

# ANNUAL REPORT

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## STORMWATER MANAGEMENT ADVISORY COMMISSION

FY 2023

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# SUMMARY OF REPORT

The Fiscal Year (FY) 2023 Stormwater Management Advisory Commission (SMAC) Annual Report provides a synopsis of the Commission’s and Raleigh Stormwater’s efforts from July 1, 2022, to June 30, 2023.

## MISSION AND VISION STATEMENTS

### SMAC Mission Statement

Manage stormwater to preserve and protect life, support healthy natural resources, and complement sustainable growth for the community.

### Stormwater Vision Statement

Foster the “Smartest” Stormwater Program possible to economically and equitably achieve our Mission.

## RALEIGH STORMWATER AND CITY COUNCIL

### Raleigh Stormwater Tour

Raleigh Stormwater had the privilege of hosting three City Council members at the Transportation and Field Services Operations Center to showcase stormwater programs, maintenance and repair technologies, upcoming projects, and future initiatives. Reverend Jemonde Taylor, SMAC Chair presented on behalf of SMAC and shared the priorities, responsibilities, and initiatives of the commission in FY 2023.



# STORMWATER INFRASTRUCTURE PROJECTS

[Stormwater Capital Improvement Projects](#) (CIP) includes a five-year projection of projects to address the highest priority project needs in the City of Raleigh. The CIP is developed by staff with input by the Stormwater Management Advisory Commission (SMAC), and the next fiscal year's CIP is presented to and approved by City Council as part of the annual budget. These projects are aimed at protecting public safety, mitigating flooding, improving water quality, restoring aging infrastructure, and improving stormwater system performance across the City. They typically include upgrades, repairs, and improvements to stormwater infrastructure including pipes, culverts, dams, bridges, streams, and stormwater control measures, such as green stormwater infrastructure. The following section highlights the Stormwater CIP projects developed or implemented during FY 2023.

## Stormwater Infrastructure Highlights

### [Glenbrook Drive and Dacian Road Stormwater Improvements](#)

The culverts located at the Glenbrook Drive and Dacian Road crossings of Walnut Creek Tributary 7 (WCT7) stream are undersized and contributing to street, yard, and structural flooding to nearby homes and the project area. In addition, a small undersized drainage pipe is creating a sink hole in the vicinity of two homes on Glenbrook Drive. The City has recently acquired and demolished the two homes to eliminate repetitive flooding issues. Design and permitting for this project are expected to be complete in Fall 2023 and moving into construction late Winter 2024, which is estimated at \$2.5 million.



*Stormwater pipes at Dacian Drive*

### [Glenwood Creston Drainage Project](#)

A series of metal pipes are failing and deteriorating in both the City right-of-way and in the backyards located between Glenwood Avenue and Creston Road, which has resulted in several sink holes forming. The City recently acquired a home on Glenwood Avenue that has a large sink hole near the foundation and the home is anticipated to be demolished in Fall 2023. After completion of the study in Summer 2023, the development of design plans to repair, replace, or rehabilitate the existing pipe system will follow. The City anticipates design for the project to be completed in Spring 2024 with construction starting late Fall 2024.



*Failing metal pipe located on Glenwood Creston*

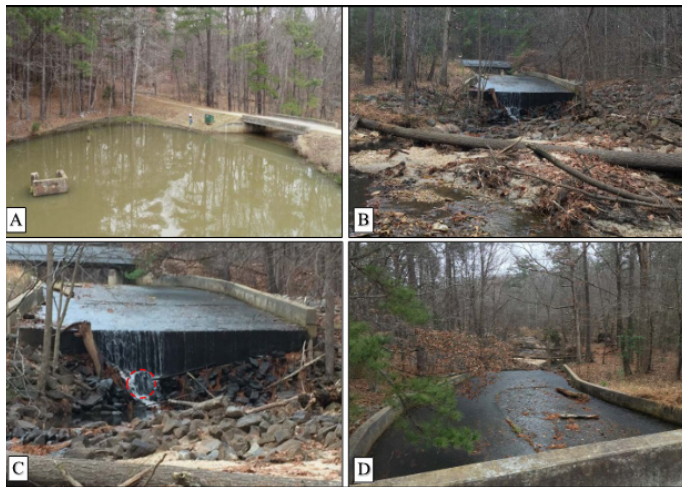
## Western North Ridge Stormwater Improvements

Western North Ridge has experienced a history of flooding due to failing stormwater systems and stream erosion. In FY 2023, Stormwater staff collaborated with a consultant to draft designs for stormwater improvements, coordinated required easements, and plan to begin construction late Summer 2023. Improvements will be made in this area where the stream channel is restricted and where there is severe erosion and is estimated to cost \$5.7 million.

The project includes a number of culvert and pipe upgrades as well as a buy-out of a flood-prone house; these improvements are all aimed at mitigating street and house flooding in this neighborhood.



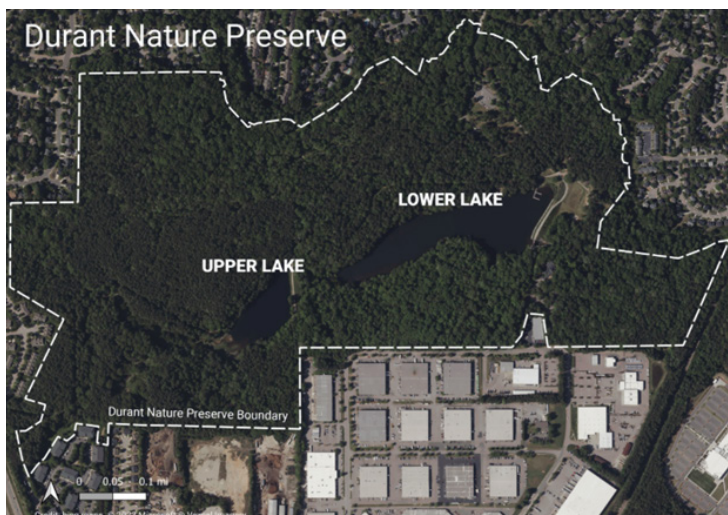
*Stormwater pipes at Western North Ridge*



