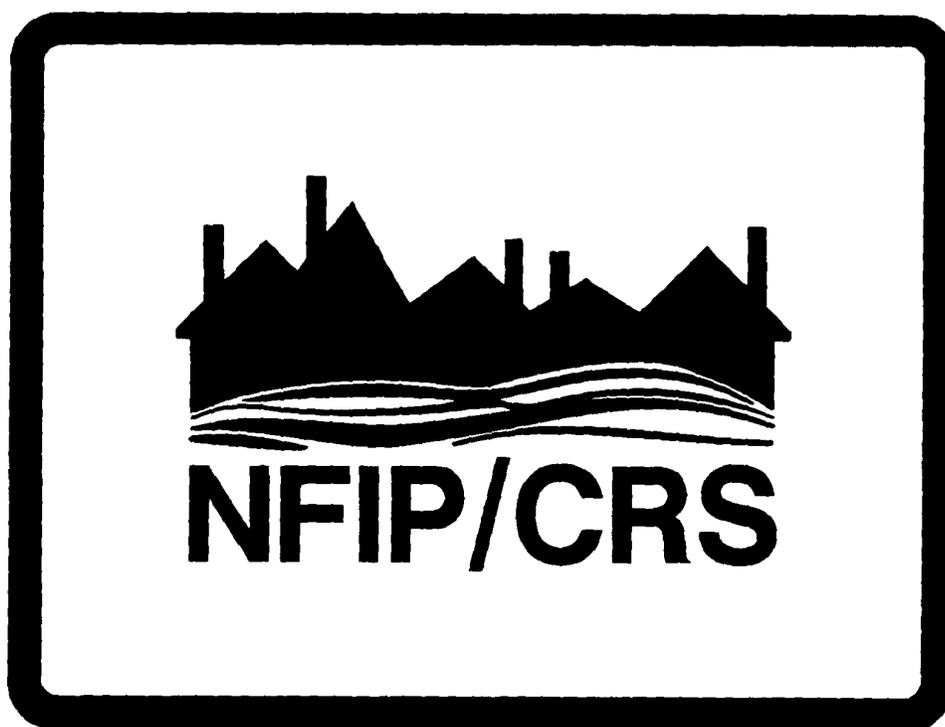


**National Flood Insurance Program  
Community Rating System**



**CRS CREDIT FOR  
STORMWATER MANAGEMENT**

January 1999

**Note on this January 1999 Edition:** This document was revised to reflect the following major changes in the 1999 *CRS Coordinator's Manual*:

- The credit points for DS, SZ, and PUB were changed, although the maximum total for SMR stayed the same.
- The credit for SMP was substantially increased, and the credit criteria were changed. The credit for SRSM was eliminated.
- Credit for FRX was increased.

This publication incorporates the 1999 changes with necessary revisions throughout.

This document was prepared for the Community Rating Task Force by the Insurance Services Office, Inc., with support from Leslie A. Bond Associates and the Association of State Floodplain Managers, Inc.

If a community is interested in applying for flood insurance premium credits through the Community Rating System (CRS), it should have the *CRS Application*. The *CRS Coordinator's Manual* provides a more detailed explanation of the credit criteria. These and other publications on the CRS are available at no cost from:

Flood Publications  
NFIP/CRS  
P.O. Box 501016  
Indianapolis, IN 46250-1016  
(317) 848-2898  
Fax: (317) 848-3578

They can also be viewed and downloaded from FEMA's Website, [www.fema.gov/nfip](http://www.fema.gov/nfip)

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## CREDIT CRITERIA

One of the biggest problems of floodplain management in urbanizing areas is the increase in peak flow caused by development within the watershed. As forests, fields, and farms are covered by impermeable surfaces like streets, rooftops, and parking lots, more rain runs off at a faster rate. When an area is urbanized, the rate of runoff can increase five-fold or more.

This problem is compounded by changes in the surface drainage system. Stormwater runoff travels faster on streets and in storm drains than it did under pre-development conditions. As a result, flooding is more frequent and more severe. Efforts to reduce the impact of increased runoff that results from new development in a watershed are known as stormwater management. Stormwater management also has water quality aspects, and includes efforts to reduce erosion and the entry of sediment and pollutants into receiving streams.

The National Flood Insurance Program (NFIP) encourages these efforts and recognizes them in the Community Rating System (CRS) under Activity 450 (Stormwater Management). This publication is provided to clarify the criteria for CRS credit under Activity 450 and to show how local programs are scored. It is assumed that the reader is familiar with the *CRS Coordinator's Manual*. The section numbering in this document corresponds to the numbering system used in the Manual. Copies of the manual can be ordered through the office listed inside the front cover.

### 450 Stormwater Management

Activity 450 has five elements that provide credit for five approaches to managing surface water outside of the floodplain:

1. The most common approach to reduce the impact of stormwater from new development is to require each developer to construct facilities to restrict the rate at which the increased runoff leaves the property. A volume of stormwater runoff is required to be stored on the developer's site. It is released at a restricted rate after the runoff subsides (stormwater DETention). A developer may store stormwater runoff for irrigation or groundwater recharge or to reduce pollution (stormwater RETention). This approach is recognized as element SMR, which stands for stormwater management regulations.
2. As an alternative to using a uniform standard for all areas, many communities regulate development according to a master plan that analyzes the combined effects of existing and expected development on stormwater and flood flows in the watershed. Such watershed-specific regulations may allow different amounts of runoff for different areas in order to control the timing of increased flows into the receiving streams. A watershed master plan may also be used to preserve wetlands, riparian areas, or other important habitats. Sometimes instead of requiring developers to build stormwater facilities on site, a plan may require them to contribute funds for a regional facility.

Regulating new development through such a master regulatory plan is recognized as element SMP, which stands for stormwater management plan. By planning the runoff from entire watersheds, this approach can be more effective in reducing increases in downstream

flooding. Watershed master planning usually uses more sophisticated modeling techniques and may consider alternative storm intensities and durations.

3. A third approach is to regulate new construction throughout the watershed so that new buildings will be less likely to be affected by local drainage problems. Much of the nation's flood damage (including one-third of all flood insurance losses) occurs in B, C, and X Zones. There are two regulatory approaches to preventing local drainage problems in new construction.

The first approach is to require the lowest floors or basement openings to be elevated above street level. This allows the street system to carry excess surface flows to the streams without damaging buildings. The other approach is to require that developers show that they have accounted for local drainage in their site plans. This element is recognized by Activity 450 as FRX, for freeboard in X Zones (i.e., those zones not in the floodplain).

4. The fourth element credited under Activity 450 is regulation of construction (and other projects that disturb vegetation and soil) to minimize sediment runoff. When an area is stripped of its ground cover, much soil can be eroded during a storm. The stormwater runoff carries the sediment to downstream channels where it is dropped. The result of this process is that the channels become filled with sediment and lose their capacity to carry larger flows.

The acronym ESC is used to recognize erosion and sediment control regulations. These regulations usually govern only construction projects but sometimes they include all modifications to the land, including farming.

5. Regulating new development for water quality purposes is the fifth stormwater management element the CRS credits. Water quality or WQ credit is based on one or more requirements for new developments to include "best management practices" that clean, filter, or otherwise improve stormwater runoff in the design of stormwater management facilities. Unlike ESC, which credits measures taken DURING construction, WQ credit is for measures that are PERMANENTLY INCORPORATED into a development's drainage facilities.

## 451 Credit Points

### a. Stemwater Management Regulations (SMR)

To qualify for credit for stormwater management regulations (SMR), the community must show that it has regulatory language that requires that peak runoff from new development be no greater than the runoff from the site in its pre-development condition. These regulations are usually part of a subdivision ordinance, public works design standard regulation, or other regulation that sets drainage design standards for new developments.

The credit for stormwater management regulations (SMR) is the sum of the points for three variables, SZ (size of development regulated), DS (design storm), and PUB (public maintenance). There must be credit for SZ and DS. For ease of credit calculation, this is expressed in the formula:

$$\text{SMR} = \text{SZ} + \text{DS} + \text{SMR} \quad \text{If SZ} = 0, \text{ then SMR} = 0$$

**1. Size of Development (SZ).** SZ has a range from 25 (all projects are regulated) to 5 (only projects 5 acres or larger are regulated). There is no credit if the regulations only affect developments larger than 5 acres or those with more than 20,000 square feet of impervious surface. The CRS does not credit regulations that apply only to these large developments because the cumulative effect of a number of small, unregulated development projects could have a significant impact on runoff in the watershed.

The points are as follows:

- a. 25, if all development projects are regulated;
- b. 20, if only single-family residences, development of parcels of 1/2 acre or less, or increases in impervious area of 5,000 square feet or less are exempt from regulation;
- c. 15, if development of parcels of 1/2 acre or less or increases in impervious area of 10,000 square feet or less are exempt from regulation;
- d. 5, if development of parcels of 5 acres or less or increases in impervious area of 20,000 square feet or less are exempt from regulation; or
- e. 0, if development of parcels larger than 5 acres or increases in impervious area of more than 20,000 square feet are exempt from regulation. If such development projects are exempt, there is no credit for SMR.

The community should adjust SZ to reflect different thresholds for different types of development. For example, if it regulates commercial developments larger than 2 acres and residential developments larger than 5 acres, SZ is pro-rated according to the percentage of current land use in each category. A similar adjustment must be made if the regulations exempt government agencies.

Contribution of funds to a stormwater management program is considered as subjecting the development to stormwater management regulation, provided that the funds are dedicated to the construction of stormwater facilities. SZ is based on the size of the smallest development that must either provide on-site facilities or contribute funds. An example of this approach is provided for White County on page WCP-1.

**2. Design Storms (DS).** DS credit is provided based on the design sizing of the runoff control facilities. For DS credit, the community's regulations must require pre- and post-development hydrology calculations and post-development runoff must be limited to pre-development levels. The standard used may be peak flow, volume, or a combination of the two.

DS is the total of the following points based on the design storms used in the regulations:

- a. 60, if detention/retention is designed for the 100-year storm;
- b. 20, if detention/retention is designed for a storm larger than the 10-year but smaller than the 100-year storm; and
- c. 10, if detention/retention is designed for the 2-year to 10-year storm.

Although the 100-year flood is the basis for floodplain management, communities are encouraged to look at the effects of stormwater management on smaller, more frequent storms. A design that maintains or reduces the peak flow from only the 100-year storm may increase peaks from smaller storms, increasing flood damage.

If the regulations are based on inches of rainfall, the value must be converted to a storm recurrence interval. The National Weather Service's Technical Paper 40 is one source that can help do this.

Stormwater regulations that focus on water quality are generally not adequate for SMR credit because they have little or no impact on flood flows. For example, some communities require detention of the first 1 inch of rainfall to reduce non-point sources of water pollution. In some areas this is less than a 1-year storm, so there is no credit provided under SMR, but it could qualify as a water quality measure (WQ) for credit under Section 451.e.

The following examples should help explain the formula for DS:

<u>Design storms used</u>	<u>DS</u>
2, 5, and 10	10
25	20
10 and 25	30
100	60
25 and 100	80
5, 25, and 100	90

Full credit (90 points) can be obtained in the following situations:

- If developers account for the runoff from three storms: the 100-year storm, another storm larger than the 10-year, and a 10-year storm;
- If the design storms include all storms up to and including the 100-year;
- If 100-year retention is required. For CRS purposes, retention (as opposed to detention) means that a basin has no outlet and stored runoff must be infiltrated into the soil, pumped out for irrigation, or otherwise disposed of on site; or
- If 100-year detention is required with a release rate based on the pre-development 10-year runoff.

**3. Public Maintenance (PUB).** Frequently, stormwater management regulations leave it up to the developer, the owner, or a homeowners' association to assume responsibility for maintenance of the required facilities (see example, page SI-1). Because experience has shown that private maintenance of stormwater management facilities is not as reliable as public maintenance in the long run, CRS credit is provided to encourage these facilities to be maintained by a public agency. This credit is also provided if the community inspects all private

stormwater facilities at least annually and has the authority to require the owners to perform appropriate maintenance.

PUB = 110, for public maintenance of all stormwater facilities, or if the community inspects all private stormwater facilities at least annually and has the authority to require the owners to perform appropriate maintenance.

A community can receive PUB credit through any one or a combination of three ways:

1. The community inspects all new stormwater management facilities at least annually and orders maintenance when needed. If the owner fails to perform the maintenance, the community does the job and bills the owner;
2. The owners of all new stormwater management facilities perform the maintenance and their engineers certify at least annually to the community that it has been done; or
3. All new stormwater management facilities (including basins built by private developers) are required to be deeded to the community, and the community inspects the facilities at least annually and provides maintenance as needed.

**b. Stormwater Management Master Plan (SMP)**

The benefits of a stormwater master plan are described in Section 450.2 on page 1. There are four prerequisites for CRS credit for a stormwater master plan:

- The community must have adopted a stormwater master plan for one or more of the watersheds that drain into the community;
- The community must have adopted regulatory standards for new construction in the watershed based on the plan;
- The plan's regulatory standards must manage future peak flows so that they do not increase over present values; and
- The plan's regulatory standards must require management of runoff from all storms up to and including the 25-year storm.

SMP = 80, for a stormwater master plan that meets these prerequisites.

An example executive summary of such a plan is provided on page WCP-8 of this document.

In many cases, detailed stormwater plans are developed on one drainage basin at a time. A community may have general stormwater management regulations (SMR) over all of its areas but is phasing in its plans as they are completed. This is credited through the impact adjustment as explained in Section 452.

