



# City of Raleigh Annual Wastewater Collection System Report 2019 - 2020

# Protecting You and the Environment

Wastewater systems have evolved considerably from early systems in the 1800's. Although the purpose has always been to collect human waste and transport it away from urban areas to protect human health, early systems merely transported the wastewater to a nearby stream, where it was discharged. Today, wastewater systems are not only expected to protect public health, but to also protect the environment as well. In 1972, the U.S. Congress passed landmark legislation entitled the "Clean Water Act" which ensured environmental protection as a performance benchmark for all wastewater systems. Long before the passage of this act, and every day since, the protection of public health and the environment have been the operating standard of the Raleigh Water's wastewater system.

This report provides information about the performance of the three (3) wastewater treatment plants: Neuse River Resource Recovery Facility (NRRRF), Smith Creek Resource Recovery Facility (SCRRF) and Little Creek Resource Recovery Facility (LCRRF) in addition to the performance of the wastewater collection system for the period of July 1, 2019 through June 30, 2020.

To learn more about the wastewater collection system or the treatment facilities, please contact Raleigh Water at 919-996-3245 or visit our web site at: [www.raleigh.gov/water](http://www.raleigh.gov/water)





# Wastewater Collection System

The City of Raleigh provides wastewater collection and treatment services for areas within the City's corporate limits and many areas in the City's Extraterritorial Jurisdictional area (ETJ). Raleigh also provides wastewater collection and treatment services for Garner, Rolesville, Wake Forest, Knightdale, Wendell and Zebulon. Temporary contracts are also in place to treat specific amounts of wastewater from Clayton, Middlesex as well as Johnston County.

The wastewater collection system functions primarily by gravity flow and it consists of approximately 2,600 miles of pipeline ranging from six inches to seven feet in diameter. An average of about 50 million gallons per day (MGD) of wastewater for this reporting period travels through the sanitary sewer collection system to the resource recovery plants for treatment.

The sewer pipes of the collection system are connected by a series of sewer manholes needed for maintenance of the collection system. Manholes in the street are flush with the pavement, while manholes near streams are built higher due to flood plain conditions. Some pipes are located above ground as well (aerial mains), particularly across streams. Ventilation is necessary at most manholes and is provided through vent holes in the lids or separate vent stacks. Although the collection system functions primarily by gravity, 120 public pump stations are necessary to keep the wastewater flowing to the resource recovery plants. Raleigh Water also uses odor control systems on many large volume pump stations and on manhole vents near public greenways to improve odor issues in these areas.

In an effort to continually improve its program the Sewer Maintenance Division fully implemented an ISO 14001:2015 Environmental Management System (EMS). The Sewer Maintenance Division's EMS is a commitment to prevent pollution through continual improvements in environmental performance and compliance with all regulatory requirements, by identifying aspects of activities having significant environmental impacts, setting performance objectives and targets and establishing standards and training for staff, including metrics for measuring performance. These processes allow the Sewer Maintenance Division to operate the collection system in a sustainable manner while contributing to the economic, social and environmental vitality of the communities it serves. Some of the highlights of the EMS in the 2019-2020 reporting period include:

- Maintained 1.38 sanitary sewer overflows (SSOs) per 100 miles of pipe (National SSO average is 4.5)
- Cleaned 320 miles (13%) of sewer line, which exceeded the Collection System Permit's annual system flushing requirement of 10%
- Completed 100% of annual easement inspections as required in the Collection System Permit
- Cleared 35 miles of high priority sewer main easements





