



Stormwater Management Advisory Commission Annual Report FY2019

Approved

raleighnc.gov



Raleigh
Stormwater



Working Together to Manage Stormwater Runoff in Raleigh



Crews installing a new stormwater pipe on Lake Wheeler Rd.

Over the last fiscal year, the City of Raleigh's Stormwater Management Advisory Commission (SMAC) worked with the Stormwater Management Division to effectively manage stormwater runoff and protect natural resources in Raleigh. These efforts resulted in many successes.

This report provides an overview and highlights:

- Stormwater Infrastructure – Implementing major Capital Improvement Program (CIP) projects;
- Drainage Assistance Program – Providing funding for projects on private property to address flooding and erosion issues that impact structures and public safety;
- Raleigh Rainwater Rewards – A cost-share program for voluntary small-scale projects aimed at improving water quality;
- Stream Restoration and Water Quality – Developing larger projects to improve water quality in Raleigh's creeks and streams; and,
- Various program and policy updates.

The Commission does also provide support for other stormwater elements that are crucial to the safety of Raleigh residents and protection of the city's water resources. These areas include fiscal analysis, business services and billing, mapping and inventory, asset management, plan review, sediment and erosion control, development inspections, stormwater control management, illicit discharge and detection, water quality monitoring and permit compliance, communications, and public education.

The Stormwater Management Division also coordinates with the City's Transportation Field Services – Stormwater Maintenance Group, which oversees the inspections and maintenance of about 26,000 storm drains in Raleigh.



This report provides an overview of the Commission's efforts in Fiscal Year 2019 (July 1, 2018 to June 30, 2019):

Stormwater Infrastructure Projects

The Commission received updates and provided input on several stormwater infrastructure CIP projects in FY2019. In this year alone there were:

- 11 major projects under construction at one time valuing \$13.9 million* in construction costs.
- 10 projects completed valuing \$8.6 million (up from seven projects in FY2018).

The Stormwater Management Division expects to finish seven more projects by the end of FY2020.

The Commission also reviewed and offered input on the proposed Stormwater CIP for fiscal years 2020 – 2024.

*This dollar amount includes a project that was managed by the Stormwater Management Division and funded by the City's Transportation Department.



New stormwater pipes on Clark Ave. that will carry rainwater through the drainage system during a storm.

Infrastructure Highlights

Brentwood Today Stream Stabilization

This project is located in a stream channel in the Marsh Creek drainage basin that runs along Greywood Drive (upstream of Huntleigh Drive). Crews reshaped and restored the stream channel and raised the streambed where a dam had breached. This stabilization project transforms the energy of the stream and protects against future streambank erosion. A combination of carefully placed rock structures combined with natural plant stabilization has provided a more functional stream channel, with better aesthetics and more habitat for wildlife.

Durant Nature Preserve Lower Dam Repairs

This project, which is located in the Perry Creek drainage basin, addressed dam safety concerns at the Durant Nature Preserve's lower lake, including fixing the dam spillway, downstream channel improvements, and stabilized the dam's upstream slope. The infrastructure upgrades slow down the flow of water coming from the lake, protect the stream below the dam, and make the dam more stable. Crews also added concrete blocks to the slope of the dam to protect the shoreline and limit erosion. This project was done in partnership with the City's Parks, Recreation, and Cultural Resources Department. The City also displayed public art along the construction fencing to educate residents about the importance of the dam repair and the natural resources in the preserve.

Lake Wheeler Road Culvert Replacement

The project required an emergency repair of a sinkhole and 70-year-old concrete metal pipe that runs underneath Lake Wheeler Road (between Maywood Avenue and Centennial Parkway) in the Walnut



Creek drainage basin. Construction included removing the old stormwater pipe, relocating private utilities, and installing the new 72-inch diameter pipe in three 40-foot segments. This process reduced the installation time, and the project was completed ahead of schedule. The new pipe is designed to last 70 years and restores the drainage infrastructure in this developing area.

Lower Longview Lake Dam Rehabilitation

This \$3.4 million project is located in the Crabtree Creek drainage basin and inside the I-440 beltline in Southeast Raleigh. This work included building an improved outflow structure that retains and controls the flow of lake water going downstream during a large storm. In addition, other dam upgrades were made to meet state dam safety requirements. This improves public safety in the neighborhood where the dam is located as well as downstream areas.

