540 DRAINAGE SYSTEM MAINTENANCE—Summary

Maximum credit: 470 points

542 Elements

a. **Channel debris removal (CDR):** Up to 200 points for inspecting natural channels on public and private property and removing debris as appropriate.

b. **Problem site maintenance (PSM):** Up to 50 points for paying special attention to known problem flooding sites, such as those needing more frequent inspections.

c. **Capital improvement program (CIP):** Up to 70 points for having a capital improvement program that corrects drainage problems.

d. **Stream dumping regulations (SDR):** Up to 30 points if the community has and publicizes regulations prohibiting dumping in streams, canals, and ditches.

e. **Storage basin maintenance (SBM):** Up to 120 points for annually inspecting public and private storage basins and performing the required maintenance.

Credit Criteria

Credit criteria for this activity are described in Section 541.b. They include drainage system inspections and maintenance requirements, no reliance on unsecured outside funding for maintenance, and compliance with federal and state laws and executive orders for environmental and historic preservation.

Each element has additional criteria specific to that element.

Impact Adjustment

The credit for CDR is adjusted based on the percentage of the community's natural drainage system that is inspected annually and properly maintained. There is no impact adjustment for PSM or SDR. The credit for SBM is adjusted based on the percentage of all the public and private storage basins within the community that are inspected and maintained.

Documentation Provided by the Community

Each element has a separate section describing needed documentation.

540 DRAINAGE SYSTEM MAINTENANCE

The OBJECTIVE of this activity is to ensure that the community keeps its streams, channels, and storage basins clear of debris so that their flood carrying and storage capacity are maintained.

541 Background

A community's drainage system consists of natural watercourses or channels; constructed storm drains, canals, and ditches; and detention/retention basins built to store high flows. In most cases, the actual channel of a natural stream will carry only the two-year flood, with larger flows being carried in the overbank area. Constructed channels are typically designed to carry larger floods than natural channels do, and communities usually have an active maintenance program for their constructed facilities. When a channel loses a portion of its conveyance capacity, overbank flooding occurs more frequently and flows reach higher elevations, potentially damaging nearby structures or causing increased channel erosion.

Even where floodplain regulations prevent construction from encroaching, streams can lose their carrying capacities as a result of the accumulation of debris, sedimentation, and the growth of unwanted vegetation. Detention and retention basins can lose their ability to store water if upstream sediment controls do not function properly or if there are highly erosive lands upstream.

One proven approach to preventing this reduction of capacity is a community program that routinely inspects and clears debris from the channels and basins. This work can be as simple as cleaning out culverts and removing trash, shopping carts, and similar debris that can dam a stream and cause flooding, even during small storms.

541.a. Activity Description

The maximum credit for Activity 540 is 570 points.

Credit is provided for keeping the channel and storage basin (detention or retention) portion of a community's drainage system clear of debris in order to maintain its flood-carrying and storage capacity during floods, and to protect water quality.

A community can receive credit for five drainage system maintenance activities:

- Inspecting and maintaining natural channels (CDR),
- Paying attention to problem sites (PSM),
- Having a capital improvements program that benefits the drainage system (CIP),

Activity 540

If a community can answer "yes" to the following questions, it should be able to receive credit for this activity.

- Does the drainage maintenance program have written procedures and written records?
- Is there an annual inspection for at least some of the channel system?
- Are inspections also conducted after major storms and in response to citizens' complaints?
- Are debris and other obstructions to flow or storage removed when they are found?

- Implementing and publicizing "no dumping" regulations (SDR), and
- Inspecting and maintaining storage basins (SBM).

The drainage system—A drainage system consists of all natural and manmade watercourses, conduits, and storage basins that collect rainfall and convey flood flows. It includes both open systems and those that are underground.

The natural conveyance system—For purposes of this activity, the natural conveyance system includes the channels that need to be maintained in order to prevent damage to buildings, roads, and other infrastructure from small, frequent storms.

The defined conveyance system varies in each community. In some communities, it may be vital to maintain the channels, bridges, and culverts in order to avoid flooding. For other communities, streams that have been converted into large roadside ditches are significant conveyors of surface water and must be kept clean

This activity is concerned primarily with the parts of the natural conveyance system that lie within the developed areas of the community. However, streams in undeveloped areas of the community also need to be included if there is a culvert or bridge crossing that is a critical access route or if there are insurable buildings that could be affected if the stream is not able to convey flows.

NFIP Requirement

The NFIP requires communities to "assure [that] the carrying capacity within the altered or relocated portion of any watercourse is maintained" (44 *CFR* §60.3(b)(7)).

This maintenance provision applies to any watercourse altered or relocated after the date of adoption of the community's floodplain management ordinance. Any natural growth or manmade debris that reduces the carrying capacity of these artificial channels may be a violation of that ordinance.

In addition, these areas may be remapped by the Federal Emergency Management Agency (FEMA) to reflect the current carrying capacity and potential increased risk to existing development.