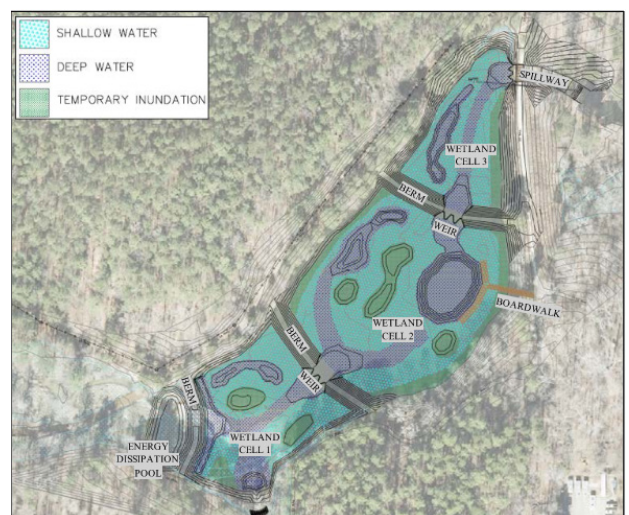
*Failing stormwater infrastructure at Upper Durant Lake (provided by NC State University)*

## Wetland Conversion of Upper Durant Lake

NCSU's Department of Biological and Agricultural Engineering and NC Sea Grant were contracted to assess the Upper Durant Lake to evaluate alternatives for the lake. NCSU developed, compared, and ranked alternatives and concluded that converting the Upper Lake to a wetland system provides the most benefit to the City. In April 2021, City Council approved this conversion and creation of the wetland designs has begun, with construction estimated to begin in 2024. This design and construction of this project is estimated to cost \$3.5 million. The City has also received a \$750,000 grant from the NCLWF for construction.



*Durant Nature Preserve Map*



*Design rendering for Upper Durant Lake*

# DRAINAGE ASSISTANCE PROGRAM

The [Drainage Assistance Program](#) is a voluntary program that helps private residents with flooding and erosion. To qualify for the program, participants must own property in the city, receive runoff from public right-of-way or public property, and be willing to donate a drainage easement to the City of Raleigh.

## Drainage Assistance Highlights

In FY 2023, nine projects were approved under the Drainage Assistance Program. The projects have a total estimate cost of \$1,139,000 and are designed to relieve flooding and severe erosion.

The Drainage Assistance Policy was also revised, which included:

- Removing the Stormwater Utility Fee payment requirement.
- Adding a clause that explained the Drainage Assistance Program would try to meet and exceed City standards when practical.
- Extending the development lookback from one year to two years. Ultimately, this specific change would not provide help to property owners who had development within the last two years.



*Flooding on a private residential property*



*Repaired drainage pipes*

## Drainage Assistance Projects Under Design

Currently, there are 14 Drainage Assistance projects that are in the design phase. These projects are in various stages from going out to bid in the next few months, to earlier stages that include the consultant engineer in the early stages of the design phase.

- |                      |                    |
|----------------------|--------------------|
| • Weldon Place       | • Beaver Dam Road  |
| • Dresden Lane       | • Courtland Street |
| • Old English Court  | • Crandon Lane     |
| • Kayla Court        | • Melbourne Road   |
| • Royal Street       | • E Jameson Road   |
| • Alamance Drive     | • Dahlgreen Road   |
| • Hunting Ridge Road | • Lord Ashley Road |

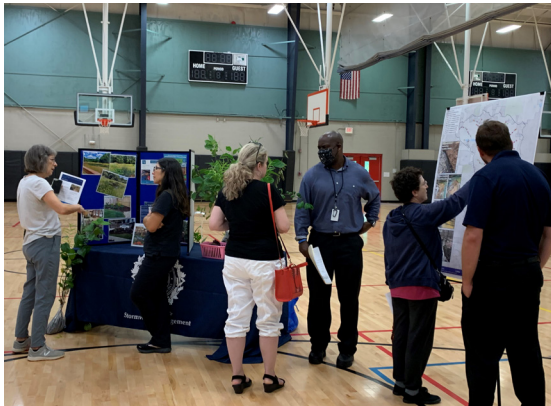
# STREAM STABILIZATION PROGRAM

The [Stream Stabilization Program](#) was created in FY 2023 with approval from SMAC and City Council in November 2022 and helps citizens with erosion that was not immediately a threat to a structure. The Stream Stabilization Program will address streambank erosion projects that would not otherwise be a high priority under the Drainage Assistance Program and thus improve water quality in the city's watersheds.

## Stream Stabilization Highlights

### Stream Stabilization Projects

Raleigh Stormwater has \$500,000 in funding per year for minor to moderate stream erosion projects. Since approval of the program, four stream stabilization projects were approved by SMAC with an estimated total cost of \$485,000.



*Staff at the Pigeon House Watershed Meeting*

### Buffer Builder Bag Program

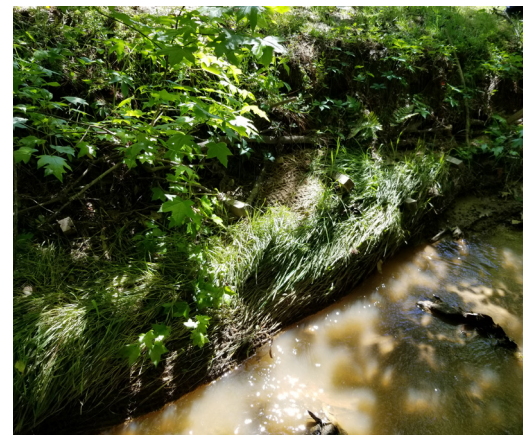
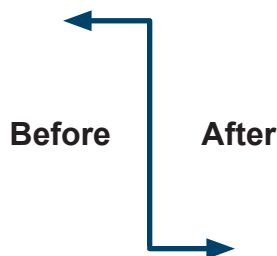
The program also established the Buffer Builder Bag (B3) Program which provides property owners with free native shrub and tree seedlings to help improve or create a streamside buffer on their property. This year, approximately 1,850 live stakes were installed throughout city properties.



*Volunteers at a Stream Bank Repair Workshop*

### Stream Bank Repair Workshops

The program also hosted four stream repair workshops. These workshops are conducted in partnership with NC State University to teach residents simple and cost-effective erosion control measures for their property. This year, approximately 1,200 feet of stream banks were repaired on public and private properties.