Many documents called stormwater master plans have been developed to guide the construction of storm drain systems. These documents are usually comprehensive reviews of a watershed's or basin's hydrology. However, they are not eligible for SMP credit if they are only used to design drainage facilities and they do not include regulations or set regulatory standards to prevent new developments from aggravating stormwater problems.

After a stormwater master plan meets the four prerequisites, additional SMP credit is awarded for seven aspects of planning:

- a. 40, if the plan provides management of future peak flows and volumes so that they do not increase over present values. If the community can demonstrate that its stormwater management plan prevents increases in peak flows and volumes, it will receive this credit.

A community may receive this credit if it meets the four prerequisites and all of its stormwater discharges into the ocean or a Great Lake. This credit is not provided if the community's stormwater discharges into a river, no matter how large, unless the community can demonstrate that there will be NO increase in the peak discharge of that river.

The more common approaches are when a community disposes of its increased volume of stormwater to an aquifer through groundwater recharge, or if the increased runoff can be stored until the receiving stream can receive it without increasing its peak flow (see the White County example in this document)

- b. 25, if the plan manages the runoff from all storms up to and including the 100-year storm.

Review of hundreds of plans from CRS communities shows that communities generally adopt stormwater master plans with one of three storm criteria: plans that deal with 2- to 5-year storms (which are not eligible for SMP credit); storms up to and including the 25-year storm (which is a prerequisite for the basic 80 points for SMP credit); and all storms up to and including the 100-year storm.

Stormwater managers who are concerned with increased flood damage resulting from future development have concluded that regulation of storms smaller than the 25-year storm do not significantly reduce that damage. At the same time, it is obvious that regulating the runoff from all storms up to and including the 100-year storm will have a greater effect on flood damage reduction.

- c. 25, if the plan manages the runoff from all storms up to and including the 5-day event. If the community can demonstrate that an event shorter than the 5-day event is the locally appropriate "worst-case" runoff event for stormwater management, it may receive this credit if it uses that event for its regulatory standard.

There are usually at least three "worst-case" runoff events for a particular recurrence interval storm: one that causes the highest peak discharge from the development; one that

causes the highest peak discharge from the watershed; and one for the stream into which the watershed discharges. Most communities plan for the first two, which may range from a few minutes to a few days. Fewer plan for the third, which may range from a few days to several weeks. This additional credit is intended to provide credit to those communities that look at the larger picture.

In many locations, a state or federal agency or a regional stormwater management or flood control agency has determined the storm duration that causes “worst-case” flooding, including flooding on larger rivers. If that agency states that a certain storm duration is appropriate for the large rivers within its jurisdiction, the community may receive credit for using that storm duration. Using continuous simulation modeling would also be credited.

- d. 15, if the plan identifies existing wetlands or other natural open space areas to be preserved from development to provide natural attenuation, retention, or detention of runoff.

Preservation of these areas reduces runoff and flood damage and provides other floodplain management benefits as well.

- e. 10, if the plan prohibits development, alteration, or modification of existing natural channels.

If the watershed master plan includes undeveloped areas, preservation of the natural channels may reduce maintenance costs and provide many amenities to the community.

- f. 10, if the plan requires that channel improvement projects use natural or “soft” approaches rather than gabions, riprap, concrete, or other “hard” techniques.

Even where communities are preserving existing natural watercourses, they may not have the needed capacity for a large storm. In these cases, the community may choose to use vegetation for erosion control or earthen berms to increase the capacity of the stream. Excavated channels may be landscaped as natural streams, golf courses, or parks.

- g. 20, if the plan was prepared in coordination with or as a part of the community’s floodplain management plan credited under Activity 510.

In many cases, a community’s floodplain management plan points out the need for watershed management, and therefore recommends the development and implementation of watershed master plans for some or all of its watersheds. In other cases, a watershed master plan can only solve part of the community’s flood problems, and its results are incorporated into a floodplain management plan. Either of these cases is eligible for this credit.

### **c. Freeboard for New Buildings in B, C, D, and X Zones (FRX)**

Requiring that the lowest floors of new buildings be elevated above street levels is discussed in Section 450.3 on page 2. FRX credit should not be confused with CRS credit for requiring new buildings in the floodplain (V and A Zones) to be above flood levels. That is credited by the CRS under Activity 430 (Higher Regulatory Standards). Similarly, FRX credit is not provided to communities that lie entirely within the floodplain.

Example ordinance language appears on page WCP-35. The FRX regulatory language is usually found in the community's building code, rather than in the ordinance with the floodplain or stormwater management regulations. In fact, communities that have adopted the Uniform Building Code MAY have already adopted this language. It is in Section 2907.5, Chapter 29. The applicant should check this language closely to be sure that it applies to all buildings, not just commercial ones. Many communities use the *CABO One and Two Family Dwelling Code* and may not require this freeboard.

The score for FRX is based on whether the lowest floor or the lowest opening has to be elevated. FRX is determined by the type and amount of freeboard required in B, C, or X Zones:

1. 50 x the height (in feet) that the lowest floor (including basement) must be above the crown of the nearest street or the highest grade adjacent to the building;
2. 25 x the height (in feet) that the lowest opening or point of entry must be above the crown of the nearest street or the highest grade adjacent to the building;
3. 50, if the regulations require that, as a condition for a building permit, the applicant must prepare a site plan that accounts for local drainage from and onto adjoining properties;  
or
4. 20, if the regulations require that the applicant provide positive drainage away from the building site.

Any of these approaches may be used to calculate FRX. There is no credit for more than 3 feet of freeboard, so the maximum value for FRX is 150 (50 x 3). The street curb or other datum may be used as an alternative to the crown of the nearest street. However, if the gutter is used (as may be the case with the Uniform Building Code), the height is reduced by 0.5 feet. A community may request credit for this regulatory provision even if it does not apply for credit for the other elements of this activity.

### **d. Erosion and Sedimentation Control Regulations (ESC)**

Regulations that require developers and builders to protect the downstream channels from sedimentation are credited under this element. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. Communities with such regulations usually have published guidelines or have adopted regional or state guidelines that are used as the basis for such plans.

ESC is based upon the areas regulated. ESC = one of the following:

1. 45, if regulations control erosion and soil loss from any disturbed land, including agricultural uses and removal of ground cover. Projects smaller than 1,000 square feet may be exempted.
2. 35, if regulations control erosion and soil loss from all construction sites. This includes road construction, earth moving, and other development projects, not just construction of buildings. Single-family homes, sites smaller than 1/2 acre, and projects that disturb areas smaller than 5,000 square feet may be exempted.
3. 30, if regulations control erosion and soil loss from construction sites. Projects that disturb areas smaller than 1 acre may be exempted.
4. 15, if regulations control erosion and soil loss from construction sites greater than 5 acres.

It is important to note that the regulations must be enforced throughout the community, not just in the floodplain. Sedimentation comes from all development projects, so all areas must be subject to the requirement. A community may request credit for this regulatory provision even if it does not apply for credit for the other elements of this activity.

“Construction sites” in subsections d.2, 3, and 4 means all sites subject to construction of buildings, roads, etc., regrading, or other non-agricultural land-disturbing activity. An erosion and sedimentation control regulation that is part of a floodplain ordinance or a building code and does not affect ALL construction sites in the community does not receive full credit under this element.

#### **e. Water Quality Regulations (WQ)**

This element provides 25 points if new development projects in the community are required to implement best management practices (BMPs). BMPs are measures that can be incorporated into new developments to reduce water pollution from stormwater runoff. This credit is not for BMPs required during the course of construction, but for measures that are permanently incorporated in developments’ stormwater management facilities.

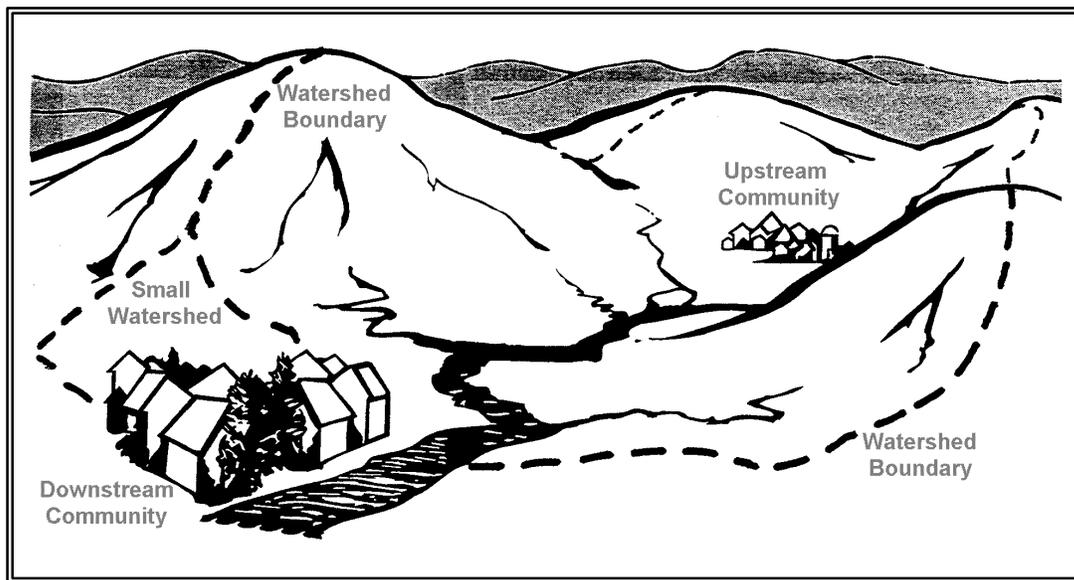
Examples of BMPs include grass filter strips at retention basin inlets or outlets, velocity dissipators and baffles, basin dimensions that encourage settling of suspended solids, aeration, infiltration trenches, skimmers, vegetated swales, and other techniques. Many state environmental protection or pollution control offices have recommended BMPs appropriate for that state. The U.S. Environmental Protection Agency’s publication *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, discusses many BMPs for coastal areas that are appropriate throughout the country (see For More Information, page 19).

For WQ credit, the stormwater management regulations must either specify one or more measures or refer to best management practices as published in an official government reference.

A mention of water quality or reduction of nonpoint sources of pollution in the purpose section of the regulations is not sufficient for credit. The regulations do not have to include small projects under 5 acres.

## 452 Impact Adjustment

The CRS measures the impact of an activity on the community. It does not matter if the stormwater management program is administered by the community or by a regional district. What counts is whether the buildings in the community are being protected from increased runoff that results from development in the watershed.



**Figure 1. Watershed Boundaries**

A watershed, also called a drainage basin or catchment area, is the geographic area where the water for a river or lake originates. All lands in a watershed drain downhill toward a stream, lake, bay, or other body of water. The boundary of a watershed is also called a divide. Stormwater runoff on one side of the divide drains to one body of water and runoff on the other side drains elsewhere.

Most communities are in several watersheds. These may include a large watershed that drains to a large stream and a number of small watersheds that drain into creeks or ditches that enter the community from other locations.

A community that can regulate all development in all of the watersheds that drain into it should receive full credit for this activity. However, this is not the case for most communities, because corporate boundaries rarely follow watershed boundaries. Most communities do not have jurisdiction over new developments outside their corporate limits or outside an extraterritorial limit. Because these communities cannot regulate all of the watersheds that drain into them, their CRS credit points are adjusted to reflect the limits of their stormwater management programs.

To do this, Activity 450 has impact adjustments for SMR and SMP that factor in the area of the watersheds affected. Impact adjustments for Activity 450 is different than for other CRS activities because the effectiveness of stormwater management depends on how much of the watershed is affected by the community's program. The impact of other activities is based on how much of the floodplain is affected. While floodplains are mapped on readily available Flood Insurance Rate Maps, most communities will have to delineate their own watersheds.

There is no impact adjustment for FRX, ESC, or WQ because they must be enforced throughout the community. Full credit for FRX is provided if the regulation applies only to areas outside the regulatory floodplain.

The impact adjustments for SMR and SMP are ratios that are multiplied by the elements' credit points. The ratio for SMR is rSMR and the ratio for SMP is rSMP. There are three ways that an applicant can obtain the values for rSMP and rSMR: Options 1, 2, and 3.

### **a. Option 1**

Option 1 is used by communities with stormwater management regulations that cover all of their watersheds.

1. Stormwater Management Regulation (SMR): If the community, separately or along with upstream communities, regulates development within all of the watersheds that affect it,  $rSMR = 1.0$ .
2. Stormwater Management Master Plan (SMP): If the stormwater management master plan regulates all development within all of the watersheds that affect the community,  $rSMP = 1.0$ .

There are two cases in which Option 1 can be used. The first is where the community actually has jurisdiction over all of its watersheds. An island community, such as Sand Island (see the example beginning on page SI-1 of this document), is one example of this. This can also happen if the community has its corporate boundaries formed entirely by watershed divides (ridges) or bodies of water. Such a community can regulate all development that will affect the water that drains into it.

The second case is that in which a regional agency either enforces stormwater management regulations or sets minimum standards for local regulations. These are county-wide or multi-county organizations, like urban drainage districts or water management districts. Development in watersheds subject to these agencies must meet the same stormwater management standards, regardless of which community they fall in.

Communities are encouraged to manage stormwater in cooperation with adjacent communities. If a community only has regulatory jurisdiction over a portion of its watersheds, then the benefits of stormwater management are only incidental. However, if upstream communities also manage future development, either independently or through watershed planning, all communities can

benefit. Therefore, if a community can demonstrate that all upstream communities in its watershed have similar stormwater management programs, it can use Option 1.