Clark Avenue Culvert Replacement

This emergency culvert replacement in the Pigeon House Branch drainage basin near downtown Raleigh began after a sinkhole formed on a sidewalk along Clark Avenue in August 2018. The sinkhole was caused by cracks around the stormwater structure and the poor condition of the 70-year-old stormwater pipe under the road. The pipe was replaced by two 60-inch diameter reinforced concrete pipes (RCPs) to improve the stormwater infrastructure in this area. The new pipe will last 70 years and allows stormwater runoff to flow more easily through the system during a rain storm.

Newton Road Culvert Replacement

The emergency culvert replacement on Newton Road in the Mine Creek drainage basin was completed in July 2018. The project was reprioritized from a repair to a replacement in May 2018 after four inches of rain fell in North Raleigh within an hour and a half causing damage to the drainage system. The pipe was replaced with a 120-foot-long concrete box culvert that allows stormwater runoff to flow through the system without relying heavily on the overflow pipes during a storm. The new design meets current standards and accounts for a 10-year storm, which is a storm that has a one in 10 chance of occurring in a given year. Staff will continue to explore options to improve the stream channel in this area along East Fork Mine Creek.

Drainage Assistance Program



A stormwater pipe that's extended to reduce erosion on a Toccopola St. property.

In FY2019, the Commission approved 10 projects through the Drainage Assistance Program that are fully funded by the stormwater utility fee. Projects focus on alleviating severe streambank erosion, repairing private storm drainage systems, and reducing flood damage to structures on private property that are impacted by stormwater runoff coming from public streets.

This is the second consecutive year that the Stormwater Management Division completed at least \$1 million worth of projects in a year. City staff finished construction on 13 projects exceeding what was approved in FY2019. This demonstrates the City's commitment to working quickly and efficiently to repair the private drainage systems in Raleigh.



Stormwater staff also continued working on projects that were approved under the former Drainage Petition Policy, which required a shared cost between the City and property owners for stormwater drainage projects.

Drainage Highlights

Crestdale Circle Bank Stabilization

Properties on Crestdale Circle experienced severe erosion from a stream off of Mine Creek. The erosion was within 13 feet of structures at three properties in this area. This impacted the structures' integrity and causes a significant public safety concern to residents. The project stabilized the streambanks with rock structures, sloping the streambank, and planting vegetation. These repairs reduce erosion and property impacts.

Toccopola Street Drainage Improvements

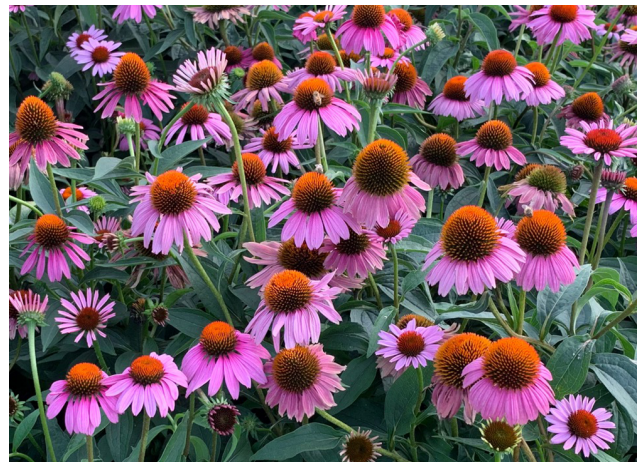
A 36-inch RCP runs between two properties on Toccopola Street. This pipe's outlet, which is in the backyard of one of the properties, was severely eroded reaching within 5-8 inches of a structure. City staff extended this pipe to eliminate the chances of erosion to the structure and to carry runoff more safely through the drainage system.

Raleigh Rainwater Rewards

The Commission completed a full year of approving projects under the updated Stormwater Quality Cost Share Policy for Raleigh Rainwater Rewards. The policy streamlines the approval process for smaller projects that are a shared cost between the City and program participants. Under the new policy, the Commission approved six projects. Raleigh City Council approved two projects. City staff approved 17 projects.

Ongoing communication and collaboration with residents and community organizations has continued to increase the number of projects completed through this program. In FY2018, 18 projects were approved valuing \$234,455 in City reimbursement. In FY2019, 25 projects were approved valuing \$244,458 (Dollar amounts may vary slightly since reimbursement is provided after construction is finished). Also, the number of projects completed increased by almost 200 percent (going from nine projects completed to 26 projects valuing \$347,026).