# WATER QUALITY INITIATIVES

Raleigh Stormwater established a variety of programs, policies, and initiatives to improve and sustain water quality across the city. By incorporating [Green Stormwater Infrastructure \(GSI\)](#) in public and private properties, investing in stream restoration and repair projects, and updating water quality policies, the city can benefit from improved water quality and environmental health.

## Green Stormwater Infrastructure in Raleigh

In July 2021, City Council endorsed the [GSI Action Plan](#) developed by SMAC and Stormwater staff, and in FY 2023, work on each action is described below.

### 1. Lead by Example

- The GSI Policy and Implementation Guide was drafted with stakeholder input and provided to City Council for review.
- GSI Advocates met with project teams regarding implementation of GSI.
- City staff are collaborating to identify opportunities to utilize GSI as traffic calming measures.
- GSI technical specifications are under development. City staff provided input for revisions to existing and development of new GSI standard details during internal design charrette.
- Over 50 city staff from various departments attended the GSI Construction Inspection Workshop hosted by Raleigh Stormwater.
- Agreements are under development to fund select GSI elements proposed for the East Civic Tower and Dix Park Gipson Play Plaza, which currently are designed to include a green roof, silva cells, bioretention, permeable pavement, and more.
- Stormwater staff led GSI Tours for SMAC and the Wake County Water Partnership.



*City staff participating in the GSI Construction Inspection Workshop*



*SMAC attending GSI Tour at Walnut Creek Wetland Center*



## 2. Support and Incentivize Private Developers

- Stormwater staff began making edits to GSI Details and completed interviews with internal and external stakeholders.

## 3. Include GSI in Rezoning Decisions

- Stormwater staff determined a procedure to establish a menu of rezoning options. This item will be brought to SMAC in FY 2024.

## 4. Include GSI in City's Planning Reports

- Stormwater staff met with planning staff to discuss GSI plans.

## 5. Propose Regulation Changes to Support GSI

- Interviews were completed with internal and external stakeholders.

## 6. Build a Program for Maintaining City-owned GSI

- Hired a new Stormwater Control Measures & Dams Asset Manager to identify and maintain GSI for the city.
- GSI Maintenance Sub-Committee continues to meet to develop cross-department ideas.
- Over 40 city staff from various departments participated in a GSI Landscape Maintenance Workshop hosted by Raleigh Stormwater.



*City staff at the GSI Landscape Maintenance Workshop*

# Water Quality Improvement Projects

## Biltmore Hills Park GSI Retrofits

In partnership with Water Resources Research Institute (WRI) of NC State University (NC State), Raleigh Stormwater completed the design for four bioretention cells, two cisterns, two conveyance swales, and three conveyance stabilizations at Biltmore Hills Park in FY 2023. Once installed, these GSI components will help reduce the amount of stormwater runoff and pollutants entering Rochester Heights Creek. Stormwater staff anticipate a reduction in streambank erosion and frequent nuisance flooding for residents living in the downstream Rochester Heights community.



*Project area at Biltmore Hills Park*

## Worthdale Park Stream Restoration and Stormwater Improvement Project

A feasibility study conducted earlier this fiscal year presented several stream restoration and enhancement concepts for three stream reaches within the park and the installation of GSI retrofits that would help improve water quality in the Walnut Creek watershed, reduce streambank erosion, prevent sediment pollution, and enhance habitat. City staff worked with consultants and the Parks Recreation and Cultural Recourse Department to advance the design to the 90% phase. The final design is expected to be completed in late 2023 and construction will begin in 2024. Construction of the stream restoration and GSI features will be funded by American Rescue Plan Act (ARPA) Funding.



*Park staff reviewing designs at Worthdale Park*

## Millbrook Exchange Park Stream Repair Project

The design for this stream repair project was completed in FY 2023. The proposed repairs include raising the elevation of the streambed, armoring the structures with stone, and constructing a floodplain bench that will be planted with native tree and shrub species to further stabilize the project, provide wildlife habitat, and replace trees that are removed during construction. Construction will take place in Fall 2023.



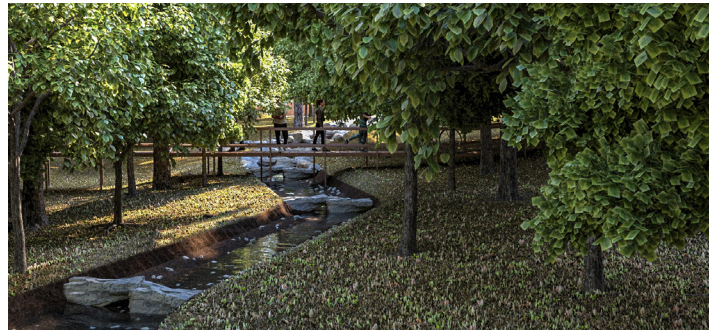
*Damaged in-stream structure at Millbrook Exchange Park*

## Durant Nature Preserve & Spottswood Stormwater Control Measure Improvements

Detailed design has continued for restoration of an existing detention pond and the outfall channel that flows through Durant Nature Preserve. The detention pond will be retrofitted to a wet pond with continuous monitoring adaptive control (CMAC) smart technology, which will increase its water quality treatment capacity. The downstream outfall restoration is designed to protect Lower Durant Lake from erosion. The overall goal of this project is to reduce erosion, improve stream health, reduce sedimentation in the downstream lake, and provide a safe experience for citizens using nearby trails.

### **Water Quality ARPA Projects**

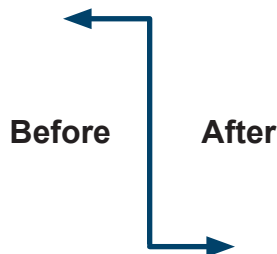
Professional services contracts for two Water Quality projects, [Lions Park Green Stormwater Infrastructure Retrofits](#) project and [Green Stormwater Infrastructure to Mitigate Stormwater & Heat Island Effects](#) project, were solicited through the Stormwater ARPA RFQ (#274-SM2022-0029). Both projects issued a Notice to Proceed to the most qualified firm and are in the planning phase with the design phase estimated to begin in 2024.



*Post-construction renderings of Durant Nature Preserve Stormwater Improvements*



*Pre-construction*



*Post-construction Rendering*

*Lions Park Green Stormwater Infrastructure installation*

# Raleigh Rainwater Rewards Highlights

SMAC supported [Raleigh Rainwater Rewards](#) projects under the Stormwater Quality Cost Share Policy. The policy improves the approval process for small-scale water quality projects that are a shared cost between program participants and the City. Over the last five years, 151 projects were approved (42 by SMAC, 4 by City Council, and 105 by Stormwater staff). In FY 2023, 28 projects were approved totaling approximately \$278,338 and 25 projects were installed and began maintenance terms.