*NOTE: The CRS has a procedure for communities in a metropolitan area, region, or state that are subject to the same regulations or regulatory requirements. A “uniform minimum credit” can be developed for these communities based on the minimum requirements. All communities in the affected area receive the same credit and usually do not have to submit as much documentation. Documentation would be needed if the community’s program exceeds the minimum requirements and it wanted more credit points.*

*For example, most communities in Delaware, Florida, Maryland, and South Carolina, along with many communities in Colorado, Illinois and Washington, receive up to 90 points for stormwater management regulations (SMR) and additional credit for ESC and WQ regulations. Generally, these communities receive the credit automatically. They do not have to apply unless they implement their own programs with more restrictive standards. Many of these communities use Option 1 because all of their watersheds are covered by the regional or statewide regulatory programs.*

*It is possible that many other state and regional agencies have regulatory programs that would qualify their communities for uniform minimum CRS credit. These agencies and/or the communities affected should contact their ISO/CRS Specialist for more information on uniform minimum credits.*

## **b. Option 2**

If a community only manages a part of a watershed, it cannot prevent future increases in runoff from all of the watershed’s development. The impact adjustment reduces the score to account for the fact that the community cannot do 100% of the job. Under Option 2, a default value of 25% is used for the impact adjustment ratio.

1. Stormwater Management Regulation (SMR): If the community does not regulate development within all of the watersheds that affect it, it may use the default value  $rSMR = 0.25$ .
2. Stormwater Management Master Plan (SMP): If the stormwater management master plan does not regulate all development within all of the watersheds that affect the community, it may use the default value  $rSMP = 0.25$ .

The default value means that communities will always get at least 25% of the credit for their stormwater management regulations no matter how little of the watershed they can actually regulate. This default value also helps communities that find it difficult to use Option 3.

### c. Option 3

Under Option 3, the impact adjustment adjusts the credit for SMR and SMP in accordance with the portion of the watershed regulated.

1. Stormwater Management Regulation (SMR): A community must develop a Stormwater Impact Adjustment Map to determine the impact of its stormwater regulations (rSMR):

$$rSMR = \frac{aSMR}{aW}$$

aSMR = the area subject to stormwater management regulations, and

aW = the area of all watersheds affecting the community.

2. Stormwater Management Master Plan (SMP): A community must develop a Stormwater Impact Adjustment Map to determine the impact of its stormwater master plan (rSMP):

$$rSMP = \frac{aSMP}{aW}$$

aSMP = the area regulated in accordance with the stormwater plan, and

aW = the area of all watersheds affecting the community.

The Stormwater Impact Adjustment Map shows the community and all watersheds that drain into it. Watersheds larger than 50 square miles (as measured where the stream enters the area under the community's jurisdiction) do not need to be shown. Although the purpose of this map is similar to the Impact Adjustment Map discussed in Section 403 of the *CRS Coordinator's Manual*, it may be quite different in appearance. The community will likely be only a small part of the total watershed.

Areas may be measured in acres or square miles. The area subject to the stormwater management regulations is shown as aSMR and the total area of the watershed is aW. aSMR is typically the area of the community plus any area subject to its extraterritorial jurisdiction. The area covered by the stormwater management plan is aSMP.

The Option 2 impact adjustment favors communities in larger watersheds that have jurisdiction over less than 25% of the watersheds that drain into them. The Option 3 adjustment favors smaller watersheds that are mostly within the community's jurisdictional area.

Option 2 is also used to estimate the community's credit in an initial application for the CRS. A community may prepare a Stormwater Impact Adjustment Map later with the assistance of the ISO/CRS Specialist. If the map has been completed during or immediately after the ISO/CRS Specialist's verification visit, the additional credit points provided by using Option 3 will be added at that time.

Many communities use Option 2 rather than calculate aSMR and aW for Option 3. However, the CRS encourages communities to calculate their points to accurately reflect their programs. Here are some ways to make it easier:

1. Follow the examples provided for Sand Island, White County, and Prentiss in this document.
2. Watershed area data are often found in the community's flood insurance study and other stormwater reports, such as "205" studies.
3. If a community can demonstrate that upstream communities have similar stormwater management regulations for the upper portions of their watersheds, it can increase the size of aSMR and aSMP. The Prentiss example uses this approach (see pages WCP-28 through WCP-38). A community in a regional district that regulates all watersheds may be able to use Option 1.
4. The following areas may be excluded from the calculations for aSMR, aSMP, and aW:
  - a. Watersheds larger than 50 square miles (as measured where the stream enters the area under the community's jurisdiction) may be excluded. The area of the watershed within the community remains in the impact adjustment calculation. An example of this is provided for the White River watershed (page WCP-26).

If such large watersheds are outside the community's jurisdiction, or are not regulated, the community will receive more credit by excluding them. If they are regulated, the community will receive more credit by including them.

- b. If watersheds upstream of the community are effectively reduced by flood control structures that control the base flood, the size of the areas affected is reduced accordingly. Only dams designed to control the base flood can be used for this type of adjustment to aW.
- c. If portions of the watersheds are unlikely to be developed due to their ownership, those portions of the watershed may be excluded. Areas that might be excluded are nature preserves, state parks, or privately owned land that is dedicated to open space use (see page WCP-26).

## 453 Credit Calculation

In this section, SMR is multiplied by the impact adjustment (rSMR). SMP is multiplied by the impact adjustment (rSMP). The results are the total credit points for each element, cSMR and cSMP.

- a.  $cSMR = SMR \times rSMR$
- b.  $cSMP = SMP \times rSMP$

For example, if the community uses Option 1 for the impact adjustment for its stormwater management regulations, SMR is multiplied by 1.0. If the community chooses Option 2, SMR is multiplied by 0.25. Under Option 3, SMR is modified by the value of rSMR calculated using the Stormwater Impact Adjustment Map.

In the final formula, the total credit points for each element are added together to produce the total credit points for Activity 450, c450. As noted above, there is no impact adjustment for FRX, ESC, or WQ. Credit is only provided if these regulations are enforced throughout the community.

$$c. \quad c450 = cSMR + cSMP + FRX + ESC + WQ$$

## 454 Credit Documentation

For a community's first application for a CRS classification, worksheet pages 31–32 of the *CRS Application* are submitted along with the documentation described below. Blank copies of these pages are found at the end of the *CRS Application*.

Subsequent requests for credit are called modifications. Modifications include the two activity worksheets AW-450 and AW-451 along with the documentation described below. These worksheets are also used by the ISO/CRS Specialist to calculate the community's verified credit. Completed examples are provided on pages SI-4 through SI-5, WCP-6 through WCP-7, and WCP-28 through WCP-29 of this document.

Section 454 on the *CRS Application* worksheet pages 31–32 and on AW-451 is a checklist for the documentation listed below. These items are needed to confirm that the community's program meets the CRS credit criteria. If there is more than one item, each should be labeled as "Attachment 1," etc., for easy reference.

Several of the documentation requirements are for ordinance or law language. A copy of the appropriate pages of the ordinance or statute is sufficient and should be attached to the worksheet. The Chief Executive Officer's certification that accompanies the application or modification is considered to include a certification that the ordinance or statute has been enacted into law and is being enforced (see Section 212.a in the *Coordinator's Manual*).

### a. Regulatory Language for SMR

The community must provide a copy of the ordinance or law language that regulates surface water runoff from new development in the watershed. Generally this will be in the form of pages excerpted from the local ordinance, statute, or bylaw.

A local "policy," drainage design manual, or other document is not acceptable unless the community can document that it has the force of law. When there is doubt, the community should submit a letter from its attorney that the documentation submitted has been adopted by the governing board and is legally binding on all new development.

The regulatory language submitted must include those factors for which the community is seeking credit. Each appropriate acronym must be marked in the margins. The acronyms are as follows:

“SMR” identifies the regulatory language that requires that peak runoff from new development be no greater than the runoff from the site in its pre-development condition. SMR regulations are usually part of a subdivision ordinance, public works design standard regulation, or other regulation that sets drainage design standards for new developments. Examples of this language are found in the Example Communities section of this document, beginning on page 20.

*NOTE: This publication contains examples of certifications and ordinance language. Communities are advised to have all certifications and proposed ordinances reviewed by their attorneys or corporation counsels.*

“SZ” is put in the margin of the section of the regulations that identifies what size of development is regulated. Usually this language is found at the beginning of the regulation in a section that discusses jurisdiction, applicability, and/or exceptions. Examples of SZ language are found for the example communities on pages SI-6 and WCP-17.

“DS” shows the regulatory language that prescribes the design storm(s) used to set the release rate from new development. It is usually in the section that discusses the design standards for retention or detention basins. It is important to note that DS is not the same as the design size for storm sewers. It is the recurrence interval of the storms that are regulated at the outfall from the development. Examples of regulations’ design storms are found for the example communities on pages SI-6 and WCP-19.

“PUB” is used to mark the section of the regulations that describes if and when stormwater management facilities built by the developer are maintained by a public agency. PUB language must cover retention or detention basins, not just the sewer lines on public rights of way.

Two types of documents can suffice for this element. The first is a subdivision ordinance or other regulatory document that states that stormwater management facilities are turned over to a public agency for ownership or maintenance. The other would be a regulation that states that a public agency may enter the property and perform the maintenance if the owner fails to properly maintain the facility. An example of the latter approach is found on page WCP-20. The community will also need to provide a copy of the procedures used to inspect and maintain the facilities (see Section 454.h).

## **b. Stormwater Master Plan**

Two or three items need to be submitted for recognition of a stormwater management master plan credited under Section 451.b:

1. Documentation of Adoption of the Plan. This is usually the minutes of the meeting where the community’s governing body adopted the plan.

2. Excerpts from the Plan. A copy of the pages of the stormwater management master plan that include the specifications that account for existing and proposed development, protect new development from flooding, and prevent increased flood hazards to existing development. These pages must also identify the size of developments affected, the design storms used, the storm durations used, and other sub-elements of SMP for which the community is requesting credit. An example is found on page WCP-16.

Copy the pages of the stormwater master plan that show the following:

- (a) Management of peak flows and volumes so that they do not exceed present values. The plan must include either regulations that meet these criteria, or must be based on a rainfall/runoff model that achieves these results;
  - (b) The recurrence interval of the storm used for the regulations and/or model;
  - (c) The duration of the storm used for the regulations and/or model; and
  - (d) [Required if the community is applying for credit for Section 451.b.2(d)—(f)] How the plan utilizes or protects the existing natural stormwater features within the watershed.
3. If the community is applying for credit for Section 451.b.2(g), the community official responsible for implementation of the stormwater master plan must provide a statement that it was prepared in coordination with or as part of the community's Floodplain Management Plan credited under Activity 510. This documentation may be provided from either plan if it is contained there.

### **c. Lowest Floor Regulations**

If the community is applying for credit for FRX under Section 451.c, the submittal must include a copy of the appropriate ordinance or law language. Normally the FRX regulatory language appears in the community's building code. The language should require that either the lowest floor or the lowest opening be set at a specific height (in inches or feet) above the crown or curb of the nearest street or above adjacent grade. The margin of the document submitted must be marked "FRX" where the regulatory language appears (see example on page WCP-35).

### **d. Erosion and Sediment Control Regulations**

If the community is applying for credit for ESC under Section 451.d, the submittal must include the ordinance or law language that requires developers or property owners to use techniques that prevent erosion and soil loss from exposed land. The ordinance(s) or law must designate an office or official responsible for receiving complaints and monitoring compliance and it must include enforcement and abatement provisions. The acronym ESC must be marked in the margin of the ordinance section that pertains to this element. An example is provided on page WCP-18.

### **e. Water Quality Regulations**

If the community is applying for WQ credit under Section 451.e, the submittal must include the ordinance or law language that requires new developments to implement appropriate best management practices to improve water quality. The acronym WQ must be marked in the margin of the ordinance section that pertains to this element.

### **f. Stormwater Impact Adjustment Map**

If the community chooses either Option 1 or Option 3 for its impact adjustment, the submittal must include a map showing the watersheds. The Stormwater Impact Adjustment Map is explained under Option 3 on pages 13–14. The submittal should also show how aSMR, aSMP, and aW were calculated. Example maps and calculations can be found on pages WCP-25 through 26 and WCP-36 through 37.

### **g. Other Communities' Regulations**

Under Option 1 and Option 3 of the impact adjustment, a community may receive more credit points if other communities in its watersheds have the same stormwater management regulations. If the applicant wants the additional credit points, it must document the other communities' regulations. This can be in the form of copies of the other communities' regulatory language.

As an alternative to copies of many regulations, the applicant may submit a statement from the regional agency with stormwater management jurisdiction that lists the other communities in which the regulations are also in effect (see the example on page WCP-38).

### **h. Facility Maintenance Procedures**

If the community is applying for PUB credit for retention and detention facilities under Section 451.a.3, then the submittal must include a copy of the procedures used to inspect and maintain those facilities. This applies for both publicly owned and privately owned facilities. The procedures should be a part of or coordinated with the community's procedures for drainage system maintenance (see Section 544.a of Activity 540 (Drainage System Maintenance) in the *Coordinator's Manual*).

### **i. Permit Records**

To confirm that the regulations have been implemented, the community must be able to show appropriate development and building permit records to the ISO/CRS Specialist. The ISO/CRS Specialist will select a sample of recent development sites and request the records during the verification visit. Permit records are not submitted with an application or modification. "Development sites" may include commercial and industrial developments, subdivisions, PUDs, and other developments that are regulated for stormwater management. The applicant should have the records ready for the verification visit.

