SC DEPARTMENT *of*
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Guide to Developing Watershed Plans



Purpose

This guide has been created to assist developers of watershed plans in South Carolina. It serves as an overview of the watershed planning process and includes helpful tips and links to resources. For a more in-depth discussion of specific plan elements, the US Environmental Protection Agency (EPA)has created a **comprehensive handbook** for watershed plan creation. In addition to reviewing this guide, organizations are encouraged to contact their **Watershed Coordinator** for help and feedback while developing watershed plans.

The Need for Watershed Plans

Local knowledge and planning are needed to improve and protect the quality of water in our streams, rivers, lakes, and estuaries. A watershed plan helps accurately identify pollutants and pollution sources so that appropriate and effective solutions can be recommended and implemented. While there is an increased realization in South Carolina of the importance of watershed plans in addressing local water quality issues, there are many parts of the state in need of watershed plans.

Effectively improving water quality requires addressing the entire watershed holistically – including identifying all water quality concerns and their potential sources. A watershed plan is a roadmap for communities to systematically define and address water quality problems and areas for protection within a given watershed. Successful watershed planning includes active participation from stakeholders, analysis of the specific causes and sources of water quality problems, identification of measurable water quality goals, and implementation of specific actions needed to solve those problems. Watersheds with approved nine-element plans are eligible for Clean Water Act Section 319 grant funding to reduce or prevent nonpoint source pollution. See Section 8 below on funding assistance for more information.

The overall goal of the completed watershed plan is to provide recommendations to address known water quality impairments and develop a thorough plan for implementing those recommendations. While data analysis is an important aspect of watershed planning, most of the efforts and resources should be spent on the interpretation of existing data for implementation rather than data analysis. Refer to the SC Watershed Atlas (available at des.sc.gov/watersheds) to identify impaired waters in your chosen watershed.

The Nine Required Elements

There are a minimum of nine required elements outlined by EPA to be included in a watershed plan. While there may be several additional elements and sections you may choose to include in your watershed plan, these nine elements must be included in a watershed plan to be eligible for Section 319 grant funding.

The nine required elements are:

a. Identify **causes of impairment** and **pollutant sources**
b. Estimate the **load reductions** expected from management measures
c. Describe **management measures** to be implemented
d. Estimate **technical and financial assistance** needed
e. Include **informational and educational components**
f. Create a **schedule for implementation** of management measures
g. Develop interim **measurable milestones**
h. Determine criteria to **measure success**
i. Create a **monitoring plan**

Writing the Plan

EPA's nine elements are only minimum requirements as there are several other critical components to include in a thorough watershed plan. A watershed plan should include each of the following sections, and it is recommended that the plan follow this outline.

1. General Watershed Overview

Watershed plans are generally developed for one to four 12-digit Hydrologic Unit Codes (HUCs). An overview of the watershed should include the HUCs covered by the plan, hydrology, geology, climate, land use and land cover, discharges, projected growth and population, source water intakes, number of drinking water customers, and a demonstration of local interest in protection and restoration.

2. Watershed Analysis

A watershed analysis should include water classification and standards, designated uses, water quality impairments impacting source water, the use or watershed function affected by the impairments, and Total Maximum Daily Loads (TMDLs), if applicable. South Carolina designates four uses for fresh and salt waters: aquatic life (AL), recreation (REC), fish consumption (FISH), and shellfish harvesting (SHELLFISH). Other uses that could be affected by water quality impairments include drinking water supply and wastewater treatment. Impairments are important because they indicate that a waterbody currently does not meet state water quality standards based on the intended use of the waterbody. Refer to the following water quality data and impairment status. **A clear objective statement should be included in the watershed plan.**

- **Water Classification and Standards**
- **SC 303(d) list of impaired waters**
- **SC Watershed Atlas**

3. Element A: Pollutant Source Identification

After locating impairments, it is important to identify causes of the impairment and potential sources of pollutants which can later be targeted for improvements. Causes

are what specifically leads to an impairment (sediment, nutrients, fecal matter). Potential sources of bacteria may include livestock in streams, pet waste, failing septic systems, and sewer pipe overflows which would cause human health risks, shellfish bed closures and increased drinking water costs.

Once the impairments, causes, and sources of those impairments are identified for the watershed, the plan should establish targets or goals for the watershed. These goals can be used to create milestones and criteria to measure success. Typically, the goal of a watershed plan is to improve an indicator so that it meets state water quality standards, leads to a removal from the 303(d) list, and/or allows for a particular use. For example, the goal may be to lower bacteria levels in a creek so that it is safe for recreational use.

It may be useful to compile an initial list of impairments, causes, sources, and impacts on waterbody in a table, such as in the example below.