# Sanitary Sewer Overflows (SSOs)

Sanitary sewer overflows (SSOs) occur when blockages in the collection system cause sewage to come out of the sewer collection system, which is usually at manhole locations. During the period from July 1, 2019 through June 30, 2020, the collection system experienced 36 SSOs that were 1,000 gallons or greater or that reached surface waters. Of the 36 SSO's, 22 were avoidable, which means they were not caused by excessive rainfall or a structural failure and were the result of preventable issues. Raleigh Water continues to pursue its goal of reducing the number of SSO's by investing millions of dollars to replace sewer lines in poor condition, by employing a fleet of sewer flusher trucks to clear blockages and proactively maintaining pumping equipment to reduce the chance of failure. Debris can be such items as rags, paper towels, "flushable" wipes, feminine hygiene products, etc., all of which are illegal to discharge into the sanitary sewer system. Cooking grease is also not appropriate to pour down the drain as it quickly congeals underground and creates blockages. Raleigh Water has an ongoing education program to educate residents and business owners regarding the need to keep grease and other inappropriate materials out of the sewer system. The following represents the SSO data from the reporting period:

Address	Date	Est. Vol. Gals.	Cause	Receiving Stream
735 CRESTWOOD DR, GARNER	7/2/2019 0:35	7256	Asset Failure	Lake Benson
306 WAIT AVE, WAKE FOREST	7/13/2019 12:25	1400	Debris/wipes	Stormdrain
4905 COOLRIDGE CT, RALEIGH	8/29/2019 16:26	6732	Debris/wipes	Beaverdam Creek
1600 MARLBORO ROAD, RALEIGH	8/29/2019 22:30	10546	Asset Failure	Crabtree Creek
3701 DADE ST, RALEIGH	9/9/2019 14:10	1050	Asset Failure	Stormdrain
5005 OAK PARK RD, RALEIGH	9/15/2019 18:57	13400	Debris/wipes	Unnamed tributary to Crabtree Creek
817 MCMAKIN ST, RALEIGH	10/4/2019 13:40	3000	Grease	Watsons Branch
6701 FOX RD, RALEIGH	11/5/2019 10:00	5100	Contractor Damage	Unnamed creek
7305 CAPE CHARLES DR, RALEIGH	11/16/2019 8:45	8350	Grease	Unnamed creek
3112 COMSTOCK RD, RALEIGH	11/26/2019 12:00	16200	Grease	Retaining pond
7001 PAINT ROCK LN, RALEIGH	12/3/2019 9:25	5040	Vandalism	Neuse Basin/ground
5021 BIVENS DR, RALEIGH	12/19/2019 4:47	7100	Debris/wipes	Unnamed creek
1200 MANCHESTER DR, RALEIGH	1/5/2020 18:30	3000	Roots	Unnamed creek
108 ROSSELL PARK CIR, GARNER	1/14/2020 10:00	1200	Contractor Damage	Storm Drainage
7408 GRIST MILL RD, RALEIGH	1/21/2020 23:27	4180	Grease	Unnamed Creek
11 BLAKEFORD DR, RALEIGH	1/25/2020 9:22	2700	Debris/wipes	Open stormdrain channel
905 SEVENTH AVE, GARNER	1/29/2020 11:30	3400	Roots	Reedy Branch
1900 VARNELL AVE, RALEIGH	2/1/2020 8:50	240	Roots	Creek
2019 PARK FALLS DR, RALEIGH	2/3/2020 11:30	2160	Debris/wipes	Unnamed tributary of the Neuse River
4029 DEEP HOLLOW DR, RALEIGH	2/3/2020 12:45	3950	Debris/wipes	Unnamed tributary in the Crabtree Basin
529 S WILMINGTON ST, RALEIGH	2/7/2020 18:30	3300	Asset Failure	Storm Drain in Walnut Creek Basin
5208 NORTH HILLS DR, RALEIGH	2/10/2020 10:08	3132	Grease	Ground
5606 FOREST OAKS DR, RALEIGH	2/14/2020 17:00	3125	Grease	Unnamed tributary of Marsh Creek
800 ORLEANS PL, RALEIGH	2/22/2020 10:34	3420	Grease	Big Branch
1101 LUPINE CT, RALEIGH	2/22/2020 11:30	3000	Debris/wipes	Lake Johnson
PINECROFT DR & SWEETBRIAR DR, RALEIGH	2/28/2020 7:15	1300	Roots	Big Branch
3620 WILLIAMSBOROUGH CT, RALEIGH	3/7/2020 16:00	2150	Roots	Open stormdrain channel
817 MCMAKIN ST, RALEIGH	3/12/2020 10:30	1215	Grease	Watson Branch Stream
44 E HESTER CT, RALEIGH	3/22/2020 15:15	2300	Vandalism	Unnamed tributary of Buffalo Creek
WAKETOWN DR AND STOCKDALE DR, RALEIGH	4/15/2020 19:27	6260	Grease	Big Branch Creek
1511 GRADUATE LN, RALEIGH	5/4/2020 15:00	3000	Roots	Unnamed creek
3151 CAPITAL BLVD, RALEIGH	5/4/2020 18:45	1575	Debris/wipes	Stormdrain
4029 DEEP HOLLOW DR, RALEIGH	5/26/2020 8:30	900	Debris/wipes	Unnamed tributary in the Crabtree Creek Basin
141 COTTON PAWS ST, RALEIGH	5/29/2020 18:24	1640	Asset Failure	Unnamed tributary of the Smith Creek Basin
514 CAMBRIDGE DR, RALEIGH	5/30/2020 15:51	3180	Grease	Unnamed Tributary in the Little Creek Basin
4000 TRYON RD, RALEIGH	6/30/2020 12:45	120223	Asset Failure	Walnut Creek