The areas or locations of flood insurance claims and disaster assistance should be considered when determining the extent of the conveyance system that deserves regular maintenance. In communities with repetitive losses (Category B and C communities as noted in Section 502), the drainage system MUST cover those areas having repetitive loss properties if the cause of the losses was local drainage problems or small, frequent storms. In general, all channels with a drainage area of 40 acres or more should be included in the conveyance system and on the map (see below).

Storage basins—For the purposes of this activity, storage basins include all constructed stormwater runoff detention or retention facilities located on public and private property. These include onsite detention or retention as well as infiltration facilities that are required for new development. The community must include all facilities constructed pursuant to stormwater management regulations credited as SMR under Activity 450 (Stormwater Management) and all publicly owned facilities. These do not include facilities constructed solely to manage water quality.

Maps and inventories—For this activity, a map of the community's conveyance system is required for CDR credit and a map of all storage basins within the community is required for SBM credit. Depending on the scale of the map, the map of the conveyance system and the map of the storage basins may be combined if the community is requesting both CDR and SBM credit.

The conveyance system map must show each item (stream segment, bridge, culvert, channel, etc.) that is listed in the community's inventory. An inventory of the entire natural conveyance system, including areas the community does not inspect or maintain, is needed to document the annual inspections. Similarly, an inventory of all storage basins, public and private, is needed for SBM credit.

541.b. Activity Credit Criteria

(1) Drainage system inspections—Credit for this activity is dependent upon annual inspection of the natural conveyance system and/or storage basins, and proper documentation of those inspections. The community (or other non-federal agency) must have a program to inspect its drainage facilities annually, upon receiving a complaint, and after each major storm. If all parts of the natural system cannot be inspected annually (for example, because there is no legal access to those parts of the streams that lie on private property or for budgetary reasons), then credit will be adjusted by the impact adjustment. Written records of inspections correlated to specific parts of the inventory are required for CRS credit.

(2) Inspection and maintenance—The inspection and maintenance of the streams and storage basins can be provided by the community, another non-federal agency, or private property owners. Many communities are in flood control or drainage districts that perform this work. Whether the inspections and maintenance are performed by the community; a county, regional or state agency; or a private property owner, the Community Rating System (CRS) community is responsible for providing all the documentation needed to verify credit. An inventory and map of the system as well as written procedures and inspection records are required for CRS credit.

(3) No credit is provided for projects that rely on unsecured outside funding, such as a special appropriation from the state legislature or approval of a U.S. Army Corps of Engineers clearing-and-snagging project. Secure outside funding, such as an annual state distribution of gasoline tax receipts, is acceptable.

(4) Environmental compliance—The community's program for drainage system maintenance must be compliant with applicable federal environmental and historic preservation laws and executive orders (see Section 507). The community and other local, regional, and state agencies responsible for portions of the drainage system must complete a CC-540EHP, Certification of Compliance with Environmental and Historic Preservation Requirements for Drainage System Maintenance. This form can be

found in Appendix F and at www.CRSresources.org/200. Credit is not provided if local drainage system maintenance procedures are not compliant with applicable federal laws and executive orders.

(5) There may be special restrictions or requirements to obtain a federal or state permit before certain maintenance work can proceed. Often, a "general" or "statewide" permit or other permission can be granted in advance for projects that are specifically described in the permit. Such laws and regulations usually do not preclude all maintenance work, but they may place restrictions on activities that disturb natural or protected areas. These restrictions must be included in the community's procedures.

Environmental Protection and Historic Preservation

The CRS is a FEMA program and therefore must ensure that activities credited by the CRS 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.

542 Elements

542.a. Channel debris removal (CDR)

The maximum credit for this element is 200 points.

Credit for this element is dependent upon annual inspection and regular maintenance of the natural channels within the community. There is no credit in this element for the inspection or maintenance of catch basins, canals, ditches, pipes, roadways, road drainage, or similar infrastructure. The community (or other non-federal agency) must have a program to inspect its natural channels annually, upon receiving a complaint, and after each major storm, and the community must record such inspections. The community (or other non-federal agency) must remove debris as needed after each inspection in accordance with a written maintenance plan. Neither the cost of the work nor the amount of debris removed affects the credit. While responding to complaints and performing inspections after storm events are required to obtain credit, a program that only responds to complaints or inspects after storms is not eligible for this credit.

To receive full credit for this activity, the community must document that it annually inspects, and maintains as required, all public and private channels in the developed portion of the community, not just natural channels in the floodplain. The impact adjustment determines the final credit, based on the percentage of the conveyance system that is covered by the inspection and maintenance program and proper documentation of the annual inspections. Note that CDR credit is provided for the natural channels that are inspected every year, and not for programs that inspect a portion of the system in one year and another portion in another year.