## Cisterns at Marsh Creek Park Greenhouse

The Raleigh Rainwater Rewards program supported the addition of two cisterns at the Marsh Creek Park Greenhouse, increasing the capacity of this system by over 3,000-gallons. This system upgrade includes a passive drawdown device to ensure the cisterns “recharge” between rain events, which will allow the capacity to capture the next rain event regardless of water usage. The captured rainwater will be used to nurture and grow plantings for landscaping throughout bends and projects Citywide.



*Marsh Creek Park Greenhouse*



*Rain Garden installed through the Raleigh Rainwater Rewards Programs*

## Rainwater Rewards Subsidy Pilot Program

In 2022, Raleigh City Council designated American Rescue Plan Act (ARPA) funding to expand outreach and implementation of Raleigh Rainwater Rewards projects in disproportionately impacted communities. The pilot program offers 100% cost reimbursement to property owners, rental properties, and places of worship. Collaboration with a range of stakeholders helped the City develop eligibility criteria to maximize limited funding to target communities that demonstrate the greatest need in response to the pandemic. A series of stakeholder meetings were held to create a team that would help engage the targeted Raleigh communities and to share more information about the program.

# EQUITY AND INCLUSION FRAMEWORK

Raleigh Stormwater and SMAC are continuing to follow the City of Raleigh's equity and inclusion goals to implement these important frameworks into stormwater services, operations, public engagement, CIP project prioritization, and budgeting. Through these efforts, the goal is to economically and equitably achieve the mission and vision of stormwater management.

## Equity and Inclusion Framework Highlights

During FY 2023, Stormwater staff completed the Hare Snipe Watershed Study and began work for the Pigeon House Branch and Rocky Branch Watershed Studies, which have helped to provide a framework to help advance the City's equity goals for stormwater services. The watershed studies received many responses from various, diverse stakeholders. The Pigeon House Branch and Rocky Branch Watershed Studies also request voluntary demographic information from survey respondents, which has been helpful to ensure equitable representation from the community.

Raleigh Stormwater partnered with a consultant team to advance Stormwater's operational equity work. This project has included review of equitable communications, project prioritization, easements processes, fee crediting, and human resources activities for Stormwater.



*Rocky Branch Watershed Study Public Meeting*



*Stormwater staff at the Raleigh Earth Day Event*

Stormwater staff have also made progress in early implementation of the \$3 million received from the City's allocation of American Rescue Plan Act (ARPA) funding to implement priority projects in areas of Raleigh that are disproportionately impacted communities. SMAC will remain actively involved with Stormwater's ARPA-funded projects as they move forward towards completion over the next several years.

SMAC and the Stormwater staff continue to partner with various organizations and City of Raleigh departments, such as the Department of Equity and Inclusion; the Office of Sustainability; Parks, Recreation and Cultural Resources; and Strategy and Innovation, to advance environmental equity, community resilience, and sustainability.

# FLOOD EARLY WARNING SYSTEM

The [Flood Early Warning System](#) (FEWS) allows stormwater staff to proactively monitor flooding through stream and rain gauges, street cameras, and prediction models.

## FEWS Highlights

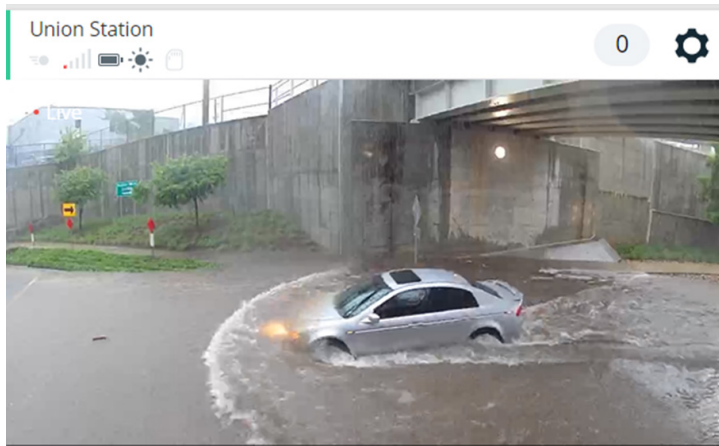
SMAC members continued to support staff in enhancing the City's storm and flood monitoring efforts. This included working with a consultant to add the Neuse River basin modeling to the flood early warning system software, expand Hotspot Area configuration, incorporate Dam Safety Monitoring and Alert Notification, develop and configure "What-if" scenarios web app, develop an Automated Storm Reporting web app, continue End of Monthly (EOM) Hydrometeorology Gage Adjusted Radar Rainfall (GARR) QC and Review, and develop Model Updates for Elevation Rating Curves.

In addition, stormwater staff continued to work closely with partners at the United States Geological Survey (USGS) and installed six new rain gauges and one new stream gauge across Raleigh.

The Flood Warning Sign network was enhanced by switching the sensor devices from Optical Sensors to Flood Sensors which are more reliable. Flashing warning signs were also added at Union Station.

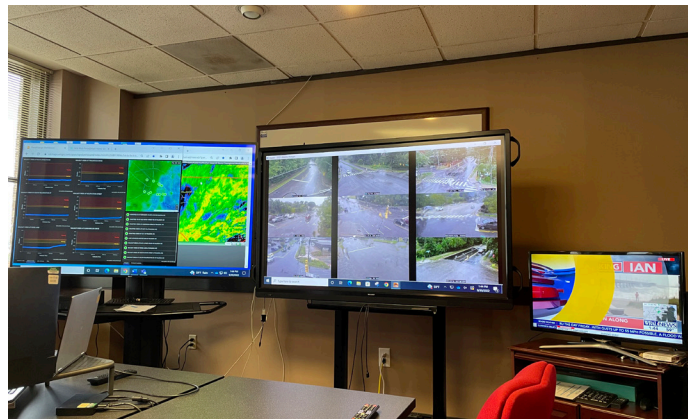


*Stormwater staff installing a rain gauge on Glenwood Avenue*



*Flood monitoring camera at Union Station*

The FEWS Program also continued to build partnerships this year with groups such as USGS, Wake County, the National Weather Service, and the Army Corps of Engineers.