Impairment	Causes	Potential Sources	Waterbody Impacts
Phosphorus	Excess nutrients	Livestock in streams, excess fertilizer, failing septic systems	Recreational and human health risks, algal blooms, taste/odor issues, increased drinking water treatment costs
Turbidity	Sediment	Construction activities, cropland, increased impervious cover	Decreased aquatic life populations, decreased oxygen and light, increased water temperature
Bacteria	Fecal matter	Pet waste, wildlife, failing septic systems, livestock in streams	Human health risks, shellfish bed closures, increased drinking water treatment costs

Element A: Considerations

Are sources of pollution identified, mapped, and described? Are causes identified?

Are loads from identified sources quantified?

Are sources broken down by subwatershed, if applicable?

Are data sources, estimates and assumptions sufficient, cited, and verifiable?

Are existing data gaps identified? Is there a plan to address data gaps?

4. Element B: Load Reductions

Load reductions provide a snapshot of the impact a project will have on reducing pollution in a watershed. Watershed plans should include the current pollutant loading in the watershed and the acceptable loading required to meet water quality standards. If a TMDL calculation has been established for a pollutant in the watershed, it will include the quantifiable amount of pollution that must be reduced in a watershed to meet water quality standards.

In addition, each management measure should be accompanied by estimated pollutant load reductions expected from each measure. These reductions can then be compared to the total amount of pollution that needs to be eliminated from the watershed.

Load reductions are typically estimated by using standard literature values or by running a model. There are many studies that report the amount of pollutants that certain practices either contribute (ex. cattle, pet waste, or failing septic systems) or reduce (ex. rain gardens, wetlands, or riparian buffers). These standard numbers can then be applied to any watershed based on the number of people, livestock, or practices in that watershed.

The best estimates usually come from studies conducted locally or regionally. When possible, use data from studies that have been conducted in South Carolina, in nearby states, or in areas with similar soils and/or land-use. When using literature values, remember to cite data sources so that readers will understand the assumptions and limitations behind the data used to develop the plan. Beyond literature values, several tools are also available to determine pollutant loadings and reductions:

- **Pollutant Load Estimation Tool**

This modified spreadsheet tool calculates the amount of nutrients, biological oxygen demand, and sediment generation in a watershed based on land use, soils, and management practices. It also estimates load reductions for specific management practices.

- **Model My Watershed**

Land use data and stormwater runoff models can be used to show how development can impact water quality.

- **National Stormwater Calculator**

This calculator estimates the annual amount of rainwater and frequency of runoff from a specific urban site using green infrastructure as low impact development controls.

- **Watershed Treatment Model**

Calculates existing land use conditions, future land use, and future retrofit scenarios.

Element B: Considerations

Will expected load reductions ensure water quality standards and other plan goals are met?

Are expected load reductions linked to pollution sources identified in Element A?

Is the complexity of modeling appropriate for the watershed characteristics, the scale and complexity of the impairment and the available water quality data?

Are the estimates, assumptions and data used in the analysis explained, cited and verifiable?

5. Element C: Management Measures

A watershed plan should describe the management measures needed to achieve the goals discussed in the previous sections. These measures can include Best Management Practices (BMPs) that are recommended for implementation in a watershed plan. Measures and practices can control pollutant loads to waterways by:

- Reducing the availability of pollutants (ex. fixing a failing septic system)
- Slowing the transport of the pollutant to the waterbody (ex. detention pond)
- Treating the pollutant before it reaches the waterbody (ex. riparian buffer)

Measures can be structural, on-the-ground practices that reduce pollutant loads before they reach nearby waterways (ex. building a fence to keep cattle out of a stream) or nonstructural, which are practices that focus on behavior change to address a pollutant at its source (ex. educating homeowners on picking up pet waste). Educational management measures can be described separately as part of a larger education and outreach program.

Be sure to list all potential structural measures that could be implemented. In addition to determining the type of management measures needed, thorough plans will also include the identification of target areas for management practice installation. Certain

areas of the watershed may be prioritized to protect valued resources, take advantage of stakeholder cooperation, or reduce costs. For example, management measures could be concentrated on property closest to the stream of interest, near monitoring stations with the most standards violations, or around heavily used recreation areas. Watershed plans should include maps that display the project area, priority parcels, and other watershed information.

Another crucial component of structural BMP implementation is maintenance as the function of structural BMPs is only as good as its maintenance. A plan should acknowledge and state that all structural BMPs will have a maintenance plan enforced by the responsible party.

There are numerous resources on BMP design. A few examples are listed below:

- **National Resources Conservation Service (NRCS) Practice Standards**

Contact your local NRCS office for assistance with design and installation.