The maintenance work is normally done by a public works crew, frequently without heavy equipment. The objective of this activity is to remove accumulated debris, yard waste, trash, shopping carts, and the like that obstruct flows that can cause flooding to adjacent

properties. It is important that the community's procedures spell out what can and cannot be removed. In areas with natural streams, for example, a certain amount of woody debris may remain in the channel area without causing a flooding problem. Concrete-lined ditches, by contrast, may need to have all debris removed in order to maintain their carrying capacity.

Credit Criteria for CDR

(1) The activity credit criteria in Section 541.b must be met.

(2) The community (or other non-federal agency) must have a program to inspect and maintain its natural channels, and inspections must be conducted

(a) At least once each year for each portion of the system credited,

(b) Upon receiving a complaint, and

(c) After each major storm.

Inspections must be recorded and action must be taken after an inspection identifies a need for maintenance or cleaning.

(3) Procedures for annual inspection and maintenance for natural channels must be in the form of written procedures or guidelines. These are explained in Inspection and Maintenance Procedures for the Conveyance System, below.

(4) The community must provide a map of the conveyance system with each item in the inventory of the drainage system labeled.

(5) The community must provide a complete inventory of its natural conveyance system.

(6) All the inspection and maintenance activities must be recorded and the records must be maintained until the next verification visit. All inspection records must be correlated with the inventory and must designate which section of the system was inspected, when it was inspected, and what the results of the inspection were, even when no work is required.

Inspection and Maintenance Procedures for the Conveyance System

The community must provide written procedures, instructions, or other documents that explain the community's inspection and maintenance program. The document(s) need not exceed several pages. In some cases, the description will be in various documents, such as a field procedures manual, memorandum of agreement with another agency, contract for ongoing maintenance work, drainage system map, or forms used for records.

The following must be included in the document(s):

(1) Designation of the person, entity, or position responsible for the program. This may be an agency other than the community's public works department, such as a drainage district, the state highway department (responsible for highway bridges and culverts), or even a private property owner.

(2) An explanation of the procedures for inspection, including when regular inspections are conducted, how soon inspections are conducted after a complaint or a storm, and whether the procedures are different for manmade and natural channels.

(3) The debris removal procedures, i.e., how soon after an inspection an area must be cleared, and what can and cannot be removed. These procedures may be different for different streams. For example, they may call for the public works department to remove downed trees and underbrush from channels near homes, but to leave them in parks or natural areas. Simply stating that "problems are corrected" or "debris is removed" is not an adequate description of what actions are to be taken for the different types of materials that may be found.

(4) A description of the records that are kept to document both the inspections and the removal projects. These records must show which portions of the conveyance system were inspected and whether maintenance was required and performed (as needed). Records showing that "staff worked for eight hours each week last year inspecting channels," for example, are not adequate if there is no record of which channels were inspected or whether any problems were found.

Even if an entity other than the community performs the inspection and/or debris removal, it is the community's responsibility to document the activity for credit. In the case of a drainage district or county-wide maintenance program, the community may find it advantageous to work with other affected communities and with the larger agency to develop consistent documentation that can be used by all communities.

Map and Inventory of the Natural Conveyance System

The community must provide a detailed map of the developed areas of the community and the natural channels in those areas and an inventory of the system. The map and inventory should include a description of which portions of the natural drainage system are in the community's inspection and maintenance program, in another agency's program or privately inspected, and qualify for credit. The five-step process described below can be used to develop the map and the inventory for CDR credit. A sixth step is provided for problem site maintenance credit (PSM) and a similar process is followed for storage basin maintenance (SBM).

Step 1. Identify the developed area of the community. Select a map of the community and identify the developed areas. Undeveloped or sparsely developed areas (e.g., those with minimum lot sizes of five acres or more), or areas in which no buildings would be affected by a lack of maintenance (e.g., steep ravines), may be excluded. However, undeveloped or sparsely developed areas with insurable buildings or critical facilities that could be affected by a lack of maintenance must be included.

Step 2. Map the natural conveyance system. Within the developed area of the community identified in Step 1, delineate all the rivers, streams, and other natural channels on the map. Note:

(a) Both public and private areas must be included in the delineation, regardless of the community's authority to inspect those areas.

(b) The delineation must include all channels in developed Special Flood Hazard Areas (SFHAs) shown on the community's Flood Insurance Rate Map (FIRM).

(c) All natural channels shown as blue lines on a U.S. Geological Survey quadrangle and draining more than 40 contributing acres must be shown.

(d) Although credit is provided only for maintenance of the natural conveyance system, the entire system that drains 40 acres or more must be shown on the map.

(e) Large underground segments of the surface conveyance system need to be shown on the conveyance system map if they convey flow from a natural channel.

Step 3. Label the segments, portions, or components of the natural conveyance system. On the map, identify and label the segments of the natural conveyance system within the drainage maintenance area. There are no requirements for how the components, segments, or portions of the system are labeled except that they must correspond to the inventory prepared in Step 4 (below).