## 455 For More Information

Many metropolitan areas have regional planning commissions or stormwater or sanitary districts with staff expertise in stormwater management. Some have model ordinances or mandatory requirements for local governments.

The Natural Resources Conservation Service (NRCS, formerly the U.S. Soil Conservation Service) has expertise in controlling erosion and soil loss. Model ordinance language and technical guidance for erosion and sediment control regulations (ESC credit) are available in many states. The NRCS staff may also be able to assist in preparing the Stormwater Impact Adjustment Map and calculating areas affected. Requests should be submitted to the local soil and water conservation district, which is usually located in the county seat.

Most states' environmental protection or pollution control offices have recommended best management practices appropriate for that state. The U.S. Environmental Protection Agency has published *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, 840-B-92-002, January 1993. This provides much information on water quality regulations. Copies can be obtained from U.S. Environmental Protection Agency, Office of Water, Washington, D.C. 20460.

## EXAMPLE COMMUNITIES

The rest of this publication consists of scoring examples for stormwater management programs from three fictitious communities. These example communities and the calculations may appear too simple. This simplification was done intentionally to help the reader focus on the scoring. The communities' programs are not meant to be models to be copied and adopted. A stormwater management program must be tailored to local conditions and developed with adequate technical input.

*NOTE: Communities are advised to have all proposed ordinance language reviewed by their attorneys or corporation counsels.*

**Sand Island.** This community is the same Sand Island that appears in the CRS publication *Example Plans*. It has the simplest program: a straightforward ordinance that requires all new development projects to ensure that the flows of the 25-year storm do not exceed the 2-year flows from the site under before-development conditions. Because the community is an island, all watersheds are regulated and it uses Option 1 for its impact adjustment.

**White County.** White County is on the fringe of a growing metropolitan area. The County has prepared Phase 1 of a "Stormwater Management Program Master Plan." It sets the plan of study and general guidelines for the County's program. A separate ordinance sets general regulatory requirements for stormwater management and erosion and sediment control.

**Prentiss.** All of the communities in White County have adopted the same county-wide regulatory standards and the County's "Stormwater Management Program Master Plan." A separate ordinance sets general regulatory requirements for stormwater management and erosion and sediment control. The Village of Prentiss is one of those communities and is in the drainage basin that has an adopted stormwater plan.

# SAND ISLAND

This community is the same Sand Island that appears in *Example Plans*. It has a straightforward ordinance that requires all new developments to ensure that the flows of the 25-year storm do not exceed the 2-year flows from the site under pre-development conditions. Because the community is an island, all watersheds are regulated and it uses Option 1 for its impact adjustment.

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## 451 Credit Points

### a. Stormwater Management Regulations (SMR)

- 1. Size of Development (SZ):** Sand Island's ordinance is applicable for all development projects except single-family residences, smaller land disturbance activities, and building additions (see page SI-6). The largest of these exemptions is construction of a new single-family house,  $SZ = 20$ .
- 2. Design Storms (DS):** Sand Island's ordinance requires developments to account for the 25-year storm volume released at the 2-year pre-development rate (see page SI-6), so  $DS = 30$ . The community receives credit for the 10-year storm and a storm larger than the 10-year storm. The sections on 100-year spillway capacity and 100-year flows to the detention basins are not relevant to the design storms used for setting the release rate.
- 3. Public Maintenance (PUB):** Sand Island has opted to leave maintenance in the hands of the property owners (page SI-7), so  $PUB = 0$ .

SMR represents the sum of the three previous variables:  $SMR = SZ + DS + PUB$ .

$$SMR = 20 + 30 + 0 = 50.$$

### b. Stormwater Management Master Plan (SMP)

Sand Island has no plan, so  $SMP = 0$ .

### c. Freeboard for New Buildings in B, C, D, and X Zones (FRX)

Sand Island has no requirements, so  $FRX = 0$ .

#### **d. Erosion and Sedimentation Control Regulations (ESC)**

Sand Island has no requirements, so ESC = 0.

#### **e. Water Quality Regulations (WQ)**

Sand Island does not have stormwater management regulations with water quality benefits. The purpose statement in Section 2 of Sand Island's ordinance (page SI-6) is not followed by specific regulatory requirements for new developments. WQ = 0.

### **452 Impact Adjustment**

Because it is an island, the area of Sand Island equals the total area of its watershed. All of its watershed is subject to its stormwater regulations. It uses Option 1 for its impact adjustment: rSMR = 1.0, and notes why on the worksheet (page SI-4).

### **453 Credit Calculation**

Sand Island's points are totaled in Section 453 of its activity worksheet AW-450 as shown on page SI-4.

### **454 Credit Documentation**

The first part of the Sand Island submittal is the community's activity worksheets. Section 454 of AW-450 lists the documentation needed. The community has checked off what is included in the submittal and what it agrees to provide during the verification visit.

The community has also marked the margins of the documents with the appropriate acronyms to show where their credited elements appear. This is very important to assist the reviewer. If the reviewer cannot find the documented support for the credit claimed, the community may not receive the credit.

One of the objectives of this publication is to provide example materials to help communicate how elements are scored. There are three types of documentation required in Section 454 that are not included in this publication:

1. As noted in Section 454.e, credit for water quality regulations (WQ) is dependent on submitting a copy of the ordinance or law language. Communities interested in example water quality ordinance language should contact their state environmental protection or pollution control office for examples of best management practices (BMP) regulations appropriate for their state.
2. If the community applies for credit for public maintenance of stormwater management facilities (PUB), Section 454.h notes that a copy of the inspection and maintenance

procedures are to be attached. White County and Prentiss (see pages WCP-7 and WCP-29) applied for this credit and noted that their procedures are part of their overall drainage maintenance procedures that were submitted with their application for Activity 540 (Drainage System Maintenance).

This approach is encouraged because it reduces the paperwork needed for a CRS application and helps ensure that various activities are coordinated with each other. Communities interested in seeing example stormwater facility maintenance procedures should obtain a copy of *CRS Credit for Drainage System Maintenance*, which is available free from the office listed inside the front cover.

3. Section 454.i notes that when the ISO/CRS Specialist conducts the verification visit, the community must show development and building permit records that demonstrate that the regulations are being enforced. Such records would include approved subdivision plats and as-built permit records that show that, for example, stormwater management facilities were constructed or buildings were elevated to avoid local drainage problems.

# SAND ISLAND'S SUBMITTAL

**450 STORMWATER MANAGEMENT**

Community: Sand Island

**451 Credit Points:**

a. SMR

1. SZ SZ = 20

2. DS DS = 30

3. PUB PUB = 0

SMR = the total of lines 1 through 3: SMR = 50

**452 Impact Adjustment: Barrier island**

a. Option 1: 1. rSMR = 1.0 2. rSMP = 1.0

b. Option 2: 1. rSMR = 0.25 2. rSMP = 0.25

c. Option 3: 1. rSMR =  $\frac{aSMR}{aW}$  = \_\_\_\_\_ 2. rSMP =  $\frac{aSMP}{aW}$  = \_\_\_\_\_

**453 Credit Calculation:**

a. cSMR = SMR 50 x rSMR 1.0 cSMR = 50

b. cSMP = SMP \_\_\_\_\_ x rSMP \_\_\_\_\_ cSMP = \_\_\_\_\_

c. FRX FRX = 0

d. ESC ESC = 0

e. WQ WQ = 0

Add the lines above. \_\_\_\_\_

c450 = value above rounded to the nearest whole number: c450 = 50

Enter this value on AW-720.

**454 Credit Documentation:** The following documentation is attached to this worksheet:

- a. [If applying for SMR] A copy of the ordinance or law language regulating surface water runoff from new developments with the acronyms marked in the margin.

- \_\_\_ b. [If applying for SMP] Copies of appropriate pages of our stormwater management master plan.
- \_\_\_ c. [If applying for FRX] A copy of the ordinance or law language that requires elevation of the lowest floor or lowest opening of new buildings.
- \_\_\_ d. [If applying for ESC] A copy of the erosion and sediment control ordinance language.
- \_\_\_ e. [If applying for WQ] A copy of the ordinance or law language that requires new developments to implement appropriate best management practices.
- \_\_\_ f. [If the impact adjustment uses Options 1 or 3] An Impact Adjustment Map showing watershed boundaries and stormwater management jurisdiction.  
**Sand Island is an island. 100% of our watershed is in our city limits.**
- \_\_\_ g. [If the impact adjustments are based on areas regulated by another community(ies)] Documentation of the other community' (ies') regulation.
- \_\_\_ h. [If applying for PUB] A copy of the procedures used to inspect and maintain drainage facilities.

We will have the following documentation available to verify implementation of this activity:

- i. Development and building permit records that demonstrate enforcement of the regulations.

To facilitate verification of this activity, please provide the names of the CRS Coordinator and local stormwater manager if other than the CRS Coordinator:

CRS COORDINATOR:	LOCAL STORMWATER MANAGER:
Name: <u>Eugene Marshall</u>	<u>Randolph Stevens</u>
Title: <u>Dir. of Comm. Development</u>	<u>Consulting Engineer</u>
Phone: <u>101/566-8727</u> Fax: <u>101/566-8728</u>	<u>101/555-4541</u> Fax: <u>101/555-4500</u>
Address: <u>Ste. 212, Municipal Complex</u>	<u>402 W. Clevenger</u>
<u>Sand Island, FL</u>	<u>Palm Bay, FL</u>

ORDINANCE NO. 90-12

AN ORDINANCE OF THE MAYOR AND CITY COUNCIL OF THE CITY OF SAND ISLAND, FLORIDA, ADOPTING THE "STORMWATER MANAGEMENT AND DRAINAGE STANDARDS FOR SAND ISLAND, FLORIDA."

BE IT ORDAINED by the Mayor and the City Council of the City of Sand Island, Florida, as follows:

Section 1. Section 8-114 of the Sand Island City Code is hereby repealed.

Section 2. It is the intent of the Mayor and the City Council of Sand Island, Florida, that stormwater flooding be minimized to the extent possible for frequent storm events. It is also the intent that water quality be preserved to the extent possible for all storm events.

Section 3. The following Section 8-114 of the Sand Island City Code is hereby adopted.

"Section 8-114. Stormwater Management and Drainage Standards

- 1. Applicability: All development shall be subject to the stormwater management and drainage requirements of this section.
  - SZ { a. "Development" shall be defined as any construction, reconstruction or placement of any building, the subdivision of any land, the construction of roads or bridges, and the filling, grading, clearing, excavation or paving of any site.
  - b. The term "development" shall not include the construction of a single-family residence, the disturbance of 5000 square feet or less, or the addition to any existing building of 2000 square feet or less.
  
- DS { 2. Standards: Peak runoff rates from any development shall be attenuated so that flows are no greater than they were before development for all storm events up to and including the 25-year rainfall event.
  - a. Detention basins shall be sized to detain a 25-year, 24-hour post-development rainfall event.
  - b. Detention basin outlet structures shall be designed to restrict flows to a pre-development 2-year, 24-hour event.
  - c. Detention basins shall be constructed with emergency overflow spillways with a 100-year capacity.
  - d. Stormwater drainage systems must be designed to effectively convey flows to the detention basin for

all storm events up to and including the 100-year, 24-hour event.

3. Review Criteria: The City Engineer has the authority to set forth stormwater management and drainage criteria so that the intent of this section is met.
4. Operation and Maintenance: All detention basins and appurtenances shall be properly operated and maintained by the property owner with permanent arrangement that shall also pass to any successive owner."

Section 4. The provisions of this ordinance shall be effective within 10 days of adoption.

PASSED AND ADOPTED by the Mayor and City Council on this 9 day of May, 1990.

John Jones  
Mayor

ATTEST:

Robert Brown  
City Clerk

APPROVED AS TO FORM:

Mary Black  
City Attorney

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# WHITE COUNTY AND THE VILLAGE OF PRENTISS

White County is on the fringe of a growing metropolitan area. The County has prepared Phase 1 of a “Stormwater Management Program Master Plan.” A separate ordinance, “Countywide Stormwater Management Standards and Regulations,” sets general regulatory requirements for stormwater management (SMR) and erosion and sedimentation control (ESC).

The Phase 1 Stormwater Master Plan qualifies for SMP credit because it sets regulatory standards throughout the County’s jurisdiction. It sets the plan of study and general guidelines for the County’s program. Phase 2 basin studies are scheduled that will produce local regulatory standards. The one for Salt Creek has been completed.

All of the communities in White County have adopted the same county-wide regulatory standards and the County’s Stormwater Management Program Master Plan. The Village of Prentiss is one of those communities and is in the drainage basin that has an adopted stormwater plan. It also regulates lowest floor elevations outside the floodplain (FRX).

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## 451 Credit Points

### a. Stormwater Management Regulations (SMR)

Because Prentiss follows White County’s regulatory program, its scores are the same as the County’s. The credit points for SMR are the sums of the credits for the three subelements:

**1. Size of Development (SZ).** The White County regulations (which cover Prentiss) cover all development (see page WCP-17). Smaller developments do not manage their stormwater runoff. Instead, they are required to pay a fee into a fund that will be used to fund regional stormwater facilities. Because all developments are required to account for their runoff, White County and Prentiss receive the maximum credit,  $SZ = 25$ .

**2. Design Storms (DS).** The outflows regulated by the White County and Prentiss regulations are the 2- and 100-year storms (page WCP-18). Detaining the 100-year storm and releasing it at a low rate (0.15 cfs) accounts for the outflows of all smaller storms, so these communities receive full credit for DS, 90 points.