Notable projects in this fiscal year include a bioretention at the Church of the Good Shepherd on Hillsborough Street, a 2,500-gallon cistern at Leaf & Limb Tree Service on Nowell Road, and a large redevelopment site at Gateway Plaza on Crabtree Boulevard that includes impervious surface removal and several bioretention areas.



Plants that will capture and clean stormwater runoff from the parking lot at Gateway Plaza.



Stream Restoration & Water Quality Projects



Innovative stream restoration that will reduce erosion at Millbrook Exchange Park.

In FY2019, the Stormwater Management Division continued designing stream restoration and water quality projects with support from the Commission and in partnership with various City departments and community organizations.

This includes finishing a project with North Carolina State University's Stream Restoration Program where 11 stone dams and a vertical control structure were installed to capture sediment in the stream and prevent streambank erosion at Millbrook Exchange Park. NCSU engineers will study the stream over the next year to track the benefits of this design.

Projects in the design, study, or construction phase as of June 30 are listed below.

LOCATION	TYPE	PARTNERS	STATUS
Devereux Meadows/Pigeon House Branch	Stream Restoration	Raleigh Parks	TBD
Durant Nature Preserve Upper Lake	Study	Raleigh Parks, NC State University, and NC Clean Water Management Trust Fund	Underway; Expected to be finished in 2019
Millbrook Exchange Park	Stream Restoration; Study	Raleigh Parks, NC State University, NC Clean Water Management Trust Fund	Construction complete; Monitoring underway
Wooten Meadows Park	Stream Daylighting and Riparian Wetlands	Raleigh Parks	Permitting Phase
Glenwood, St. Mary's, and Wake	Bioretention	Raleigh Parks, NCDOT, Raleigh Transportation/Transit	Design Phase
Glen Eden Pilot Park	Bioretention	Raleigh Parks	Design Phase
Peterson Street	Green Street Bioretention	Raleigh Parks	Design Phase
Walnut Creek Wetland Park	Gravel Wetland	Raleigh Parks	Design Phase
Rose Garden	Bioretention	Raleigh Parks	Permitting Phase



Program and Policy Updates

Stormwater Design Manual

Last fiscal year, the Stormwater Management Division received approval from Raleigh City Council to rewrite the City's Stormwater Design Manual. The manual was originally updated in 2002 after the City expanded regulations to address stormwater issues beyond those that were enforced during construction, like stormwater quality, stormwater retention, and stormwater conveyance (the flow of stormwater runoff on developed sites and streets).

Now, there are regulations for stormwater management that are not reflected in the manual. The new manual will include updated and new design information on:

- Riparian buffers;
- Floodplain development;
- Small lot development;
- Water supply watershed issues;
- Lot-to-lot drainage;
- Steep slope regulations; and,
- Green stormwater infrastructure.

The goal is to help the development community and homeowners design and submit plans that are consistent with the correct policies, methods, and requirements so that they can effectively navigate shifting development trends; meet local, state, and federal regulations; design to meet or exceed what is required during construction; and protect the environment.

The City plans to get community and stakeholder feedback while making these updates to the manual. This will take place at the beginning of FY2020. A final version will be reviewed by the Commission, the Planning Commission, and Raleigh City Council. Stakeholders will have the opportunity to comment at each stage of the process. The new manual is expected to be completed in mid-2020.

Flood Monitoring Efforts

The Commission has worked closely with staff to enhance the City's storm and flood monitoring efforts. Over the last fiscal year, the City installed flood monitoring cameras at 8 locations near streams and floodprone areas in Raleigh (16 cameras in total will be installed). The Stormwater Management Division uses the real-time cameras to help monitor creek and road flooding (The City's Transportation Department also uses the cameras to monitor traffic).

In addition, the City started installing flood warning signs that flash when creek water is beginning to flood nearby roads to warn people against entering flooded areas. The cameras and signs allow City staff to:



Flood warning signs will notify residents when water levels reach the road and when a road is flooded.