When labeling the components or portions of the conveyance system, the community should consider the owner (e.g., the community, the state, or private owner) or whoever inspects and maintains the segment of the system. Inventory labels may be as simple as numbers or numbers with prefixes to identify the stream or channel name. Communities may choose to label their inventory with an identifier for a channel segment ("CH001") or a bridge crossing ("BR001").

Step 4. Develop an inventory of the system. Develop an inventory or list of all components, portions, or segments of the natural conveyance system. Each listed channel segment or item in the inventory should correspond to the labels on the conveyance system map. The community may determine the format for the inventory that best fits its needs. However, the inventory should include a column to indicate whether the portion of the system is included in the community's inspection and maintenance program. A column for the most recent inspection date is recommended. Figure 540-1 shows a sample inventory table. In this example channels, bridges, and culverts are shown separately. A community may, instead, provide an inventory of only channel segments if that is how they are designated in the community's record keeping system.

All natural portions of the conveyance system within the community's developed area must be listed in the inventory. The inventory is used for determining the community's impact adjustment for this activity.

Step 5. Show the portions of the natural conveyance system that are included in the community's annual inspection and maintenance program. The natural conveyance components included in the community's annual inspection and maintenance program must be highlighted on the conveyance system map or marked in some other method, and they must be noted on the inventory (Figure 540-2).

Component	Type	Description	Owned By	Included in Inspection/ Maintenance Program	
CH0001	Channel	Between 1st Street and Central	City		
CU0001	Culvert	Jones Creek at Central	City		
CH0002	Channel	Between Central and Main	City		
BR0001	Bridge	Jones Creek at Main	County		
CH0003	Channel	Between Main and Grand Avenue	Private		
CU0002	Culvert	Jones Creek at Grand Avenue	City		

Figure 540-1. Step 4 of a sample inventory of a conveyance system.

The community may also note the portions of the system that are not part of their program for various reasons. For example, there may be no right of access on private property or there may be areas that the community does not cover for budgetary or other reasons.

Step 6. Show the problem site maintenance locations on the map and list locations in the inventory. If the community is requesting credit for problem site maintenance (PSM) (see Section 542.b), the list should identify the problem sites, as shown in Figure 540-2, and any problem sites not included in the inventory of the natural drainage system.

Identifier (nCDC)	Type	Description	Owned By	Included in Program (Credited) (nCDR)	Problem Site?
CH0001	Channel	Between 1st St. and Central	City	Yes	
CU0001	Culvert	Jones Creek at Central	City	Yes	Yes
CH0002	Channel	Between Central and Main	City	Yes	
BR001	Bridge	Jones Creek at Main	County	Yes	Yes
CH003	Channel	Between Main and Grand Avenue	Private	No	
CU001	Culvert	Jones Creek at Grand Avenue	City	Yes	

Figure 540-2. Step 5 of a sample inventory of a conveyance system.

Credit Points for CDR

CDR = 200 points, for channel debris removal within the community's natural drainage system in accordance with the credit criteria

The action taken must be in accord with the community's inspection and maintenance procedures, which must be consistent with federal and state environmental protection laws and regulations.

Impact Adjustment for CDR

$$rCDR = \frac{nCDR}{nCDC}, \text{ where}$$

nCDR = EITHER the number of items in the inventory that are inspected and maintained, OR the length of the system that is inspected annually (every year) and maintained, and

nCDC = EITHER the total number of items in the developed portion of the community's drainage system, OR the total length of the system

Items can be components or segments. If rCDR is less than 0.10, then 0.10 is used.

If the community, other agency, or private inspection program does not include all of the natural conveyance system in all developed areas of the community, then the impact adjustment measurements (nCDR) must exclude those areas (components, segments, or portions). The most common reason for not maintaining portions of the system in a developed area is that the streams or channels lie on private property.

Note that the CRS is not intended to encourage communities to look at flood protection in isolation from other equally important local concerns, such as habitat preservation. However, if a stream or channel is not maintained in compliance with the community's procedures for any reason, and damage to buildings could result, the lack of drainage system maintenance must be reflected in the impact adjustment.

Example 542.a-2.

A public works department for a community in Georgia inspects all of the publicly owned channels, bridges, and culverts within the city, but not the streams on private property. City crews remove critical accumulations of debris that are found during the annual inspection and when problems are reported by neighboring residents. The crews record the inspections and the removals on forms maintained in the public works department. This work is done every winter. From the

community's conveyance system map and inventory, the community has identified a total of 125 conveyance system segments within the city, and 80 of those segments are inspected and maintained by the community.

$$rCDR = \frac{nCDR}{nCDC} = \frac{80}{125} = 0.64$$

Documentation for CDR Provided by the Community

(1) At each verification visit,

(a) A dated copy of the written procedures, instructions, or other documents that explain the community's routine inspection and debris removal program.