- **International Stormwater BMP Database**

This database contains over 700 BMP studies, performance analysis results, tools for use in BMP performance studies, monitoring guidance, and other study-related publications.

- **SCDES Best Management Practices Handbook**

This manual includes practices for erosion and sediment control, runoff control, and low impact development.

- **National Menu of Stormwater Best Management Practices**

This searchable database includes education, construction, post-construction, and pollution prevention measures.

- **Best Management Practices for Georgia Agriculture**

This manual provides descriptions, effectiveness, and relative cost of BMPs that are understood to protect surface water quality in Georgia.

- **Quick Reference Guide for Best Management Practices**

This guide provides BMP examples and their functionality in a watershed model and was developed by the Chesapeake Bay Program.

- **Agricultural BMP Handbook for Minnesota**

This handbook includes definitions, effectiveness based on scientific literature, and economic considerations for many BMPs.

Element C: Considerations

Does the plan describe BMPs that will address the causes of pollution identified in Element A? Have critical and priority areas been identified?

Is the rationale given for the selection of BMPs?

Are BMPs applicable to the pollutant causes and sources? Are they feasible?

Are the BMPs linked to load reductions identified in Element B?

Have BMPs been mapped?

In selecting and siting the BMPs, are the estimates, assumptions and data used technically sound?

6. Element D: Financial and Technical Assistance

Financial and technical assistance are critical to implementing a watershed plan. Cost estimates for management measures including salaries, regulatory fees, supplies, equipment, and contractual work should be established during the planning process. Knowing generally how much a plan will cost to implement makes applying for implementation funding quicker and easier.

Sources of financial assistance to implement management measures can include:

- Section 319 grants for nonpoint source implementation projects
- SC Clean Water State Revolving Fund
- USDA's Environmental Quality Incentives Program and Conservation Reserve Programs
- Local government stormwater fees and capital improvement funds
- Federal grants
- In-kind donations of labor, equipment, supplies or cash

It is also important to consider what kind of technical assistance will be needed to implement the watershed plan. For example, specific expertise may be needed for best management practice design, siting, and implementation, as well as developing monitoring or outreach programs.

Element D: Considerations

Are sources of needed technical assistance included?

Does the plan describethe anticipated involvement of assisting organizations or volunteers? Are cost estimates included? Are they reasonable?

Does the cost estimate include all planning and implementation costs? Are potential funding sources listed?

Is there an estimated contribution from each funding source?

7. Element E: Education and Outreach

In the planning stages, it is important to engage community members in identifying water quality problems and solutions and to solicit partners for executing the plan. Education and outreach are also important components of a watershed plan. Outreach can be viewed as a nonstructural best management practice in which the goal is to change behaviors that contribute to water quality problems. For example, a watershed plan may recommend educating residents and visitors about picking up pet waste so that it does not run off into nearby streams.

Effective outreach aimed at changing behavior typically follows these five steps:

1. **Identify the problem.** In watershed plans, this is usually the pollutant of concern the plan is targeting.

2. **Set goals.** This includes the overall vision or outcome of an outreach campaign.

3. **Identify undesirable behaviors contributing to the problem**. Outline what people are doing that needs to be changed.

4. **Identify appropriate behaviors to reduce contributions to the problem.** Outline what people in the watershed should be doing.

5. **Get to know your audience.** Find out who, specifically, is doing the undesirable behaviorto teach them good practices.

This process should be repeated for each target audience, based on what behavior should be encouraged or changed. It often takes multiple outreach efforts before people will adopt a new practice. Having partners who know people in the watershed is therefore essential to establishing those relationships needed to encourage adoption of management measures. **EPA's Watershed Academy** page has more information and resources on education and outreach.

Element E: Considerations

Does the plan identify relevant stakeholders?

Are there sustainable mechanisms to keep the public informed about the plan and its implementation?

Does the plan include methods to engage stakeholders and landowners in participation and implementation?

Do education measures affect behavior change?

Does the education process prepare stakeholders for BMP operation and maintenance after implementation is complete?

Was there active and diverse public participation in the plan's development?

8. Elements F and G: Implementation Timeline and Milestones

Watershed plans should include the milestones or measurable tasks necessary to implement the plan, understanding that goals and milestones may change over time. Groups should prioritize goals and tasks and assign a time frame to each. Milestones should include pre-construction activities such as identifying funding options, securing funding, obtaining permits, and developing engineered designs, as well as project implementation tasks. Milestones are measurable, incremental actions toward reaching a water quality improvement goal while the implementation schedule is the overall timeline for aspects of implementation.

Elements F and G: Considerations

Does the schedule include a logical sequence of implementation actions needed to meet plan goals?