*Flood Early Warning System*

# STORMWATER UTILITY FEE

The [Stormwater Utility Fee](#) provides the large bulk of the revenue to implement Stormwater’s key goals to protect people, property, and local waterways by reducing hazardous flooding, preventing erosion, and preventing pollution from entering streams and rivers.

## Stormwater Utility Fee Highlights

During FY 2023, the Commission reviewed stormwater fee rate options for FY 2024 to present to Raleigh City Council for approval. The fee was subsequently changed from an average residential monthly fee of \$7.18 in FY 2023 to \$7.36 for FY 2024 beginning July 2023. This rate adjustment helped Stormwater to plan for the highest level of service to date for the upcoming FY 2024. Under the new utility fee rate, the stormwater budget for FY2024 is approximately \$36.4 million, with \$13.2 million available for upcoming capital improvement projects. Stormwater also continues to regularly benchmark its fee to other municipal programs and Raleigh continues to provide high service levels for a competitive rate compared to our peers.

# DEVELOPMENT MANAGEMENT

The Development Management team ensures that development projects in the City and Extra-Territorial Jurisdiction (ETJ) meet the City’s requirements to protect the environment and public safety through plan review, construction inspections, and post-construction SCM inspections.

- Post-construction stormwater – Neuse nutrient management to protect water quality and peak runoff controls to prevent flooding.
- Drainage design – requirements for pipes, ditches, and inlets
- Erosion and sediment control – during-construction controls for water quality and runoff
- Floodplain development – for FEMA and non-FEMA floodplains
- Riparian buffer protection
- Water supply watershed protection- additional requirements for overlay districts

In FY 2023, Development Management team completed 15,600 plan reviews, reviewed 861 major sites, and responded to over 300 citizen inquiries related to plan review in addition case-specific correspondence.

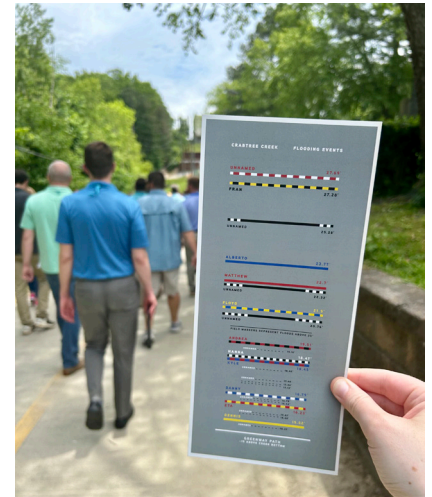
## Floodplain Regulation Highlights

On July 19, 2022, new Federal Emergency Management Agency (FEMA) floodplain maps went into effect, which was Raleigh’s first major update since 2006. As part of the update, all of Raleigh’s FEMA floodplain has now been studied for future conditions, which is defined as basing the hydrology on the current zoning on the property as opposed to the current build out of the property.

In addition, Raleigh’s new floodplain regulations went into effect, which restricts development of vacant lots in the FEMA floodplain areas. This represents a big step forward for the City in its overall mission to be “Stormwater Smart.”

## Alluvial Decoder Floodplain Installation Tour

In May 2023, stormwater staff presented and provided a tour on the Alluvial Decoder Floodplain Installation near Crabtree Creek for the The Association of State Floodplain Managers (ASFPM) Conference. The Alluvial Decoder was installed December 2021 with the goal to educate the public on floodplains, their function, and their importance. Color-coded poles align the installation to highlight flood elevations from various storm events. Educational cards were developed and distributed to further explain the importance of floodplains.



*Alluvial Decoder Educational Card*

## Neuse Nutrient Rules Highlights

On May 1, 2023, changes to the Unified Development Ordinance (UDO) took effect, implementing the [NCDEQ Neuse Nutrient Strategy](#). Changes to development regulations were required with the updated Neuse Rules on April 1, 2020. This included a requirement for local governments to submit updated local programs, including proposed ordinance changes. The City's program was approved in November 2022, with a requirement that new ordinance language be adopted by May 2023. The proposed [Neuse Nutrient Rule Changes](#) (TC-1-232) were heard by the Planning Commission on March 14, 2023 and on April 18, 2023, a public hearing was held and City Council adopted the changes. Online training was provided to the design community on April 20, 2023.

The changes included:

- Stormwater nutrient compliance calculations throughout the City of Raleigh now require use of SNAP Tool rather than the previous calculation method.
- Stormwater control measure (SCM) designs are now required to use the current NCDEQ Stormwater Design Manual, which includes the Minimum Design Criteria (MDCs). The City previously allowed use of the archived NCDEQ manual.
- The term Built Upon Area (BUA) is incorporated into Article 9.2 of the UDO. It is synonymous with impervious area.
- For sites with over 24% Built Upon Area (BUA), a primary SCM is required on-site before off-site credits can be purchased. This replaces the previous threshold amounts.
- The grandfathered lot provisions in UDO 9.2.2.A only apply to lots that are not part of a common plan of development. This puts some small developments into traditional stormwater requirements (UDO 9.2.2.B through H).

## Stormwater Design Manual Highlights

In November 2022, stormwater staff presented a [Stormwater Design Manual](#) update to SMAC. During FY 2023, plan review staff addressed comments on the version 1 and version 2 drafts of the Manual, conducted additional research, and met with internal stakeholders. Staff also composed guidance for the Neuse Rules changes that will be incorporated into the Manual. Updates for SMAC are planned for September 2023 and November 2023.



# ASSET MANAGEMENT

The goal of the Asset Management Program is to make the best use of resources to extend the life of stormwater assets and protect public safety. Stormwater staff continued to implement the Asset Management Program that has been supported by SMAC for Dams and Stormwater Control Measures (SCMs) and Municipal Separate Storm Sewer System (MS4) assets.

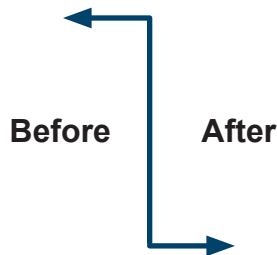
## Dams and Stormwater Control Measures

Advancement of asset management fundamentals included inventorying all City-owned Stormwater Control Measure (SCM) assets and continued effort towards documenting condition. The City currently has 113 SCMs that include both regulatory controls and voluntary measures that were designed to improve water quality. These devices will soon be supplemented by a series of additional devices that are coming out of the construction phase in the project life cycle over the next year. Over the past year, work has been completed by stormwater staff to address maintenance issues identified during annual inspections that resulted in a device not being certified.