(b) The map of the community's drainage maintenance area with the natural conveyance system delineated and labeled.

(c) A complete inventory of the community's conveyance system, corresponding to the map.

(d) Copies of the records that show when and where inspections were conducted and the results of those inspections. Copies of records that show that maintenance was performed in instances in which inspections revealed problems.

(e) Completed Certifications of Compliance with Environmental and Historic Preservation Requirements for Drainage System Maintenance (CC-540EHP) from the community and any other relevant local, regional, or state agencies, which can be found in Appendix F.

The ISO/CRS Specialist may visit a sample of sites in the field to verify that maintenance has been performed in accordance with the procedures.

(2) With the annual recertification,

(a) Examples of the records that show that inspections were conducted during the year and maintenance was performed when the inspections revealed problems.

542.b. Problem site maintenance (PSM)

The maximum credit for this element is 50 points.

PSM credit is provided if the community's drainage system maintenance program identifies locations within its conveyance system, natural or constructed, that are "choke points," chronic dumping sites, obstructions to flows, or sites with erosion or sedimentation problems, that are inspected and maintained differently or more frequently than other parts of the system. Such inspections are in addition to those credited under CDR. Communities with no natural drainage system can receive this credit if portions of their constructed conveyance system are chronic problem maintenance sites that need and receive attention more often than annually.

Credit Criteria for PSM

(1) The activity credit criteria in Section 541.b. must be met.

(2) The community must have written procedures or guidelines that identify each problem site, what the issues are, and what special inspection and/or maintenance is needed at each site. These are explained in "Maintenance Procedures for Problem Sites," below.

(3) The problem sites must be identified on the community conveyance system map developed for CDR credit, or a map of the constructed system if the community is not eligible for CDR credit.

(4) The community's problem site maintenance program must require that

(a) An inspection be conducted more than once each year,

(b) An inspection of each problem site be conducted after each major storm, and

(c) Action must be taken after an inspection identifies a need for maintenance or cleaning.

Maintenance Procedures for Problem Sites

The written procedures or guidelines for problem site maintenance may be a part of the community's CDR procedures or a separate document. It needs the following additional information:

(1) A list of each problem site, including

- What makes the site different from the rest of the drainage system,
- The procedure for increased inspection and maintenance, and
- Who is responsible for the inspection and maintenance of the site.

(2) The records that are kept to document both the inspections and the maintenance, if different from the CDR records.

Credit Points for PSM

PSM = 50, if the community's program for problem site maintenance is in accord with the credit criteria

Example 542.b-1.

Over the years the City of Pullman's crews have identified spots that are chronic drainage problems, such as the culvert under the railroad on the South Fork Palouse River and places on Missouri Flat Creek where ice jams usually form in late winter. The drainage maintenance procedures list these spots and require the crews to visit them first and

more frequently during rains or ice breakup. The culvert under the railroad is inspected weekly and cleaned out as soon as debris is found. PSM = 50

Impact Adjustment for PSM

There is no impact adjustment for PSM.

Documentation for PSM Provided by the Community

(1) At each verification visit,

(a) A copy of the procedures, instructions, or other documents that explain the community's problem site inspection and maintenance. These are likely to be part of the procedures submitted for CDR credit. The special problem site inspection and maintenance procedures need to be identified, e.g., marked in the margin as "PSM."

(b) A list of the problem sites and a map showing their locations.

(c) Copies of the records for specific sites as requested by the ISO/CRS Specialist, showing that inspections were conducted and that maintenance was performed when inspections revealed problems.

The ISO/CRS Specialist may visit a sample of sites in the field to verify that maintenance has been performed in accordance with the procedures.

(2) With the annual recertification,

(a) Examples of the records showing that the required inspections were conducted during the year and that maintenance was performed when inspections revealed problems.

542.c. Capital improvement program (CIP)

The maximum credit for this element is 70 points.

CIP credit recognizes the implementation of a capital improvement plan and a capital improvement program that make permanent, structural changes within the drainage system to reduce flood problems or maintenance problems. This credit is not for a program of continuous maintenance, such as cleaning or repairing inlets and culverts. Creditable examples would be ongoing programs to

- Enlarge culvert and bridge openings to eliminate bottlenecks,
- Install permanent hard or soft bank protection measures,
- Install grates to catch debris during high flows,

- Build new retention basins to reduce flows into existing channels,
- Convert problem channels into "low-maintenance" channels, or
- Improvements to the underground system.

The capital improvements program should address the "choke points and other obstructions to flows" that warrant the special attention that is credited in PSM.

Credit Criteria for CIP

(1) The activity credit criteria in Section 541.b. must be met.

(2) The community must also be receiving credit for PSM.

(3) Sites that are improved through the program must be in either the community's natural or constructed conveyance system.