Is the schedule appropriate based on the complexity of the impairment and size of the watershed?

Are identified milestones measurable and attainable?

Does the plan identify incremental milestones with anticipated completion timeframes?

Does the plan include progress evaluations and possible adjustments, or revisions as needed?

Are the milestones linked to the schedule in Element F?

Below is an example of a milestones and implementation table.

BMP	Milestones	Timeline		
		Year		
		1	2	3
Pursue Funding Sources	Work with partners to consider funding options	✓	✓	✓
	Apply for funding	✓		
Land Protection	Prioritize parcels for protection	✓		
	Send targeted mailings to priority landowners	✓	✓	
	Pursue conservation easements on prioritized parcels		✓	✓
Septic Tank Repair or Replacement	Send targeted mailings to homeowners and septic contractors	✓	✓	✓
	Provide educational materials, workshops, and presentations	✓	✓	✓
	Replace 50% of all failing septic systems	✓	✓	✓
Livestock BMPs	Prioritize parcels	✓		
	Conduct outreach to landowners	✓	✓	✓
	Install exclusion fencing		✓	
	Install alternate water sources			✓
Stream Restoration	Identify priority areas	✓		
	Identify and obtain necessary permits	✓	✓	
	Channel grading and stabilization		✓	✓
	Install native vegetation for buffer		✓	✓
	Host educational workshop			✓

9. Element H: Evaluation Criteria

All watershed plans should include a way to track plan progress and determine if plan goals are being met or if they need revision. Criteria should be established for each management measure as well as for the overall success of the watershed plan. Evaluation criteria should be measurable and quantifiable. For example, a plan might include tracking the number of management practices installed, or the percentage of samples meeting water quality standards. A plan could also include criteria that compares response rates before and after an educational campaign.

Element H: Considerations

Are criteria measurable and quantifiable?

Do the criteria effectively measure progress toward load reduction goals? Are target achievement time frames identified?

Does the plan include a process to determine if anticipated reductions are met?

10. Element I: Monitoring

As water quality improvements are the ultimate goal of watershed plans, it is critical to outline the type of monitoring necessary to measure this goal. Watershed plans will include SCDES monitoring information, however plans should outline an ideal monitoring strategy which may go above and beyond SCDES monitoring. This section should reflect what type of monitoring a group believes is necessary to fully identify and measure progress towards water quality goals as well as acknowledge any monitoring that is currently being conducted.

As with other plan elements, visuals are useful for strategically assessing monitoring needs in a watershed. Watershed plans should include a map with the key waterbodies, existing monitoring stations, and potential monitoring locations to clearly communicate the monitoring strategy. Some resources for monitoring data in South Carolina include:

- SCDES Surface Water Monitoring Program
- USGS Water Data

- SC Adopt-a-Stream
- Universities
- Municipalities including those with MS4 programs
- Water Utilities

Element I: Considerations

Does the plan describe how monitoring will be used to evaluate the effectiveness (in reducing loads to the waterbody) of the implementation efforts?

Will the monitoring plan effectively measure the evaluation criteria identified in Element H?

Are the monitoring methods, including parameters, number of sites and frequency of sampling, appropriate and adequate?

Will the monitoring method link the load reductions from implementation to improvements in the waterbody?

Putting It All Together

The final draft version of your watershed plan will be submitted to SCDES Nonpoint Source Staff for review. Changes, corrections, and suggestions may be made by SCDES staff to be completed before the plan is approved. Once a plan has been approved, it should be made available to watershed stakeholders and to the public as a resource to aid in watershed protection and restoration efforts. Plans which have been funded by a Watershed Plan Development Grant will be published on the SCDES webpage and the SC Watershed Atlas.

Watershed plans should be revisited periodically to include additional components, changing conditions, data, and goals, or revised to cover additional HUCs or BMPs. A watershed plan provides an excellent opportunity to educate community members about key water quality issues and get them involved in restoration activities.

Important Notes to Remember

- The overall goal of a watershed plan is to provide a **plan for implementation** of the recommendations made in the plan to ***address known water quality impairments.***
- Only discuss pollutants that are **addressed by recommendations** made in your watershed plan.
- **Proofread** the watershed plan for grammar, spelling, and formatting before submitting for review.
- Provide a **draft plan to stakeholders** for review before submitting to SCDES
- Submit the full draft to SCDES for approval only after it has been **thoroughly reviewed by all authors** and direct participants.
- Focus on **sources of pollution** and **measures to reduce them** rather than crunching data.
- SCDES staff, including the NPS Coordinator and Watershed Coordinators, are available for technical support and guidance throughout this process. Please visit the **Watershed Program webpage** for Contact Information.

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