Devices in the inventory include:

- Bioretention (41)
- Proprietary devices (13 Filterra)
- Constructed wetland (12)
- Dry pond (10)
- Rainwater harvesting / cistern (10)
- Wet pond (8)
- Underground detention (6)
- Permeable pavement (3)
- Green roof (3)
- Level spreader/ filter strip (3)
- Sand Filter (3)
- Treatment Swale (1)

Discussions are underway that will shape the future of the inventory including lessons learned from rainwater harvesting practices, bioretention, permeable pavement, constructed wetland, and the proprietary devices which have been implemented to varying degrees of success.



*Brentwood Stormwater Control Measure Device*

The City also currently has an interest in 36 dams. Of these structures, fifteen are in parks and seven are associated with previous capital improvement projects. The remaining fourteen structures are associated with City right-of-ways (i.e., roadways would be impacted in the event, however unlikely, of a dam safety emergency).

It is important to note that many of the structures associated with City right-of-ways have complex consortium ownership with private ownership as well as City interest through right-of-ways and/or easements. In 2022, a study was conducted to assess the various project alternatives to address the deficient Camp Pond Dam and is expected to move to the design phase during FY 2024. In 2023, Eastgate Park Dam will undergo similar evaluation consistent with the updated Lake Management Evaluation Policy.



*Eastgate Park Dam Outlet*

## MS4 Asset Management Highlights

The Municipal Separate Storm Sewer System (MS4) assets include pipes, crossline conveyances, inlets, junctions, and manholes. In FY 2023, the MS4 Asset Management Program focused on the following:

- Proactive condition assessment in coordination with the watershed studies
- Developing a process to inspect and evaluate the condition of cross line conveyances (CLCs), such as culverts
- Developing a permit process to receive as-built drawings of newly installed stormwater infrastructure to update the asset inventory
- Continued improvements to the risk framework used to identify stormwater assets with the highest risk of failure. Improvements include integration of the risk model with the asset inventory and inspection data software.

## Stormwater Maintenance Unit

The Stormwater Maintenance Unit (SMU) provides maintenance to the portion of the MS4 storm drainage system that is within the City's Right-of-Way and other areas within public drainage easements. In addition to maintenance, the SMU supports several other programs including Asset Management, Watershed Planning, Drainage Assistance, Education and Outreach, Capital Improvements, and the Leaf Collection Program.

The SMU continues to grow and advance the maintenance capabilities of the City with the support of SMAC. This past year the SMU had another active and successful year of maintenance and system repairs by expanding their capabilities, completing several larger projects and reorganizing to provide better internal and external customer service. The additional staff and equipment supported by SMAC allows the SMU to keep pace with the maintenance needs of the City.



## Expanded Capabilities

The SMU has expanded its capabilities in several ways this past year by purchasing a QuickLock Joint repair system which allows for quick and easy internal pipe repairs on joints or utility bore holes. Our in-house team can repair a failing joint or pipe in a couple of hours with no digging. In addition to the QuickLock system, the SMU took delivery of a water recycling flusher truck. One of the first in the country, the flusher truck recycles water by filtering out solids while it cleans the pipe and reusing the filtered water in the pipe cleaning process. This allows for a much-reduced volume of water being used in the pipe cleaning process and a reduced amount of time to flush a pipe.



## System Maintenance Larger Projects

In addition to routine maintenance and minor repairs, the SMU does several larger system repair projects each year and plans to expand this component of their program in the future. Using in-house maintenance crews to construct larger system repair level projects reduces the project timeline, reduces cost and allows for the City to have a greater level of control over design-bid-build projects. These projects are typically designed in house but can also be consultant designed. Below is the list of projects completed or started over the past fiscal year.

*Stormwater staff performing a pipe repair*

## System Repairs Projects

In addition to routine maintenance and minor repairs performed by SMU, several larger system repair projects are completed each year by either SMU or contractors. Using in-house maintenance crews to conduct larger system repair level projects, reduces the project timeline, reduces cost, and allows the City to have greater control over design-bid-build projects. These selected projects are typically designed in-house but can also be consultant designed.

### Burkwood Lane

The Burkwood Lane project added 310 feet of 24-inch parallel pipe to the existing system on Burkwood Lane which increased system capacity, reduced yard and structural flooding, and reduce reoccurring maintenance requests. This project was completely designed and constructed with in-house staff.

## River Forest

The River Forest project used both pipe excavation and cured in place pipe lining to rehabilitate a stormwater pipe that was failing and creating large sinkholes near a house.

## Burgess Court

This project was designed by consultants and constructed by Stormwater and Transportation staff during FY 2023. The project included a replacement of the headwall for two 84” stormwater pipes. This project was critical as the stormwater infrastructure was under the only access for 61 town homes.



*Burgess Court Stormwater Headwall*

## East Franklin Street

The stormwater inlet at the intersection of East Franklin and North Blount Street has been an issue for years. The catch basin top was a custom design that was continuously being crushed by turning vehicles. SMU staff worked with the Stormwater management staff to modify the box and build a new top that would be less vulnerable to turning vehicles.



*Stormwater Drain on East Franklin Street*

## West Jones Street Emergency Repair

An emergency repair was completed at West Jones Street and North Salisbury Street when a sinkhole opened up in the road. Staff were able to replace 53 LF of corroded metal pipe that caused the sinkhole. The maintenance staff were able to complete the repairs quickly and reopen the street within a few business days.



*Stormwater staff repairing stormwater pipe on West Jones Street*

## Future Annual Stormwater Rehabilitation Project

In FY 2024, staff will begin the first annual stormwater rehabilitation project. This project will include 10 to 12 sites throughout the city where trenchless technology will be implemented to rehabilitate failing stormwater infrastructure. The projects will limit disturbance to each site location through the use of pipe lining. The work will be proactive to address issues before larger surface presenting problems appear.