**3. Public Maintenance (PUB).** White County and Prentiss leave maintenance up to the owners. However, if the owners do not do the job, the County or the municipality will perform the maintenance tasks (page WCP-20). The County has agreed to perform annual inspections of stormwater detention facilities throughout the County, including the incorporated areas. Both communities receive full credit,  $PUB = 110$ .

SMR represents the sum of the three previous variables:  $SMR = SZ + DS + PUB$ .

$$SMR = 25 + 90 + 110 = 225.$$

#### **b. Stormwater Management Master Plan (SMP)**

White County and Prentiss may receive credit for the Phase 1 Stormwater Management Master Plan. It meets or exceeds each of the four prerequisites for SMP credit. The plan has been adopted, the communities have adopted regulatory standards based on it, the regulatory standards manage future peak flows, and at least a 25-year storm is used. The communities get SMP credit because they adopted the regulatory standards recommended in the plan. The plan summarizes the goals and applicability of the ordinance, but the amount of SMP credit comes from the specific ordinance language. Both communities are eligible for the basic  $SMP = 80$ .

However, the Phase 1 Plan is eligible for more credit:

- It manages runoff from events up to the 100-year storm: 25 points.
- It uses a locally appropriate duration for modeling runoff: 25 points.
- In the Long Brook watershed, it preserves open space as natural areas: 15 points

When the Flood Management Plan is completed in 2000, the Phase 1 Plan will be eligible for 20 points because it will be coordinated with the Flood Management Plan.

For Prentiss and for all of White County except the Long Branch watershed,

$$SMP = 80 + 25 + 25 = 130.$$

For the portion of White County that is in the Long Brook watershed,

$$SMP = 80 + 25 + 25 + 15 = 145.$$

### **c. Freeboard for New Buildings in B, C, D, and X Zones (FRX)**

Only the Village of Prentiss requires that new buildings outside of the floodplain be elevated (page WCP-35). Lowest floors must be at least 12 inches above the top of the curb of the nearest street.  $FX =$  the freeboard height in feet.  $FX = 1$ .  $FRX = 50 \times FX = 50 \times 1 = 50$

### **d. Erosion and Sedimentation Control Regulations (ESC)**

As shown on page WCP-18, the White County countywide ordinance regulates erosion and sediment releases during construction. As noted in Section III-1, the regulations affect all projects that “clear, excavate, dig, fill or otherwise disturb land.”  $ESC = 35$ . Prentiss and the other municipalities in the County have adopted these rules.

### **e. Water Quality Regulations (WQ)**

Neither community has stormwater management regulations with water quality benefits. Goal #2 of White County’s master plan (page WCP-11) is not followed by specific regulatory requirements for new developments.

## **452 Impact Adjustment**

White County’s regulatory program does not cover all of its watersheds. As shown in Table 1 on page WCP-9 and on the watershed map on page WCP-10, all streams except for Braton Creek drain areas outside the County’s boundary. White County must use either Option 2 or Option 3. If it uses Option 2,  $rSMR = 0.25$ .

If White County uses Option 3, it must prepare a Stormwater Impact Adjustment Map and calculate the areas affected. This is done on pages WCP-25 and WCP-26. The County’s stormwater program includes the areas for both the unincorporated areas and the municipalities. To make its calculations easier, the County opted to include the areas of its municipalities. It excluded the national forest area and that part of the White River watershed outside its corporate limits that is larger than 50 square miles.

As shown on page WCP-26, the area of the resulting watershed is 272.7 square miles. The area subject to stormwater management regulations is the area of the County, 204.2 square miles.

$$rSMR = \frac{aSMR}{aW} = \frac{204.2}{272.7} = 0.7488 = 0.75$$

An impact adjustment of 0.75 will produce a higher score than Option 2’s 0.25. White County chooses Option 3 because it will receive more points. Most of the work to calculate affected areas was already done as part of the stormwater management plan.

For the same reason, White County used Option 3 to determine rSMP. Page WCP-26 shows how the County calculated the impact adjustment for its stormwater management plan, rSMP. Since all of the County’s watersheds are eligible for  $SMP = 130$ , but only the Long Brook watershed

is eligible for SMP = 145, the County calculates aSMP1 (associated with SMP1 = 130) as 190.5 square miles. aSMP2 (associated with SMP2 = 145) = 13.7 square miles. For White County,

$$\begin{aligned} \text{cSMP} &= \frac{(\text{aSMP1} \times \text{SMP1})}{\text{aW}} + \frac{(\text{aSMP2} \times \text{SMP2})}{\text{aW}} = \frac{(190.5 \times 130)}{272.7} + \frac{(13.7 \times 145)}{272.7} \\ &= (0.70 \times 130) + (0.05 \times 145) = 91.00 + 7.25 = 98.25 \end{aligned}$$

As with White County, Prentiss' watersheds include areas beyond its jurisdiction. The watersheds within White County are subject to the same regulations because all communities have adopted the county-wide plan. However, it must calculate its own rSMR and rSMP as shown on pages WCP-36 and WCP-37 because its relative areas are different. Option 3 produces higher scores than Option 2 for both rSMR and rSMP, so the City uses Option 3.

### 453 Credit Calculation

The communities' points are totaled in Section 453 of their activity worksheets, AW-450. These are shown on pages WCP-6 and 7 and WCP-28 and 29.

White County and Prentiss have the same SMR and ESC scores because they follow the same regulations. But different percentages of the watersheds that impact them are outside of their jurisdictions, so rSMR and rSMP are different. As a result, the total points for Activity 450 are different for two communities that regulate to the same standards. Prentiss also has FRX credit.

### 454 Credit Documentation

The first part of each example is the community's activity worksheets. Section 454 of AW-450 lists the documentation needed. Each community has checked off what is included in the submittal and what it agrees to provide during the verification visit. The applicants have numbered the attachments to make the review easier.

Each community has also marked the margins of the documents with the appropriate acronyms to show where their credited elements appear. This is very important, because if the reviewer cannot find the documentation for the credit claimed, the community may not receive the credit.

One of the objectives of this publication is to provide example materials to help communicate how elements are scored. There are three types of documentation required in Section 454 that are not included in this publication:

1. As noted in Section 454.e, credit for water quality regulations (WQ) depends on submitting a copy of the ordinance or law language. Communities interested in example water quality ordinance language should contact their state environmental protection or pollution control office for samples of best management practices regulations appropriate for their state.
2. If the community applies for credit for public maintenance of stormwater management facilities (PUB), Section 454.h notes that a copy of the inspection and maintenance

procedures are to be attached. White County and Prentiss applied for this credit and noted that their procedures are part of their overall drainage maintenance procedures that were submitted with their application for Activity 540 (Drainage System Maintenance).

This approach is encouraged because it reduces the paperwork needed for a CRS application and helps ensure that various activities are coordinated. Communities interested in seeing example stormwater facility maintenance procedures should obtain a copy of *CRS Credit for Drainage System Maintenance*, available free from the office listed inside the front cover.

3. Section 454.i notes that when the ISO/CRS Specialist conducts the verification visit, the community must show development and building permit records that demonstrate that the regulations are being enforced. Such records would include approved subdivision plats and as-built permit records that show that, for example, stormwater management facilities were constructed or buildings were elevated to avoid local drainage problems.

# WHITE COUNTY'S SUBMITTAL

**450 STORMWATER MANAGEMENT**

Community: White County

**451 Credit Points:**

a. SMR

1. SZ SZ = 25

2. DS DS = 90

3. PUB PUB = 110

SMR = the total of lines 1 through 3: SMR = 225

**452 Impact Adjustment:**

a. Option 1: 1. rSMR = 1.0      2. rSMP = 1.0

b. Option 2: 1. rSMR = 0.25      2. rSMP = 0.25

c. Option 3: 1.  $rSMR = \frac{aSMR}{aW} = \frac{204.2}{272.7} = 0.75$       2.  $rSMP\ 1 = \frac{aSMP1}{aW} = \frac{190.5}{272.7} = 0.70$

$rSMP\ 2 = \frac{aSMP2}{aW} = \frac{13.7}{272.7} = 0.05$

**453 Credit Calculation:**

a.  $cSMR = SMR \times rSMR = 225 \times 0.75$  cSMR = 168.75

b.  $cSMP = SMP1 \times rSMP1 + SMP2 \times rSMP2 = 130 \times 0.70 + 145 \times 0.05 =$  cSMP = 98.25

c. FRX FRX = 0

ESC ESC = 35

WQ WQ = 0

Add the lines above. \_\_\_\_\_

c450 = value above rounded to the nearest whole number: c450 = 302

Enter this value on AW-720.

**454 Credit Documentation:** The following documentation is attached to this worksheet:

- a. [If applying for SMR] A copy of the ordinance or law language regulating surface water runoff from new developments with the acronyms marked in the margin. **Attachment B**

- b. [If applying for SMP] Copies of appropriate pages of our stormwater management master plan. **Attachments C & D**
- c. [If applying for FRX] A copy of the ordinance or law language that requires elevation of the lowest floor or lowest opening of new buildings.
- d. [If applying for ESC] A copy of the erosion and sediment control ordinance language. **Attachment B**
- e. [If applying for WQ] A copy of the ordinance or law language that requires new developments to implement appropriate best management practices.
- f. [If the impact adjustment uses Options 1 or 3] An Impact Adjustment Map showing watershed boundaries and stormwater management jurisdiction. **Attachment E**
- g. [If the impact adjustments are based on areas regulated by another community(ies)] Documentation of the other community(ies) regulation. **Attachment F**
- h. [If applying for PUB] A copy of the procedures used to inspect and maintain drainage facilities. **See Application for Activity 540, #544a**

We will have the following documentation available to verify implementation of this activity:

- i. Development and building permit records that demonstrate enforcement of the regulations.

To facilitate verification of this activity, please provide the names of the CRS Coordinator and local stormwater manager if other than the CRS Coordinator:

CRS COORDINATOR:

LOCAL STORMWATER MANAGER:

Name: Margaret Winslow

Ralph K. Martin, P.E.

Title: Housing & Development Director

County Engineer

Phone: 222/333-2211 Fax: 222/333-2212

222/333-2121 Fax: 222/333-2100

Address: 402 So. Chambers Rd.

402 So. Chambers Rd.

Hayeston, ST

Hayeston, ST

# Attachment A

## **Stormwater Management Program**

### **Master Plan**

### **Executive Summary**

White County  
Village of Cherry Hill  
City of Hayeston  
Village of Prentiss  
City of Reynolds  
Village of Thomasville

*October 1998 Update*

# White County Stormwater Management Program Master Plan

## Executive Summary

October 1998 Update

### A. Introduction

As part of the White River Watershed (Figure 1), White County has experienced widespread flooding for decades, with the most severe and repetitive flooding along the White River and Salt Creek. The rate of development in both unincorporated and incorporated White County has steadily increased over the past two years. White County has recognized that with new development comes increases in flood flows and the large potential for increased frequency of flooding and an increase in floodplain areas.

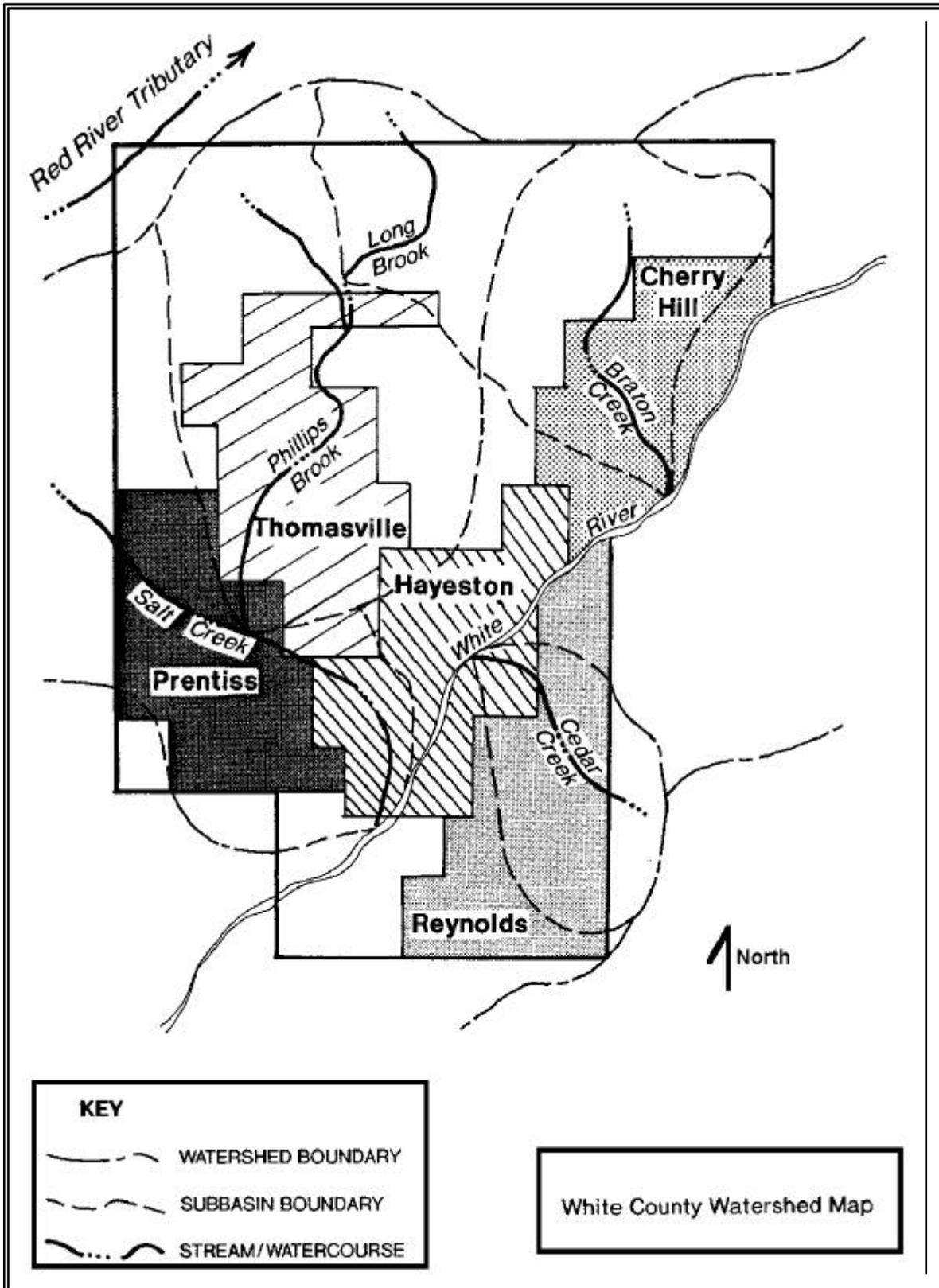
The majority of development before 1980 was along the White River and to the southeast. Currently, development is moving to the north and west into the Phillips Brook, upper Salt Creek, and Braton Creek watersheds. Figure 1 shows the major watersheds within White County and Table 1 provides total watershed areas and watershed areas within the County.