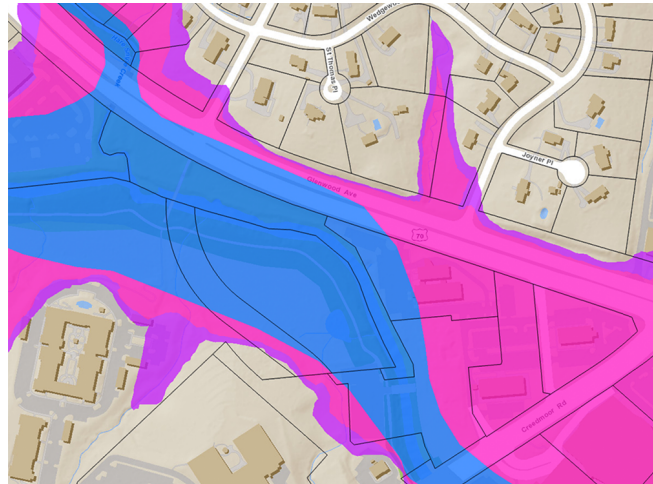
- Provide flood warnings more quickly;
- Help the community proactively prepare for flooding hazards that are not completely preventable; and,
- Confirm the data that's being collected through the stream gauge system with the US Geological Survey.

Flood Hazard Mitigation Program

The Stormwater Management Division continued efforts with the Flood Hazard Mitigation Grant Program to assist residents who have properties in the floodplain and as a result experience hazardous flooding. The Commission provides ongoing support to the City to purchase single-family and commercial properties that are significantly impacted by major flooding because they were built prior to current development regulations. These properties are restored to green space, which allows the floodplain to function more naturally and in turn reduces significant flooding to homes. Projects are both locally and federally funded.

Updating Floodplain Regulations

Following Raleigh City Council recommendation, the Commission and stormwater staff started a stakeholder group process to explore updating floodplain regulations. The goal with the regulation change is to reduce flooding impacts and safety concerns in Raleigh, particularly for floodprone areas near streams and creeks that are expected to flood during a large rain storm. A community stakeholder group including developers, homebuilders, government entities, residents, businesses, real estate, and environmental organizations began meeting in April 2019. They are looking at what can be built in the floodplain; how to improve buildings that are in the floodplain but not built to current regulations; access to structures when it floods; and flood study requirements.



Raleigh's floodplains indicated in blue and pink along Crabtree and Walnut Creek.

Stakeholders also are asking for resident input through an online survey. This survey was distributed by mail and email to 4,300 residents who live in or near the floodplain. Since April 2019, more than 400 people have responded to the survey. Once stakeholder recommendations are made, they will be reviewed by the Commission and Raleigh City Council. If approved, recommendations will go through the ordinance change process.

Green Stormwater Infrastructure

Following direction from Raleigh City Council in May 2019, the Commission developed a plan for exploring how the City may advance the use of green stormwater infrastructure (GSI) in land development. Currently, adding GSI features (like cisterns, permeable pavement, green roofs, and rain gardens) is voluntary. The Commission presented the plan to Raleigh City Council in August 2019. At the meeting, City Council provided additional direction and requested that the Commission continue to work on the plan.



Watershed Planning

The Commission continues to guide the development of an integrated watershed master plan. This project will address:

- Future growth;
- Development;
- Environmental and natural resource protection;
- Sustainability and resilience;
- Fiscal responsibility; and,
- Quality of life.

The plan will provide direction for stormwater management programs that will result in a more comprehensive approach to improving stormwater infrastructure and preserving natural resources.

Lake Preservation

The Commission provided recommendations to improve the City's Lake Preservation Policy. The goal of the updated policy is to provide:

- A clear/consistent framework for investing stormwater funds in lake-related projects;
- Priorities that are based on public/environmental benefit (i.e.: public safety, flood control, water quality, and regulatory compliance); and,
- Flexibility in choosing the best course of action (Preservation vs. a stream restoration and/or creating wetlands).

Rain Barrel Program

The Commission was instrumental in the launch of the City's Rain Barrel Program in September 2018. Through ongoing communication and outreach, there have been nearly 70 rain barrels purchased from vendors in FY2019. Stormwater staff also hosted workshops on rain gardens and rain barrels periodically throughout the year. In an effort to provide ongoing education about rain barrel use to residents - There is a permanent rain barrel display at Walnut Creek Wetland Park and the Thomas G. Crowder Woodland Center.

Education and Outreach

The Stormwater Management Division completed 26 school visits and reached nearly 2,000 students this year. Education includes stormwater-themed storytime, demos, board games, and presentations.

SMAC Mission Statement

The Stormwater Management Advisory Commission will manage resources sufficiently to protect the public infrastructure, quality of life, environment, and property of the citizens of Raleigh through fair and equitable cost-effective means. SMAC recommendations will seek to improve, enhance, and protect the quality of the Neuse River and its tributaries.