# Watershed Planning

The watershed planning program seeks to strategically improve stormwater conditions for our customers. SMAC continued to provide input on the watershed planning process which includes a comprehensive look at stormwater conveyance needs, asset renewal, water quality, flooding, and stream conditions in a watershed. SMAC also provided input on the Public Engagement Plan developed to engage the community in watershed planning. In FY 2023, studies were ongoing in the following high priority watersheds:

## Hare Snipe Creek Watershed

This study was completed in FY 2023, resulting in recommended infrastructure projects to address flooding in the watershed and identification of opportunities for water quality improvement projects. The highest priority projects near Battleford Drive, Whispering Branch Road, and Braceridge Road are included in the near term Capital Improvements Plan.



*Hare Snipe Creek Watershed Public Meeting*



*Pigeon House Branch Watershed Public Meeting*

## Pigeon House Branch Watershed

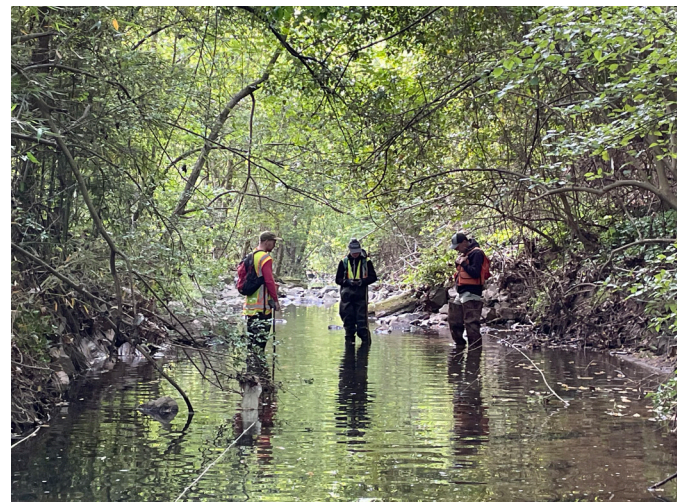
This study was ongoing in FY 2023. Preliminary planning, data collection, and stream assessments were completed. The public survey and Public Engagement Plan were launched. The study will continue through FY 2025. The next phase includes modeling, evaluation of potential improvements, and continued public engagement.

## Rocky Branch & Central Walnut Creek Watershed

In FY 2023, staff collected data, conducted stream assessments, and launched the public survey. The Public Engagement Plan is under development. The study will continue through FY 2025. The next phase includes modeling, evaluation of potential improvements, and continued public engagement.

## **Marsh Creek Watershed**

This watershed was identified as the next area for study. Data collection for this study is anticipated to begin in FY 2024.



*Rocky Branch Stream Assessment*

## Managing Lakes in Raleigh

Stormwater staff continued efforts to manage lakes in Raleigh in conjunction with the updated Lake Management Evaluation Policy to increase public safety, reduce flood risks, protect waterways and watersheds, and adhere to regulatory compliance. Stormwater continued work on planning for the transition of Upper Durant Lake to a more sustainable and resilient wetland habitat system. Several other lake management projects are in progress including Camp Pond Lake and Eastgate Lake, both of which involve technical analysis and public engagement.



*Lake Johnson Dam*



*Eastgate Park Lake*



*Camp Pond Dam*



*Upper Durant Lake*

## MS4 Permit Compliance & Stormwater Management Plan

The Stormwater Division completed the North Carolina Department of Environmental Quality (NCDEQ) Compliance Audit in August 2022. The audit was a success with NCDEQ issuing a Notice of Compliance with no compliance issues noted in October of 2022. In addition, during FY 2023 Stormwater staff updated the City's Stormwater Management Plan, which is available online. Currently, staff is in discussion with NCDEQ staff to finalize new permit language which is set to renew in October 2023. This permit with our Stormwater Management Plan aims to protect local waterways by monitoring and managing runoff throughout the City. Stormwater staff plan to provide permit language and Stormwater Management Plan updates to the Commission over the upcoming fiscal year.

# RAIN BARREL PROGRAM

Stormwater continues to offer a [Rain Barrel Program](#) with partners EPOCH Rain Barrels and Rain Water Solutions. Through the two vendors, the program offers discounted rain barrel sales to promote stormwater pollution prevention.

## Rain Barrel Program Highlights

During FY 2023, staff hosted two rain barrel/rain garden workshops, totaling approximately 17 attendees, to demonstrate how these features operate and how to properly install and use them. Two rain barrels were given away during City Earth Week events in April.

# EDUCATION AND OUTREACH

The Raleigh Stormwater Management Public Education Program Plan sets the context, objectives, and activities for implementing the Public Education and Outreach program. Objectives include raising public awareness on the causes and impacts of stormwater pollution; informing the public of stormwater pollution prevention; educating the public through various forms of media; providing educational materials to businesses and the community at large; coordinating public outreach activities to increase stormwater pollution awareness; and identifying common stormwater pollutants, causes, effects, and ways to reduce them.

## Stormwater Education Programs

Public education and outreach is a requirement of the MS4 permit. Activities include classroom EnviroScape demos, Story Time reading for pre-school and K-2 grades, Green Stormwater Infrastructure (GSI) demos, Touch a Truck Career Day events, STEM events, and the annual Stormwater Capture It! Arts Contest. Approximately 2,500 students have been educated about stormwater.

SMAC was actively involved in outreach and education strategies for various stormwater initiatives throughout the year to improve communication and reach to communities across the city, specifically with the [Stormwater Capture It! Arts Contest](#). Acting in the capacity of a Grand Jury, they reviewed and made the final determination of winning entries for the Art and Video awards. The 2023 contest had an outstanding year with a record 54 entries. SMAC reviewed the top 5 entries in both the art and video categories resulting in a tie in both categories and awarding two winning entries each category. Reverend Jemonde Taylor, SMAC Chair presented the Awards to the students at the Environmental Awards and Earth Day event in April 2023.



*2023 Capture It Art Contest Winner*

# Community Outreach, Engagement, and Volunteering

Stormwater staff participated in a variety of community, educational, and outreach events such as the [Regional Creek Week Celebration](#), Arbor Day, Earth Day, and the Songbird Festivals. Stormwater also attended the Our Creeks, Our Community Festival, which was in commemoration of Walnut Creek Watershed's EPA designation as part of the Urban Waters Federal Partnership.

In addition to public events, a stormwater educational table is present at all stormwater infrastructure and watershed study meetings, giving the public the opportunity to ask questions of various staff members and receive information on all stormwater related services.