**Table-1 White County Watershed Data**

Stream	Total Watershed Area (sq. mi.)	Area Within White County (sq. mi.)
White River*	247.1	60.8
Braton Creek	28.8	28.8
Salt Creek	66.0	41.4
Phillips Brook	44.2	42.7
Long Brook	17.0	13.7
Cedar Creek	18.0	13.2
Red River Tributary	<u>3.6</u>	<u>3.6</u>
Total Area	424.7	204.2

\* Excluding the listed tributary watersheds.

Figure 1. White County Watershed Map.



On September 23, 1991 the White County Board passed Resolution 91-812 authorizing the preparation of a Stormwater Management Program Master Plan for the County. The purpose of the Plan was to recommend preventative measures to minimize the impact of development on flood flows and flood levels and to examine remedial measures to reduce existing flooding.

In the same Resolution, the County Board solicited the cooperation of the municipalities within the County to allow a “Countywide” program to include stormwater management regulations.

## **B. Intergovernmental Arrangement**

Five municipalities are within White County: Cherry Hill, Hayeston, Prentiss, Reynolds, and Thomasville (Figure 1). The municipalities and the County had similar floodplain standards, but stormwater regulations varied widely. Hayeston and Reynolds, though they have annexation opportunities, are highly developed and have had no stormwater detention requirements in the past. Cherry Hill, Prentiss, and Thomasville, in the northern and western portions of the County, have high rates of growth predicted. All communities recognized the need to have uniform stormwater standards to protect new and existing developments.

By December 14, 1991, all five municipalities had signed intergovernmental agreements with White County, giving the County the authority to develop and propose countywide regulations, and to study the six major watersheds within the County. Financial contributions were made by the municipalities to the County for the cost of the studies based on the population of the municipality. The intergovernmental agreements stipulated that any regulatory standards, watershed studies, and capital improvement plans adopted by the County would also have to be adopted by any affected municipality before the County action would have the force of law.

Two councils were established to provide coordination of effort: an Executive Council made up of county board members and municipal mayors and presidents and a Technical Council made up of County and municipal staff members. The Technical Council reports to the Executive Council.

## **C. Program Goals**

The intergovernmental agreements stated the following Goals of the Countywide Stormwater Management Program and Master Plan:

Goal #1 Provide a unified approach to the management of surface water throughout White County.

Objective A. Establish a countywide forum or council for the discussion of issues and the development of solutions.

Objective B. Develop equitable funding mechanisms for countywide efforts.

Goal #2 Protect the natural resources of White County and prevent the degradation of streams, lakes, and wetlands.

Objective A. Develop countywide policies for the protection and enhancement of the County's natural resources.

Goal #3 Prevent increases in the frequency and magnitude of flooding due to urbanization, and seek solutions to existing flooding problems.

Objective A. Develop and adopt countywide regulations that will limit post-development flows to pre-development conditions.

Objective B. Develop and adopt countywide floodplain regulations to provide for consistency in floodplain management.

Goal #4 Strive to optimize and reduce the cost of flood relief efforts and to minimize duplication of effort in the area of regulatory programs.

Objective A. Inventory County flooding problems and propose potential solutions.

Objective B. Develop a County-municipal joint approach to funding of remedial flood control efforts.

#### **D. County-Wide Stormwater Master Plan**

In February 1992, the Executive Council agreed to a three-phase approach to finding solutions for its flooding problems.

- First, it would contract for a County-wide master plan which would summarize the history of flooding in the County, recommend regulatory standards needed to prevent increases in flooding, and recommend priorities for more detailed studies of each of the watersheds within the County.
- Second, it would contract for the detailed basin studies.
- Finally, while the basin studies were underway, it would contract for a flood management master plan which would recommend solutions to existing flood problems.

#### **E. Phase 1 Stormwater Management Plan**

The Phase 1 Stormwater Management Plan was contracted in October 1992 and completed in July, 1994. It provided the following:

##### **History of flooding:**

Past development in White County has primarily been in the central, southern, and eastern areas (Cities of Hayeston and Reynolds). The north and west areas of the County hold the largest potential for future development, but any increases in flows pose an adverse effect for the entire County.

The White River has 186 square miles of watershed upstream of White County. White County residents have experienced White River flooding since the County was first settled. Tributary flooding on Braton Creek, Salt Creek, and Cedar Creek has not been as common as White River flooding, but since 1978 at least one of the streams has flooded each year.

### **Recommended regulatory program:**

Regulatory standards recommended by the Phase 1 Plan were accepted by the County in September 1994. The regulations were subsequently adopted by the White County Board in February 1995 and by all the municipalities by September 1995. Implementation of the regulations and standards are the responsibility of the local government, however technical advice is provided by the County engineering staff, if requested by a municipality.

The adopted regulations incorporate stormwater management and floodplain management standards. Stormwater management regulations include analysis of all storm events up to and including the 100-year event. Detention must be provided for the 100-year event. Outlets are restricted to 0.15 cubic feet per second (cfs) per acre of development for the 100-year event and 0.05 cfs per acre of development for the 2-year event. A spillway designed for the 500-year storm must be provided in line with downstream conveyance. A fee-in-lieu-of detention is required for developments under 1 acre. Fees collected are set aside for the construction of regional detention facilities prescribed in the watershed studies. The fee-in-lieu-of detention is allowed for developments over 1 acre, but only if a watershed plan has been adopted and a regional facility designed.

Detention basin capacity is to be determined using the 100-year, 96-hour storm, which the Water Resources Division of the state Department of Natural Resources has determined is the time of concentration for the White River. All conveyance facilities are to be designed using the time of concentration for the watershed above the facility.

Maintenance is the responsibility of the owner (including homeowners' associations). The County Engineer's staff will inspect each facility at least annually and after any rainfall event that exceeds 2 inches in 24 hours. If they determine that maintenance is required, the County notifies the owners that they have 30 days to perform the maintenance and provide a report on the repair to the County Engineer. If such a report is not received within 30 days, the County Highway Department will make the repairs and place a lien on the property for the amount of the repairs.

The Long Brook watershed, which is almost entirely rural, was identified as an opportunity to preserve riparian and forest habitat. Except for a 160-acre tract of 5-acre "mini-farms," the entire watershed is in large parcels that are currently either unused or are used for seasonal grazing or harvesting firewood. As a result of numerous public meetings with a committee representing the property owners in Long Brook watershed, it was agreed that all watercourses which drain more than 80 acres would be preserved as open space and left in their current use until such time as the owner wished to develop the parcel for residential, commercial or industrial use. At that time, the owner will realize his full development potential through density trades and leave the floodplains undeveloped. Ownership may be retained by the development or the land may be deeded to the White County Department of Parks and Recreation. It was agreed that the watershed plan for the Long Brook watershed would be done third, after Salt Creek and Phillips Brook. If a property

owner develops his parcel prior to completion of that study, he must have hydrology and mapping studies done to determine the existing floodplains for all watercourses which drain more than 80 acres.

## **F. Phase 2 Watershed Studies**

Beginning in 1995, tributary watersheds are being modeled for planning purposes and to determine appropriate locations for regional detention facilities. This effort will also determine if more restrictive detention requirements were necessary for certain watersheds.

Based on the Phase 1 study, the watersheds of the County were prioritized for detailed studies as follows:

1. Salt Creek
2. Phillips Brook
3. Long Brook
4. Cedar Creek
5. Braton Creek

The White River is being studied by the U.S. Army Corps of Engineers and will not be independently studied by the County. The tributary watershed models are being provided to the Corps for use in the White River Study.

In June 1996 the Salt Creek Watershed Plan was adopted by the White County Board, the Villages of Prentiss and Thomasville, and the City of Hayeston, which have jurisdiction within the Salt Creek watershed. The Watershed Plan includes an improved detention standard of 0.10 cfs/acre and 0.05 cfs/acre for the 100-year and 2-year events, respectively.

The plan also included a regional flood control reservoir located within Prentiss' Village limits that will alleviate current flooding in Prentiss and Hayeston. It will provide stormwater storage for approximately 25% of the expected new development in the Salt Creek watershed. The regional reservoir is not anticipated to be constructed until 1999, but the improved regulations went into effect upon adoption of the Plan.

Currently, Phillips Brook watershed is being modeled in detail and a draft plan is expected in January, 1999.

## **G. Phase 3 Flood Management Plan**

Funding of all White County stormwater management efforts has been done through budgeting of County Public Works funds, which are matched by contributions from the municipalities. With the anticipation of regional reservoirs and increased staff efforts, the County and municipalities have considered forming a stormwater utility. This utility may also allow all stormwater facilities to be maintained by the utility rather than being left to the responsibility of the developer.

Based on the results of the Phase 1 Stormwater Master Plan, White County, with the financial participation of the communities, issued a contract for a flood management plan which is to

recommend solutions to existing flood problems throughout the County. This study is expected to recommend a combination of structural and non-structural components, including channel improvements, improved storm drains, acquisition of floodprone buildings and County purchase of flood insurance for some buildings until regional detention facilities are constructed. This study will be closely coordinated with existing and ongoing watershed studies, including the Corps study of the White River. It will be completed in July of 1999.

# Attachment B

## Excerpts

### **Countywide Stormwater Management Standards and Regulations**

Adopted by:

White County, February 16, 1995  
Village of Cherry Hill, August 20, 1995  
City of Hayeston, June 5, 1995  
Village of Prentiss, March 8, 1995  
City of Reynolds, August 27, 1995  
Village of Thomasville, March 29, 1995

*Reprinted September 1995*

**Article II:**

**Applicability for Stormwater Management Requirements.**

SZ

*Section II-1.* This Ordinance shall apply to all development within White County. Development shall be any activity, excavation or fill, alteration, subdivision, change in land use, or practice, including without limitation redevelopment, undertaken by private or public entities that affects the discharge of stormwater.

*Section II-2.* Developments under 1 acre are required to pay a fee-in-lieu-of construction of the stormwater management requirement. Developments over 1 acre may be allowed to pay a fee-in-lieu-of the stormwater management requirements if approved by the County Engineer. The amount of the fee-in-lieu shall be determined as provided for in Section XVII of this Ordinance.

**Article III:**

**Land Disturbance Permit**

*Section III-1.* No person, firm or corporation shall clear, excavate, dig, fill, or otherwise disturb land without first obtaining a Land Disturbance Permit from the Office of the County Engineer.

*Section III-2.* The application for a Land Disturbance Permit shall include the following information:

- a. A detailed description of the proposed activity, its purpose, and intended use;
- b. Site location (including legal description) of the property, drawn to scale, indicating whether it is proposed to be in an incorporated or unincorporated area;
- c. Anticipated dates of initiation and completion of the activity;
- d. Plans of the proposed activity shall be provided which include:
  - i. A vicinity map showing the site of the activity, north arrow, map scale, and the location and names of all property lines, elevation contour lines (at a 2-foot contour interval), drainage channels, and roads on and in the vicinity of the site.
  - ii. A plan view of the project showing the project location and dimensions, set backs from property lines, and easements.
  - iii. If the project is in a Special Flood Hazard Area, the location of the floodplain and floodway boundaries and the elevations of the 10-, 50-, 100-, and 500-year floods.
  - iv. A soil erosion and sedimentation control plan for the disturbed area. This plan shall include a description of the sequence of grading activities and the temporary sediment and erosion control measures to be implemented to mitigate their effects. This plan shall also include a description of final stabilization and revegetation measures and the identification of a responsible party to ensure post-construction maintenance. The plan shall be in accordance with the guidelines of the “Model Soil Erosion and Sedimentation Control Ordinance” published by the state Department of Natural Resources, 1989.
- e. Any and all other local, state, and Federal permits or approvals that may be required for this type of development activity.

ESC {

**Article V:**

**Stormwater Management Requirements**

SMR { *Section V-1.* Post-development stormwater discharges from any development shall be detained or retained such that pre-development discharges are not exceeded.

*Section V-2.* In development design, stormwater volumes shall be minimized by utilizing the following hierarchy:

- a. Minimize impervious surfaces of the development consistent with the needs of the project.
- b. Attenuate flows by use of open vegetated swales and natural depressions and preserve existing natural stream channels.
- c. Infiltrate stormwater discharge on-site.
- d. Provide stormwater retention basins.
- e. Provide stormwater detention basins.
- f. Construct storm sewers.