(4) There must be a "master list" of sites that are planned for improvement projects. The list can be prepared from master watershed plans, complaints, or reports from maintenance crews. Projects do not have to be prioritized or listed in any order. For example, the community may determine which projects will be funded at the beginning of each fiscal year.

The master list could be of sites submitted in relation to PSM credit, provided that the community intends to "eliminate or correct the problem sites." In other words, the list must be related to the capital improvement program. It cannot just be a list of problems that are not slated for correction.

The recommended correction measures for the problem sites do not need to be the result of detailed plans or studies. They may be one-sentence statements on the most likely approach (e.g., "enlarge culvert," "bank stabilization," etc.).

If the program is administered by a county or multi-community district (i.e., an organization outside the community's jurisdiction), then the list must be prepared from master watershed plans and not based solely on complaints or other ad hoc methods.

(5) The community must spend money on a regular basis on such improvement projects (a one-time-only project would not be credited). This can be documented by a multi-year capital improvements budget or line items in several years' budgets that fund drainage improvement projects.

CIP and Credit for Activity 530

Once a capital improvement project is completed, it may qualify for CRS credit under Activity 530 (Flood Protection). Projects that protect repetitive loss properties and critical facilities receive higher credit under Activity 530.

All the needed documentation can usually be found in three documents: a watershed or stormwater management master plan identifying problems and likely projects, a written capital improvement plan for public works or a drainage plan that has a master list of proposed projects, and the community's annual budget that shows how funds are spent each year.

The analyses done for WMP credit under Activity 450 (Stormwater Management) may include a list of projects that may qualify for CIP credit.

Credit Points for CIP

CIP = CIP1 + CIP2

CIP1 = 30, if the community has an ongoing program, such as a capital improvement plan, that meets the credit criteria

CIP2 = 40, if the community has an acceptable engineering analysis of the drainage system that includes an evaluation of the 1% annual chance (100-year) flood at the problem site

For CIP2 (40 points), a watershed-based hydrologic and hydraulic analysis (sometimes called a stormwater master plan) must have been completed that identifies the problem and provides a solution. It must include an estimate of the 1% annual chance (100-year) flood at the problem site and the resulting flood elevations. The design of the "solution" may use a lower design standard, but the community needs to recognize the impact of the 1% flood.

Example 542.c-1.

King County, Washington, has a county-wide Flood Control Zone District that is funded by property taxes. It funds a variety of programs, including a six-year Capital Improvement Program, which is updated annually. The Capital Improvement Program was developed through an engineering analysis of each watershed within the community. Currently over 50 projects are completed each year. CIP = 70

Impact Adjustment for CIP

There is no impact adjustment for CIP1.

$$rCIP2 = \frac{aCIP2}{aC}$$, where

aCIP2 = the area of the community covered by the watershed-based analysis and

aC = the area of the community

Documentation for CIP Provided by the Community

(1) At each verification visit,

(a) Excerpts from the capital improvement plan or other documentation that shows that the community (or other drainage maintenance agency) has an ongoing program to reduce drainage maintenance or flooding problems. The submittal must include

(i) A master list of the community's drainage and flooding problem sites that need to be corrected or eliminated;

(ii) Recommended correction measures for the problem sites;

(iii) Documentation that funds are spent on capital improvement projects each year, and

(iv) [If full credit is requested] Documentation of the engineering analysis done for each watershed.

542.d. Stream dumping regulations (SDR)

The maximum credit for this element is 30 points.

SDR credit is provided for adopting and enforcing regulations that prohibit the dumping or disposal of debris throughout the community's drainage system. Many local urban flood problems are caused when shopping carts, yard waste, trash, or other debris is dumped into channels. This debris can clog culverts, divert flows, and reduce the conveyance capacity of channels. Regulations that prohibit the disposal of all debris within a channel help reduce this problem.

Credit is not provided for an ordinance that prohibits littering or similar general nuisances, for ordinance language directed solely at water quality problems, or for language limited to activities in the floodplain. The regulations must specifically address the problem of keeping channels clear of materials such as brush, fill, and items normally not covered in littering ordinances.

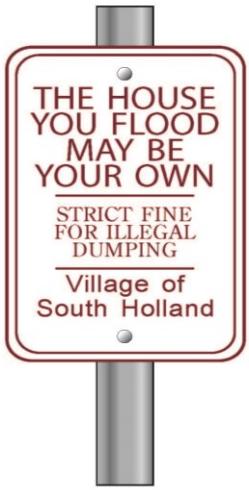

Figure 540-3. An example of a "no dumping" sign.

Credit Criteria for SDR

(1) The activity credit criteria in Section 541.b. must be met.

(2) The community must also be receiving credit for CDR.

(3) The regulations that prohibit disposal of debris in the community's drainage system must be enforced throughout the entire community. The regulation must designate an office or official responsible for receiving complaints and monitoring compliance and it also must include enforcement and abatement provisions.

