Integrated Planning in Action

2017 RVA Clean Water Plan

Richmond, Virginia

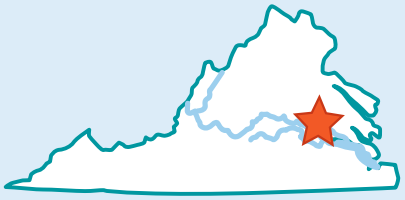
Richmond's business district seen from the south bank of the James River, just above the river's fall line. Photo courtesy of West Cary Group.

RVA H2O

EPA Region 3

227,000 *population*

CSO MS4 WWTF



Richmond is the capital of Virginia, home to about 227,000 people. The James River, Virginia's largest river and the largest tributary to the Chesapeake Bay, runs through the capital. The James River cuts through the heart of the city and has rapids that are popular with boaters and whitewater rafters.

The city of Richmond manages three water utilities: wastewater, stormwater, and drinking water. Flows from Richmond's combined and separate sanitary sewer systems are treated at the city's wastewater treatment facility[1], which discharges into the James River. About two-thirds of Richmond is served by a storm sewer system[2]. Stormwater discharges and combined sewer overflows (CSOs) also flow into the James River, as well as its tributaries.

Challenges

Stormwater, discharges from the wastewater treatment facility, and sewage overflows contribute bacteria, sediment, and nutrients into Richmond's local waterways and ultimately the Chesapeake Bay. Requirements to control and reduce pollutant discharges to the James River and its tributaries historically were defined in many separate permits, orders, and regulations. These separate water quality requirements included waste load allocations associated with total maximum daily loads for bacteria, nitrogen, phosphorus, and sediment in three separate permits: a permit for wastewater treatment facility discharges, a wastewater treatment facility general permit for nutrients, and a permit for stormwater discharges. Richmond also agreed to a 2005 consent order from the Virginia Department of Environmental Quality to better regulate CSOs through a long-term control plan (LTCP).

Integrated Planning in Action

In 2014, Richmond began a stakeholder-driven integrated planning process to gain efficiencies in managing multiple water quality requirements and make progress toward its clean water goals. This process emphasized stakeholder involvement because of the importance of water quality to many groups and the general public, and because of the need to collaborate to achieve goals. Another primary driver for Richmond was to develop a single integrated permit that complies with an aggregated waste load allocation for the city's wastewater treatment facility, CSOs, and stormwater discharges. Both the city's and the community's goals guided a list of comprehensive water protection-based strategies for the plan. In addition, the city evaluated the impact the existing regulations would have on residents' water and sewer rates. Based on this evaluation, Richmond determined that it needed to maximize the effectiveness of funds through analysis of alternatives and sequencing of actions to address human health and water quality.

Richmond engaged the public extensively throughout the planning process. The city developed an outreach plan and established a technical stakeholder group that included environmental non-governmental organizations, utilities, community coalitions, city planners, park and river protection organizations, universities, and state regulators. The city used a third-party facilitator to build a trusting relationship with stakeholders and gather useful input. Richmond also created an outreach campaign to promote the city's progress and educate the community about pollution prevention.

[1] "Wastewater treatment facilities" (WWTFs) is a generic term for facilities that treat or manage wastewater, including publicly owned treatment works.

[2] Storm sewers and storm sewer systems can also be referred to as municipal separate storm sewer systems (MS4s). Stormwater discharge permits can be referred to as MS4 permits.

Estimated Five-Year Costs of Richmond's Proposed Strategies

Strategy	Capital Cost	Operation and Maintenance Cost (Five Years)	Total Cost
Riparian restoration	$900,000	$200,000	$1,100,000
Storm sewer green infrastructure	$10,500,000	$2,000,000	$12,500,000
Combined sewer green infrastructure	$2,600,000	$750,000	$3,350,000
Stream restoration	$1,700,000	$1,200,000	$2,900,000
Planting native species	$70,000	$95,000	$165,000
Planting trees	$1,600,000	$600,000	$2,200,000
Land conservation	*	*	*
Water conservation	$220,000	$50,000	$270,000
Pollutant reduction in storm sewer areas	$16,385,000	†	$16,385,000
Total	$33,975,000	$4,895,000	$38,870,000

** The city did not estimate costs for the land conservation strategy.*
† The city will estimate operation and maintenance costs for street sweeping and catch basin cleanout activities for each of the five years of the permit.

The city's water quality managers and stakeholders produced a common set of integrated planning goals (see box below). For each goal, the stakeholders developed multiple objectives, then evaluated the strategies to achieve these objectives (see table above). For example, the pollutant reduction strategy included illicit discharge special studies and best management practice performance modeling to reduce pollutant discharges in the storm sewer areas.

The city then modeled the strategies to see how effective they would be in meeting Richmond's permit requirements, water quality standards, and other integrated planning objectives. The planning team developed specific metrics and associated targets for each strategy, such as pounds of pollutant removed, linear feet of stream restored, and acres of tree canopy planted.

The city estimated the costs of nine strategies for the first five years of implementation would be about $39 million (see table above). Richmond estimated a longer-term schedule for CSO projects based on its LTCP. Capital, operation, and maintenance for Richmond's LTCP CSO infrastructure projects would cost more than $392 million over 30 years.

Richmond's final integrated plan describes a process the city will use to implement individual projects to help meet its targets while keeping affordability in mind.

Results

In 2018, the Virginia Department of Environmental Quality issued Richmond an integrated permit covering the wastewater treatment facility, CSOs, and stormwater discharges. This permit includes aggregate annual waste load limits and monitoring requirements for all systems Richmond manages. The permit holistically considers stormwater and combined sewer system focused projects in light of the benefit-cost ratio and pollution reduction benefits when choosing and implementing projects and practices. Richmond's integrated permit implements the RVA Clean Water Plan, which the city published in 2017 as final documentation of the integrated planning process.

Since it began implementing the RVA Clean Water Plan, Richmond has made significant progress toward its targets. As of January 2020, the city had reached:

- 66 percent of its target for building LTCP CSO projects.
- 623 percent of its stream restoration target, restoring 13,080 more linear feet of stream than planned.
- 23 percent of its green infrastructure target for the combined sewer system.
- 12 percent of its green infrastructure target for the storm sewer system.
- 30 percent of its tree planting target.
- 950 percent of its land conservation target, conserving 103 more acres than planned.

Richmond's Integrated Planning Goals

- Manage wastewater and stormwater to improve the quality and quantity of groundwater and surface water
- Protect and restore habitats to support balanced aquatic and terrestrial communities
- Eliminate redundant activities; be more efficient and effective in addressing wet weather impacts and improving water resources
- Work to identify projects to encourage public participation in reducing water pollution
- Implement land conservation and restoration practices to improve water quality
- Create partnerships to minimize costs and identify the most environmentally beneficial projects
- Maximize water availability through efficient management of drinking water, stormwater, and wastewater
- Provide safe, accessible, and ecologically sustainable water-related recreational opportunities for all
- Collaborate to gather consistent high-quality data to characterize the status and trends of water resources to gauge the effectiveness of restoration efforts