DS  
SMP2 (b) { *Section V-3.* The design storage to be provided in a detention basin shall be based on the stormwater discharge from the 100-year, 96-hour event and reservoir routed. Detention storage shall be computed using a hydrograph method.  
SMP2 (c)

*Section V-4.* The drainage system for the development shall be designed to control the peak rate of discharge from the development for the 2-year event and the 100-year event, which shall be no greater than 0.05 cubic feet per second (cfs) per acre of development for the 2-year events and 0.15 cfs per acre for the 100-year event. The duration of the events used shall equal the time of concentration for the watershed above the location of the facility or reach being designed.

*Section V-5.* If a watershed plan has been adopted by the White County Board and the affected municipalities that prescribes alternate detention volume and release rate requirements, then those requirements shall be in effect for the particular watershed for which the watershed plan was adopted.

**Article IX:**

**Maintenance of Stormwater Management Facilities**

*Section IX-1.* Maintenance of stormwater management facilities located on private development shall be the responsibility of the owner of that development. Before obtaining a permit from the county or municipality, the owner of the development shall execute a maintenance agreement with the county or municipality guaranteeing that the owner of the development and all future owners will maintain its stormwater management system. The agreement shall specify that the county or municipality is authorized to enter onto the development for purposes of inspection of the stormwater management facilities. Such agreement shall be recorded with the Recorder of Deeds.

*Section IX-2.* The Office of the County Engineer shall inspect each stormwater management facility built pursuant to the provisions of this Regulation at least annually. If any deficiencies are found which might cause the facility to fail to operate as designed, the County Engineer shall immediately notify the owner of the facility and demand that it be corrected within 30 days.

*Section IX-3.* If the owner of the development or any future owner fails to adequately maintain the stormwater management facility, and does not make corrections after being notified in writing 30 days prior, the county or municipality may have the necessary work completed and assess the cost to the development owner.

P U B

# ORDINANCE NUMBER 95-8

## White County

Adopted February 16, 1995

### Pertaining to Land Use and Development in the Long Brook Watershed

**WHEREAS** White County has determined that the Long Brook Watershed as shown on the map which is marked "Appendix 1" to this Ordinance is largely undeveloped at this time; and

**WHEREAS** the White County Executive Council has identified the Long Brook watershed as having special riparian and forestry values within its watercourses; and

**WHEREAS** the Phase 1 Stormwater Management Master Plan has recommended that certain actions be taken to preserve these values;

#### **IT IS THEREFORE ORDAINED:**

1. The current 100-year floodplains of all watercourses which drain more than 80 acres shall be left in their current condition and usage until such time as development occurs in areas outside these floodplains.
2. Any development proposal of land that includes floodplain, shall be in the form of a planned unit development (PUD) which allows the same amount of development outside the floodplain as would have been allowed on the entire parcel. This will be accomplished by increasing the zoning density, waiving coverage and setback requirements and other means that may be necessary to allow for the fair economic development of the non-floodplain property while preserving the floodplain areas.
3. At such time as the development plan is approved by the County, the owner may either retain ownership of the floodplain property or deed it to the County to reduce his property taxes. In either case, the land will be allowed to revert to its natural state. If it is deeded to the County, the County Parks and Recreation Department may, as advised by environmental experts, enhance the habitat by removing exotic plants and planting native vegetation.
4. The White County Executive Council agrees to conduct a detailed watershed study on the Long Brook watershed to be completed no later than July 1, 2000 to map the 100-year floodplains for all watercourses which drain more than 80 acres.
5. If the owner of any parcel wishes to develop his/her property prior to the completion of the detailed watershed study described in 4. above, he/she shall conduct a study of all watercourses on the parcel to determine the 100-year floodplain boundaries for

SMP2 (e)

watercourses which drain more than 80 acres. This study shall be conducted at the expense of the owner.

6. The subdivision named “Green Acre Farms” located in the southwest one quarter (1/4) of Section 16, Range 3S, Township 4W, White River Base and Meridian, is exempt from this ordinance.

# Attachment C

November 21, 1996

I, Ralph K. Martin, hereby certify that:

SMP

1. The County of White, the Village of Prentiss, the Village of Thomasville, and the City of Hayeston in concurrence with the White County Stormwater Management Executive Council have adopted the "Salt Creek Watershed Management Plan;"
2. This Plan is a master plan that accounts for existing and proposed development, will protect new development from flooding, and will prevent increased flood hazards to existing development;
3. The regulations require that the 100-year release rate from stormwater management detention facilities be no greater than 0.1 cubic feet per second (cfs) per acre of development, and that the 2-year release rate be no greater than 0.05 cfs per acre of development;
4. The Salt Creek watershed regulations are based on the modeling of the watershed using the U.S. Army Corps of Engineers HEC-1 and HEC-2 models; and
5. All other requirements in the Countywide Stormwater Management Ordinance remain in full force.

Ralph K. Martin

Ralph K. Martin, P.E.  
County Engineer

Registered Professional  
Engineer #19355

# Attachment D

The projects are prioritized for implementation based on the following factors:

- Hydrologic/Hydraulic Compatibility;
- Economics;
- Number of Buildings Relieved from Flooding;
- Citizen Concern; and
- Safety.

With all of these objective and subjective factors considered, the recommended plan as presented in this report is the final result of these studies.

## G. Construction Funding:

The total cost of the improvements recommended above is itemized in Appendix E. This large amount cannot be funded from the County's and the municipalities' operating budgets.

A general obligation bond issue is therefore recommended. The state Department of Community Affairs administers a program that combines local bond issues and sells larger issues that are backed by the state. This results in a more favorable interest rate. It is recommended that the County Treasurer investigate this funding option.

## H. Regulatory Standards:

White County and the affected municipalities in the County have adopted the "Countywide Stormwater Management Standards and Regulations." This ordinance sets stormwater management and erosion and sedimentation control standards for all new developments in the watersheds within the County.

With one exception, this plan has found those standards appropriate for the Salt Creek watershed and recommends that the County and the municipalities continue to enforce them.

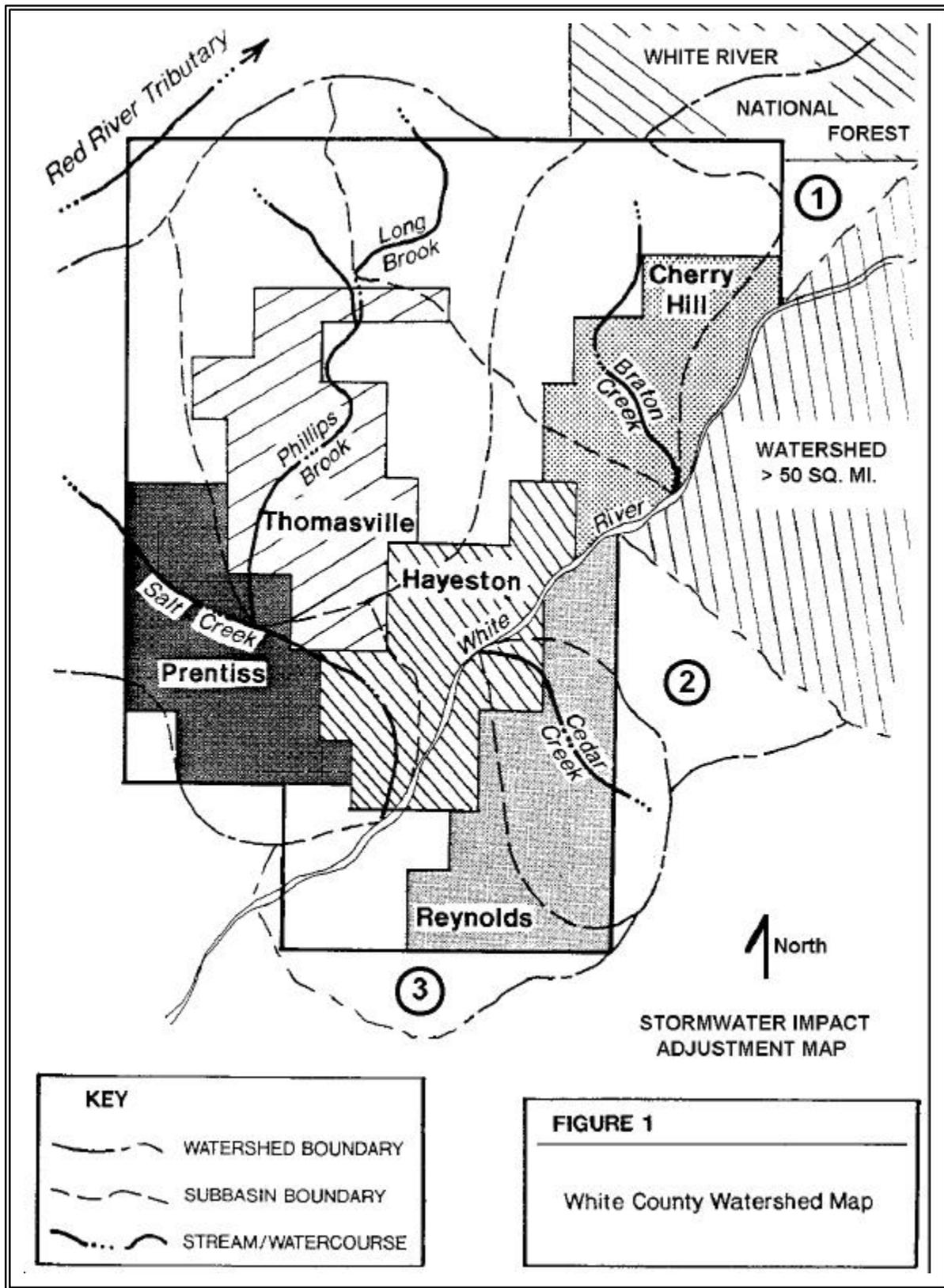
The exception is the 100-year release rate. As discussed in Section D and detailed in Appendix F, a more restrictive release rate is needed to attenuate discharges into the proposed retention structures.

Therefore, it is recommended that Section V-4 of the "Countywide Stormwater Management Standards and Regulations" be amended by adding at the end of the section: "Within the Salt Creek watershed, the peak rate of discharge shall be

SMP

0.1 cfs per acre for the 100-year event." As provided in Section V-5, adoption of this watershed management plan is considered as adoption of this amendment to the ordinance.

# Attachment E



**White County Community Rating System Application  
Activity 450**

Impact Adjustment Calculations:

aW = the area of all watersheds that drain into White County.

The area of all watersheds = 424.7 (ref., Table 1, White County Stormwater Management Program Master Plan, Executive Summary).

aW can be modified by eliminating watersheds outside (upstream) of the County's jurisdiction that are larger than 50 square miles. As shown on the Impact Adjustment Map, the White River upstream of the County has a watershed of 115 square miles.

aW can also exclude areas not expected to develop due to their ownership. Northeast of the County is the White River National Forest, which accounts for 37 square miles of the White River watershed not already excluded.

Areas 1, 2, and 3 outside the County to the northeast of Cherry Hill and east and south of Reynolds must still be counted. They are parts of the White River watershed, but they are smaller than 50 square miles where they enter the County.

Therefore,  $aW = 424.7 - 115 - 37 = 272.7$  square miles

aSMR = the area of the watersheds subject to stormwater management regulation. All of White County (including incorporated areas) is subject to the stormwater management regulations, so aSMR = the area of White County = 204.2.

$$rSMR = \frac{aSMR}{aW} = \frac{204.2}{272.7} = 0.7488 = 0.75$$

aSMP = the area of the watersheds covered by the stormwater management master plan. An adopted plan covers all of the watersheds within the County. The area of the watersheds within the County is 204.2 square miles (ref., Table 1, White County Stormwater Management Program Master Plan, Executive Summary). Of this total, 13.7 square miles is in the Long Brook watershed. The remaining watershed under the master plan is 190.5 square miles.

$$rSMP1 = \frac{aSMP1}{aW} = \frac{190.5}{272.7} = 0.70 \quad rSMP2 = \frac{aSMP2}{aW} = \frac{13.7}{272.7} = 0.05$$

# Attachment F

November 21, 1994

I, Rebecca Sanders, hereby certify that the following communities have adopted the ordinance "Countywide Stormwater Management Standards and Regulations" on the dates so indicated. Certified copies of these ordinances have been filed in this office as required by law.

<u>Community</u>	<u>Date Passed</u>
White County	February 16, 1993
Village of Cherry Hill	August 20, 1993
City of Hayeston	June 5, 1993
Village of Prentiss	March 8, 1993
City of Reynolds	August 27, 1993
Village of Thomasville	March 29, 1993

SIGNED:

Rebecca Sanders

County Clerk

DATE:

October 1, 1998

# PRENTISS' SUBMITTAL

## 450 STORMWATER MANAGEMENT

Community: Prentiss

### 451 Credit Points:

a. SMR

1. SZ SZ = 25

2. DS DS = 90

3. PUB PUB = 110

SMR = the total of lines 1 through 3: SMR = 225

### 452 Impact Adjustment:

a. Option 1: 1. rSMR = 1.0      2. rSMP = 1.0

b. Option 2: 1. rSMR = 0.25      2. rSMP = 0.25

c. Option 3: 1. rSMR =  $\frac{aSMR \ 97.8}{aW \ 127.2} = \underline{0.77}$       2. rSMP 1 =  $\frac{aSMP1 \ 84.1}{aW \ 127.2} = \underline{0.66}$

rSMP2 =  $\frac{aSMP2 \ 13.7}{aW \ 127.2} = \underline{0.11}$

### 453 Credit Calculation:

a. cSMR = SMR 225 x rSMR 0.77 cSMR = 173.25

b. cSMP = SMP1 130 x rSMP1 0.66 cSMP = 101.75  
       + SMP2 145 x rSMP2 0.11 =

c. FRX FRX = 50

ESC ESC = 35

WQ WQ = 0

Add the lines above. \_\_\_\_\_

c450 = value above rounded to the nearest whole number: c450 = 360

Enter this value on AW-720.

