in the dam failure warning and response plan. They must include appropriate actions to be implemented when the dam failure flood threatens or occurs. The actions are conducted by the community and other cooperating agencies and organizations.

Credit Criteria for DFO

- (1) The activity credit criteria in Section 631.b must be met.
- (2) The dam failure operations actions must be included in the dam failure warning and response plan or a related document (credit criterion (4) in Section 631.b).
- (3) Credit is based on the extent and level of detail the dam failure warning and response plan provides for the response operations. General statements or an assignment of responsibilities with no specifics about what is to be done are not credited. For full credit for DFO, 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 specified agencies and organizations need in order to perform their assigned responsibilities.
- (4) DFO4 credit is provided 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.

Credit Points for DFO

DFO = the sum of the following, up to the maximum of 30 points:

DFO1 = 10 points, if the community has developed scenarios that explain what could happen if a dam failed

DFO2 = 10 points, if the plan identifies response tasks and responsible community staff and other public and private organizations with responsibilities related to the response tasks in the plan

DFO3 = 5 points, for maintaining a data base of people with special needs who require evacuation assistance when a dam failure warning is issued, and for having a plan to provide transportation to secure locations

DFO4 = up to 10 points, if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task and the sources of necessary resources

Impact Adjustment for DFO

The impact adjustment for the activity is described in Section 633.

Documentation for DFO Provided by the Community

(1) At each verification visit,

- (a) The dam failure warning and response plan or related document that describes the operations and actions credited above (credit criterion (2) in Section 632.d and credit criterion (4) in Section 631.b). The plan or related document must be marked to show where the credited items appear.

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

- (a) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year (credit criterion (6) in Section 631.b). The exercise must include the actions credited under this element.

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

632.e. Dam failure critical facilities planning (DCF)

The maximum credit for this element is 20 points.

DCF credit should be closely tied to the critical facilities coordination done under Section 612.d (CFP).

DCF1 credit is provided for having information about all critical facilities that could be affected by a dam failure included in the community's dam failure response plan. In general, facilities not subject to flooding during a dam failure 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 will be needed to support the flood response effort.

Additional credit is provided in DCF2 if dam failure warning and response plans for individual critical facilities have been developed, reviewed, or accepted by the community.

Credit Criteria for DCF

- (1) The activity credit criteria in Section 631.b must be met.
- (2) DCF1 is a prerequisite for any DCF credit.
- (3) For DCF1 credit, the community's dam failure response plan must list the facilities considered critical in a dam failure emergency. The community must contact the facilities to determine if they need special warning arrangements. The community does not need to provide a special warning to all critical facilities, only those that need one.

There is no impact adjustment for DCF1. The community must include all critical facilities affected by a dam failure on its list.

- (4) For DCF2 credit, dam failure warning and response plans must have been developed, reviewed, or accepted by the community for individual critical facilities.

Credit Points for DCF

DCF = the sum of the following

DCF1 = up to 10 points, if the adopted plan includes

- (a) contact information, including the names and phone numbers of the operators of all public and private critical facilities affected by dam failure, and
- b) arrangements for special warnings or early notifications directly to those critical facilities that need advance warning

DCF2 = up to 10 points, if critical facilities listed under DCF1 have their own dam failure 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

Impact Adjustment for DCF

There is no impact adjustment for DCF.

Documentation for DCF Provided by the Community

(1) At each verification visit,

- (a) A list of all public and private critical facilities affected by dam failure or needed to be operational during a dam failure flood, with the contact and warning needs information.
- (b) [For DCF2] The above ((1)(a)) 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.

(2) With the annual CRS recertification,

- (a) A page from the latest list of the critical facilities provided for DCF1, which must be updated at least annually.
- (b) A description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year and a copy of the after-action report or lessons-learned report.

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

633 Impact Adjustment

There is no impact adjustment for the state dam safety program (SDS). All communities that benefit from the program receive the same credit. There is no impact adjustment for DCF.

The credit points for DFR, DFW, and DFO are adjusted based on the number of buildings affected by the element. Determining these adjustments requires identifying the area affected and then counting the buildings within that area.

(1) The area affected by a dam failure flood is shown on the map required under credit criterion (2)(b) in Section 631.b. This area may be larger or smaller than the community's Special Flood Hazard Area (SFHA), depending on the size of the dam's reservoir and its distance upstream from the community.

(2) Counting buildings for an impact adjustment is discussed in Section 302. In most cases, the number of buildings affected by an element will be the same as the number of buildings in the area expected to be inundated by a dam failure flood.

$$(1) rDFR = \frac{bDFR}{bDF}$$

$$(2) \text{ rDFW} = \frac{\text{bDFW}}{\text{bDF}}$$

$$(3) \text{ rDFO} = \frac{\text{bDFO}}{\text{bDF}}, \text{ where}$$

bDFR = the number of buildings that benefit from the dam failure threat recognition system,

bDFW = the number of buildings that benefit from the dam failure flood warnings,

bDFO = the number of buildings in the area covered by the dam failure operations actions, and

bDF = the number of buildings in the community expected to be inundated by a failure of all the high-hazard-potential dams that affect the community

bDFO cannot be greater than bDFW
 bDFW cannot be greater than bDFR
 rDFR cannot be greater than 1.0

634 Credit Calculation

$$\begin{aligned} \text{c630} = & \text{SDS} + (\text{DFR} \times \text{rDFR}) + (\text{DFW} \times \text{rDFW}) \\ & + (\text{DFO} \times \text{rDFO}) + \text{DCF1} + \text{DCF2} \end{aligned}$$

635 For More Information

- a. Additional information, documentation checklists, reference materials, and examples can be found at www.CRSresources.org/600.
- b. Information on state definitions for high-hazard-potential dams was prepared in 2010 by the Association of State Dam Safety Officials and is available at http://www.damsafety.org/media/Documents/Surveys/HazardPotentialClassifications_2010sept.pdf.
- c. More information on dam safety activities and state programs can be found on the website for the Association of State Dam Safety Officials at www.damsafety.org.
- d. The following can be obtained from FEMA's Dam Safety Office website at www.fema.gov/protecting-our-communities/plan-ahead-dam-failure/dam-failure-information.

Model State Dam Safety Program, Association of State Dam Safety Officials, FEMA-316CD. (2007).

Catalog of FEMA Dam Safety Resources, FEMA. (2008).

Emergency Action Planning for Dam Owners, FEMA-64. (2007).

636 Related Activities under the Community Rating System

- The outreach to residents required in Section 631.b (5) and developing an appropriate approach as part of a Program for Public Information can be credited under Activity 330.
- DFR is similar to element FTR under Activity 610 and element LFR under Activity 620. 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.
- DFW is similar to element EWD under Activity 610 and element LFW under Activity 620. It credits a flood warning dissemination system that provides a critical linkage between the recognition of an impending flood and the community's response to the emergency. The three warning dissemination systems should be closely coordinated.
- DFO is similar to element FRO under Activity 610 and element LFO under Activity 620. It identifies opportunities to prevent loss of life and property damage during a flood. The three response operations plans should be closely coordinated.
- DCF is similar to Activity 610 and 620 credits because it requires the maintenance of a current list of critical facilities in potential levee inundation areas, the maintenance of up-to-date contact information for each critical facility, and having plans for warning each critical facility in a timely manner.
- Documentation of the annual exercise is a prerequisite for Activities 610, 620, and 630. One exercise can meet all three activities' requirements.