*Stormwater staff at the Moore Square Middle School Career Day*

Stormwater offers short- and long- term volunteer opportunities for individuals interested in marking storm drains with 'No Dumping' stickers, collecting baseline water quality data, or removing trash from creeks and streams during organized cleanups. In FY 2023, Stormwater also piloted a [GSI Visual Monitoring Program](#) which helps monitor projects using photos to visually track changes and project growth over time. Approximately 1,200 volunteers contributed 2,171 hours to help remove 23,000 pounds of trash from our streams, mark 800 storm drains, and monitor 8 streams.





# INTERNSHIP PROGRAM

During FY 2023, Stormwater once again participated in the award-winning [Partnership Raleigh Community Climate Internship Program](#) to offer internship opportunities for area college students. Stormwater has also developed several part-time/intern roles that are intended to be ongoing, supporting diverse areas of the program such as flood early warning, stormwater utility billing, GIS, and water quality.

Stormwater's Partnership Raleigh intern from FY 2023 evaluated the largest recorded flood events for Walnut Creek, a work that may also contribute towards a future floodplain educational awareness campaign.

Stormwater and the Commission are continually helping to advance the City's Strategic Plan initiative (GNR 4.4) that focuses on youth engagement with stewardship and environmental education.



*2023 Partnership Raleigh Community Climate Interns*

# STORMWATER MANAGEMENT ADVISORY COMMISSION MEMBERS

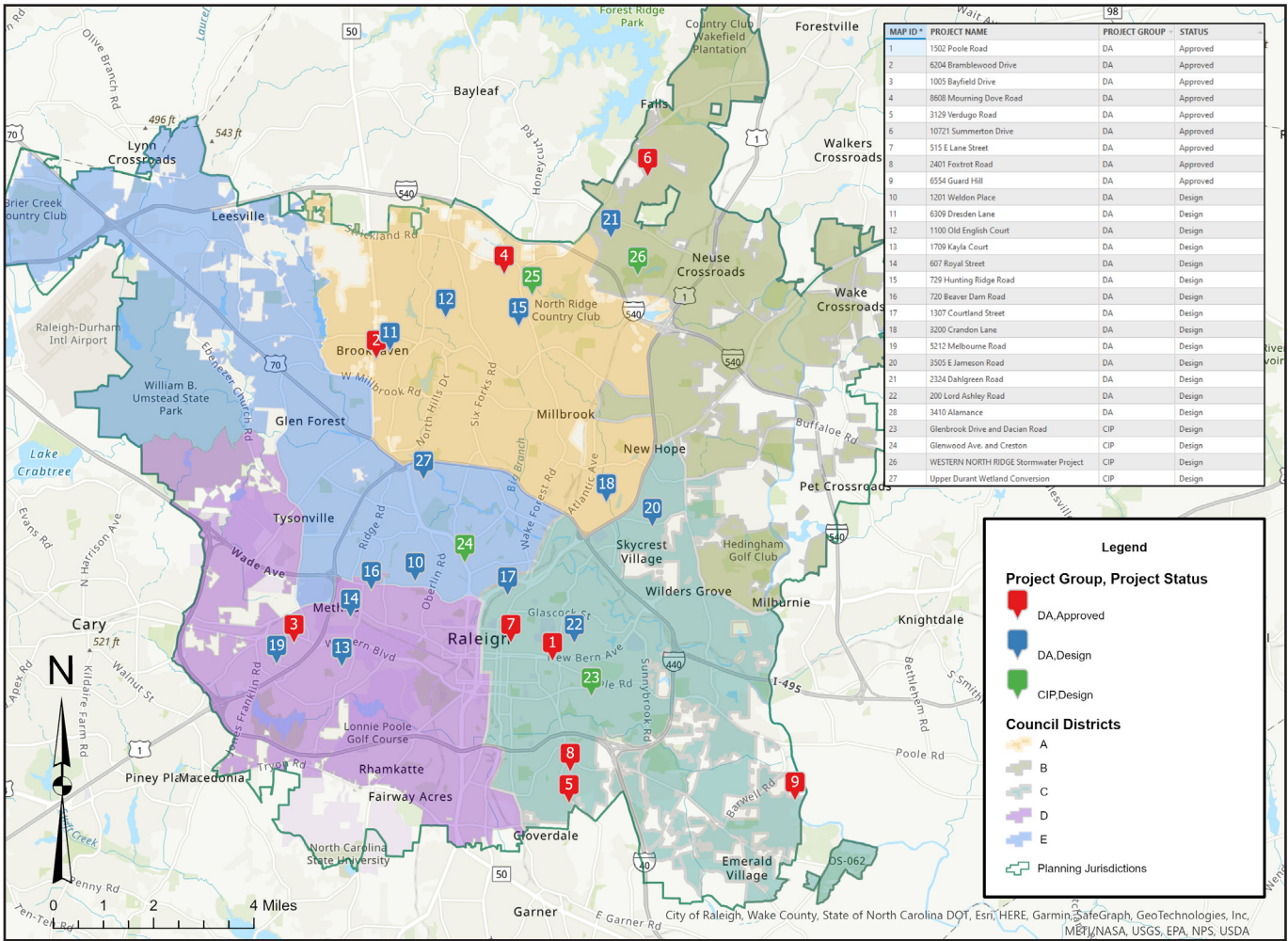


- Reverend Jemonde Taylor — **Chairperson**
- Graham Smith — **Vice Chair**
- Josh Dalton
- Nicola Hill
- Barrett Jenkins (not in photo)

- Samantha Krop
- David Markwood
- Tirrill Moore
- Lou Ann Phillips
- Anne Spafford

# YEAR AT A GLANCE

## FY 2023 Stormwater Projects



### Our Raleigh Residents



**1,200**  
Volunteers



**2,171**  
Hours Worked



**23,000 lbs**  
Trash Removed

### Stormwater Maintenance Unit Summary Statistics

Task	Asset Quantity FY 2022	Asset Quantity FY 2023
Pipes Inspected	5,039 (325,463 LF)	6,550 (481,101 LF)
Pipes Flushed	14,099 LF	12,822 LF
Replaced or Repaired Pipes	689 LF	669 LF
Catch Basins Maintained	691	1,575
Catch Basins Repaired	385	215
Street Sweeping	4,951 miles	7,007 miles