### 454 Credit Documentation: The following documentation is attached to this worksheet:

- a. [If applying for SMR] A copy of the ordinance or law language regulating surface water runoff from new developments with the acronyms marked in the margin. **Attachments 1 & 2**

- b. [If applying for SMP] Copies of appropriate pages of our stormwater management master plan. **Attachments 3, 4, & 5**
- c. [If applying for FRX] A copy of the ordinance or law language that requires elevation of the lowest floor or lowest opening of new buildings. **Attachment 6**
- d. [If applying for ESC] A copy of the erosion and sediment control ordinance language. **Attachment 2**
- e. [If applying for WQ] A copy of the ordinance or law language that requires new developments to implement appropriate best management practices.
- f. [If the impact adjustment uses Options 1 or 3] An Impact Adjustment Map showing watershed boundaries and stormwater management jurisdiction. **Attachment 7**
- g. [If the impact adjustments are based on areas regulated by another community(ies)] Documentation of the other community(ies) regulation. **Attachment 8**
- h. [If applying for PUB] A copy of the procedures used to inspect and maintain drainage facilities. **See our Application for Activity 540, item 544a**

We will have the following documentation available to verify implementation of this activity:

- i. Development and building permit records that demonstrate enforcement of the regulations.

To facilitate verification of this activity, please provide the names of the CRS Coordinator and local stormwater manager if other than the CRS Coordinator:

CRS COORDINATOR:

LOCAL STORMWATER MANAGER:

Name: Marjorie A. Bach

Ralph K. Martin, P.E.

Title: Village Clerk

White County Engineer

Phone: 222/334-4433 Fax: 222/334-4444

222/333-2121 Fax: 222/333-2100

Address: 5122 Main St.

402 So. Chambers Rd.

Prentiss, ST

Hayeston, ST

# Attachment 1

Village of Prentiss

Ordinance No. 1993-14

BE IT ORDAINED by the President and Board of the Village of Prentiss on this 8th day of March, 1993:

**SMR**

WHEREAS the Village of Prentiss by adopting Ordinance No. 1991-26 agreed to participate in a countywide stormwater management program with White County that called for the development of countywide regulations and policies to protect the natural resources of the County, and

WHEREAS White County has proposed countywide stormwater management standards and regulations that have been determined to be in the best interest of the residents of White County.

NOW THEREFORE, the Village of Prentiss hereby adopts by reference the "White County - Countywide Stormwater Management Standards and Regulations" adopted by White County Board on February 16, 1993.

FURTHERMORE, the provisions of this ordinance shall be effective upon adoption of this ordinance. Any development currently under review by the Village Engineer shall be subject to the provisions of this ordinance.

Thomas Kurtz

President

ATTEST:

Marjorie A. Bach

Village Clerk

APPROVED AS TO FORM:

Gordon Cashman

Attorney

# Attachment 2

[Same as White County's Regulations, pages WCP-16 through WCP-22]

# Attachment 3

November 21, 1994

I, Ralph K. Martin, hereby certify that:

SMP

1. The County of White, the Village of Prentiss, the Village of Thomasville, and the City of Hayeston in concurrence with the White County Stormwater Management Executive Council have adopted the "Salt Creek Watershed Management Plan;"
2. This Plan is a master plan that accounts for existing and proposed development, will protect new development from flooding, and will prevent increased flood hazards to existing development;
3. The regulations require that the 100-year release rate from stormwater management detention facilities be no greater than 0.1 cubic feet per second (cfs) per acre of development, and that the 2-year release rate be no greater than 0.05 cfs per acre of development;
4. The Salt Creek watershed regulations are based on the modeling of the watershed using the U.S. Army Corps of Engineers HEC-1 and HEC-2 models; and
5. All other requirements in the Countywide Stormwater Management Ordinance remain in full force.

Ralph K. Martin

Ralph K. Martin, P.E.  
County Engineer

Registered Professional  
Engineer #19355

# Attachment 4

Village of Prentiss

Ordinance No. 1994-09

BE IT ORDAINED by the President and Board of the Village of Prentiss on this 29th day of January, 1994:

WHEREAS the Village of Prentiss by adopting Ordinance No. 1991-26 agreed to participate in a countywide stormwater management program with White County that called for the prevention of increased flows due to development, and called for the development of watershed plans to propose solutions to county flooding problems, and

**SMP**

WHEREAS White County has proposed the "Salt Creek Watershed Management Plan," and portions of the Village of Prentiss are within the Salt Creek Watershed, and

WHEREAS the Plan recommends flood control alternatives and recommended more restrictive stormwater detention requirements for development in the Salt Creek Watershed.

NOW THEREFORE, the Village of Prentiss hereby adopts by reference the "Salt Creek Watershed Management Plan" adopted by the White County Board on January 10, 1994,

FURTHERMORE, the provisions of this ordinance shall be effective upon adoption of this ordinance. Any development currently under review by the Village Engineer shall be subject to the provisions of this ordinance.

**Thomas Kurtz**

\_\_\_\_\_  
President

ATTEST:

**Marjorie A. Bach**

\_\_\_\_\_  
Village Clerk

APPROVED AS TO FORM:

**Gordon Cashman**

\_\_\_\_\_  
Attorney

The projects are prioritized for implementation based on the following factors:

- Hydrologic/Hydraulic Compatibility;
- Economics;
- Number of Buildings Relieved from Flooding;
- Citizen Concern; and
- Safety.

With all of these objective and subjective factors considered, the recommended plan as presented in this report is the final result of these studies.

### G. Construction Funding:

The total cost of the improvements recommended above is itemized in Appendix E. This large amount cannot be funded from the County's and the municipalities' operating budgets. A general obligation bond issue is therefore recommended. The state Department of Community Affairs administers a program that combines local bond issues and sells larger issues that are backed by the state. This results in a more favorable interest rate. It is recommended that the County Treasurer investigate this funding option.

### H. Regulatory Standards:

White County and the affected municipalities in the County have adopted the "Countywide Stormwater Management Standards and Regulations." This ordinance sets stormwater management and erosion and sedimentation control standards for all new developments in the watersheds within the County.

With one exception, this plan has found those standards appropriate for the Salt Creek watershed and recommends that the County and the municipalities continue to enforce them. The exception is the 100-year release rate. As discussed in Section D and detailed in Appendix F, a more restrictive release rate is needed to attenuate discharges into the proposed retention structures.

Therefore, it is recommended that Section V-4 of the "Countywide Stormwater Management Standards and Regulations" be amended by adding at the end of the section: "Within the Salt Creek watershed, the peak rate of discharge shall be 0.1 cfs per acre for the 100-year

SMP

event." As provided in Section V-5, adoption of this watershed management plan is considered as adoption of this amendment to the ordinance.

# Attachment 6

4-26 Village of Prentiss Code

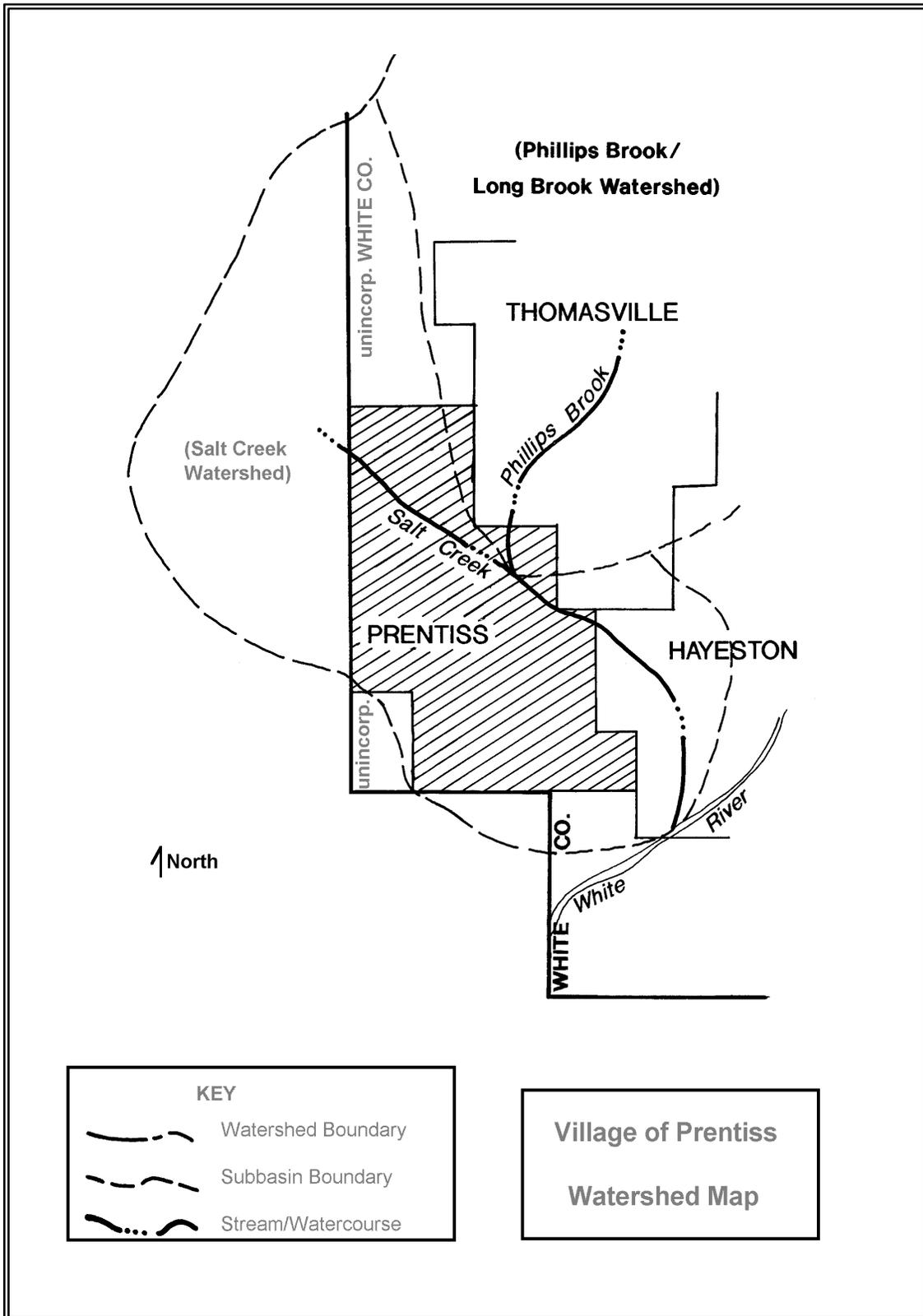
## **Sect. 436. Elevation of Structures**

**F R X**

All buildings associated with development not located in Special Flood Hazard Areas on Flood Insurance Rate Maps for the Village shall have the lowest floor elevation constructed at least 12 inches above the top of curb elevation of the nearest adjacent street.

# Attachment 7

## Impact Adjustment Map for Prentiss.



**Village of Prentiss CRS Application  
Activity 450**

Impact Adjustment Calculations:

aW = the area of all watersheds that drain into Prentiss.

Essentially all of the Village of Prentiss is within the Salt Creek watershed. The Salt Creek watershed is composed of three basins (see Village of Prentiss watershed map, Attachment 7, and Map 1 in White County Stormwater Management Program Master Plan, Executive Summary).

Salt Creek	66.0 square miles
Phillips Brook	44.2
Long Brook	<u>17.0</u>
	127.2 = aW

Source: Table 1, White County Stormwater Management Program Master Plan, Executive Summary

aSMR = the area of the watersheds subject to stormwater management regulation.

All of the watersheds within unincorporated White County and the Villages of Thomasville and Prentiss are subject to the same regulations as spelled out in "Countywide Stormwater Management Standards and Regulations."

Only the areas of the watersheds outside of White County are not regulated to these standards. The areas within White County are as follows:

Salt Creek	41.4 square miles
Phillips Brook	42.7
Long Brook	<u>13.7</u>
	97.8 = aSMR

Source: Table 1, White County Stormwater Management Program Master Plan, Executive Summary

$$rSMR = \frac{aSMR}{aW} = \frac{97.8}{127.2} = 0.7689 = 0.77$$

aSMP = the area of the watersheds covered by the stormwater management master plan.

An adopted plan covers the Salt Creek watershed within Prentiss and the rest of White County. The area of the Salt Creek watershed, including Phillips Brook and Long Brook within the County is 98.7 square miles. Excluding Long Brook, aSMP1 = 84.1. aSMP2 = 13.7.

$$rSMP1 = \frac{aSMP1}{aW} = \frac{84.1}{127.2} = 0.66$$

$$rSMP2 = \frac{aSMP2}{aW} = \frac{13.7}{127.2} = 0.11$$

# Attachment 8

November 21, 1994

I, Rebecca Sanders, hereby certify that the following communities have adopted the ordinance "Countywide Stormwater Management Standards and Regulations" on the dates so indicated. Certified copies of these ordinances have been filed in this office as required by law.

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SIGNED:

Rebecca Sanders

County Clerk

DATE:

November 21, 1994