(4) Additional credit is provided if the community publicizes the regulatory requirements that prohibit stream dumping. This may be done through the following outreach projects:

(a) A notice sent to all property owners in the community (which may or may not be credited under OP in Activity 330 (Outreach Projects)); or

(b) Posting "no dumping in the stream" signs at key locations in the drainage system, such as frequent problem spots, schools, or public parks. An example of a sign that has been used by several CRS communities is shown in Figure 540-3; or

(c) An outreach project identified in the community's Program for Public Information (PPI) credited under Activity 330 (Outreach Projects), provided that the PPI specifies the message and recommends the best way to disseminate it.

Credit Points for SDR

SDR = EITHER:

SDR = 15, if regulations prohibit dumping in the community's drainage system,

OR

SDR = 25, if regulations prohibit dumping in the community's drainage system and the community publicizes the regulatory requirements (see credit criterion (4)(a) or (b)),

OR

SDR = 30, if regulations prohibit dumping in the community's drainage system and the publicity is covered in the community's PPI (see credit criterion (4)(c))

Example 542.d-1.

A community's code of ordinances deals with nuisances and misdemeanors. The article states that the police department is responsible for enforcement of listed violations. It also prescribes penalties.

The code states:

> It shall be unlawful to dump, deposit, or otherwise cause any trash, landscape debris, or other material to be placed in any stream, channel, ditch, pond, or basin that regularly or periodically carries or stores water.

The community's documentation includes all appropriate sections of the municipal code with "SDR" marked in the margins. One of the City's outreach projects in Activity 330 discusses the need for drainage system maintenance and what to do if dumping is seen. SDR = 25

Impact Adjustment for SDR

There is no impact adjustment for this element. The regulation must be enforced throughout the entire community.

Documentation for SDR Provided by the Community

(1) At each verification visit,

(a) A copy of the stream dumping regulation prohibiting the disposal of debris in the affected drainage system. The acronym SDR must be marked in the margin of the ordinance sections that pertain to this element, including the responsible office or official.

(b) [If the community is requesting the extra credit for publicizing the regulation] A copy of how the community publicized the regulations during the year. If the publicity was in a document credited under Activity 330 (Outreach Projects), a separate submittal is not needed, provided that the other document (including a PPI, if credited) is annotated to show where SDR is publicized.

(2) At each recertification,

(a) [If the community is requesting the extra credit for publicizing the regulations] A copy of how the community publicized the regulations during the year.

542.e. Storage basin maintenance (SBM)

The maximum credit for this element is 120 points.

SBM credit is dependent upon annual inspections and regular maintenance of retention, detention, infiltration, and other types of storage basins. The community (or other non-federal agency) must have a program to regularly inspect, at least annually, public and private storage basins and remove debris as needed. Neither the cost of the work nor the amount of debris removed affects the credit. A program that responds to complaints and conducts inspections after storms is required, but such a program alone is not enough to obtain this credit.

After each inspection, appropriate maintenance must be completed where it has been determined that it is needed.

The maintenance work is normally done by a public works crew, usually without specialized equipment, but backhoes and trucks are frequently required. The objective of this activity is to remove accumulated sediment or debris that prevents the storage or infiltration of excess stormwater. It is important that the community's procedures spell out

what can and cannot be removed. In some areas detention facilities also provide water quality treatment. In those situations, special care must be taken when removing sediment and debris to ensure that the facility still provides all its design functions.

Inspection and maintenance may also be performed by the owner of the basin if it is not owned by the community. The community's ordinance (credited under PUB in Activity 450) must require inspections by a registered design professional at least annually, with the reports submitted to the community if the owner is responsible for inspection and maintenance.

Credit Criteria for SBM

(1) The activity credit criteria in Section 541.b. must be met.

(2) The community must be receiving credit for PUB within element SMR under Activity 450.

(3) The community must have a program to inspect and maintain its storage basins and any storage basins constructed to comply with the standards credited in SMR (Activity 450), and inspections must be conducted

(a) At least once each year,

(b) Upon receiving a complaint, and

(c) After each storm that could adversely affect the drainage system.

Action must be taken when an inspection reveals a need for maintenance or cleaning. Procedures for inspection and maintenance must be in the form of written procedures or guidelines. These are explained in "SBM Procedures," below

(4) Procedures for annual inspection and maintenance of storage basins must be in the form of written procedures or guidelines. These are explained in SBM Procedures, below.

(5) The location of all public and private storage basins must be mapped.

(6) The community must have a complete inventory of storage basins within its jurisdiction.

(7) All the maintenance and inspection activities must be recorded and the records must be maintained until the next verification visit.

Component (nSBC)	Type	Description	Owned by	Credited (nSBM)
Det0001	Detention	Central Creek Basin	City	Yes
Det00012	Detention	North Fork Clover	City	Yes
IN0001	Infiltration	Sunrise HOA	City	Yes
IN0002	Infiltration	Jones Creek at Main	County	Yes
Det0003	Detention	Northstar Safeway	Private	No
Det0004	Detention	Stonewater HOA	Private	Yes
		Total:	6	5

Figure 540-4. A sample of an inventory included as part of a community's storage basin maintenance procedures.

SBM Procedures

The written SBM procedures or guidelines, which may be included in the same document as the community's CDR procedures, must include the following information:

(1) Designation of the person, entity, or position responsible for the program.

(2) An explanation of the procedures for inspection, including when regular inspections are conducted and how soon inspections are conducted after a complaint or a storm. The explanation should include procedures that are different based on

(a) The type of each facility (detention, infiltration, retention, below-ground),

(b) Whether it is publicly or privately owned, and

(c) Whether it is subject to the maintenance program;

(3) The maintenance procedures, i.e., how soon after an inspection an area must be cleared, what can and cannot be removed, and who is responsible (based on public or private ownership); and

(4) A description of the records that are kept to document both the inspections and the maintenance activities.

Credit Points for SBM

SBM = 120 points for maintenance of storage basins within the community in accordance with the credit criteria

Impact Adjustment for SBM

The impact adjustment for SBM is based on all storage basins in the community, rather than only those that are in developments approved since the community started receiving CRS credit. The community's SBM procedures must include a list of all public and private storage or retention basins and note those that are covered by the procedures (nSBM).

$$rSBM = \frac{nSBM}{nSBC}, \text{ where}$$

nSBM = number of storage basins, public and private, inspected annually and maintained as needed, and

nSBC = total number of storage basins, public and private, within the community

If rSBM is less than 0.10, then 0.10 is used.

Example 542.d-1.

A city's public works department inspects all of the city's public storage basins and requires the owners of private storage basins to submit an annual inspection report to the city. City crews remove critical accumulations of debris that are found during the annual inspection and when problems are reported by neighboring residents. In addition, the city frequently performs maintenance on private facilities and then bills the owner for the work when the owners do not perform the required annual inspection or maintenance.

The program inspects and maintains 10 publicly owned basins and 54 of the 102 private basins. The 54 basins were constructed after passage of an ordinance that requires public maintenance.

nSBM = 10 + 54 = 64

nSBC = 10 + 102 = 112

$$rSBM = \frac{nSBM}{nSBC} = \frac{64}{112} = 0.57$$

Documentation for SBM Provided by the Community

(1) At each verification visit,

(a) A copy of the procedures, instructions, or other documents that explain the community's storage basin inspection and maintenance program.

(b) The map showing the location of all storage basins in the community.

(c) The inventory of the storage basins located in the community.

(d) Copies of the records that show that annual inspections were conducted and maintenance was performed when the inspections revealed problems.

(e) A completed Certification of Compliance with Environmental and Historic Preservation Requirements for Drainage System Maintenance (CC-540EHP), which can be found in Appendix F.

The ISO/CRS Specialist may visit a sample of sites in the field to verify that maintenance has been performed in accordance with the procedures.

(2) With the annual recertification,

(a) Examples of the records showing that inspections were conducted during the year and maintenance was performed when the inspections revealed problems.

543 Credit Calculation

c540 = cCDR + PSM + cCIP + SDR + cSBM, where

cCDR = CDR x rCDR, and

cCIP = CIP1 + CIP2 x rCIP2, and

cSBM = SBM x rSBM

544 For More Information

a. Additional information, reference materials, checklists, and examples can be found at www.CRSresources.org/500.

b. *Stream Obstruction Removal Guidelines*, C. McConnell et al., eds., American Fisheries Society, 1983. Copies are available for $8 plus shipping from the American Fisheries Society, 5410 Grosvenor Lane, Bethesda, MD 20814 or from the online bookstore at http://afsbooks.org/x55010xm.

545 Related Activities under the Community Rating System

- The publicity needed for stream dumping regulations credit (SDR) can be an outreach project credited under Activity 330 (Outreach Projects). More credit can be received if the outreach project was part of a Program for Public Information, which is also credited under Activity 330.
- Element OSP (open space preservation) under Activity 420 (Open Space Preservation) reduces the need for channel maintenance.
- Activity 420's natural shoreline protection element (NSP) encourages communities to let their shorelines and stream banks go natural, reducing the need for maintenance in these areas. However, if the natural shorelines are in developed areas, they would still need to be inspected for debris to receive full credit for CDR. The impact adjustment map for NSP should be the same as the conveyance system map needed for CDR.
- Stormwater management regulations (SMR) in Activity 450 (Stormwater Management) establish the criteria and design standards for storage basins within a community.
- Public maintenance of required facilities (PUB) in Activity 450 (Stormwater Management) provides the authority for public inspection and maintenance of private drainage facilities.
- Once a capital improvements project (CIP) is completed, it may qualify for CRS credit under Activity 530 (Flood Protection). Projects that protect repetitive loss properties and critical facilities receive higher credit under Activity 530.