# Resource Recovery Facilities

## Neuse River Resource Recovery Facility (NRRRF)

The NRRRF was designed to serve the City of Raleigh and surrounding communities. The facility is located in Wake County, approximately 12 miles southeast of Raleigh, near the Johnston County line and currently can treat up to 75 MGD.

The NRRRF did not experience any NPDES permit (NC0029033) performance violations during the past fiscal year, while treating approximately 46.3 million gallons of wastewater per day. Through improvements and continued excellent operation of the facility, the NRRRF has accomplished 17 consecutive years of 100% compliance, resulting in the facility's Platinum 17 Award issued by the National Association of Clean Water Agencies. The treatment capacity was recently increased to 75 million gallons per day and the solids stabilization process will be converted from aerobic digestion to anaerobic digestion which will provide a fuel source for natural gas powered vehicles in the City's bus fleet and reduce overall biosolids volume. This project will result in a net positive energy yield of 2.12 Megawatts and is expected to be completed in 2022.





## Smith Creek Resource Recovery Facility (SCRRF)

The SCRRF was designed to serve the Town of Wake Forest and was transferred to the City of Raleigh on July 1, 2005. The plant is located in Wake Forest, approximately 14 miles north of Raleigh and operates with a capacity of 3.0 MGD.

The SCRRF did not experience any NPDES permit (NC0030759) performance violations during the past fiscal year, while treating an average 2.1 million gallons of wastewater per day. As a result of the SCWWTP experiencing 100% compliance, it received the Platinum 15 Award, which is issued by the National Association of Clean Water Agencies for 15 consecutive years of such compliance.



## Little Creek Resource Recovery Facility (LCRRF)

The LCRRF was designed to serve the Town of Zebulon and was transferred to the City of Raleigh on October 1, 2006. The plant is located in Zebulon, approximately 24 miles east of Raleigh and operates with a capacity of 2.20 MGD.

The LCRRF did not experience any NPDES permit (NC0079316) violations during the past fiscal year while treating an average of 0.832 million gallons of wastewater per day. The Little Creek WWTP has earned a fifth consecutive Gold Award as no discharge violations occurred during the reporting period. The facility has been in 100% compliance 12 out of the past 13 years.



The following table shows the permit limits and performance history of the resource recovery facilities for this past fiscal year:

Paramater	Permit Limit	NRRRF	LCWWTP	SCRRF
Ammonia-Nitrogen (mg/L)	2.00/1.00/1.00	0.13	0.00	0.14
Fecal Coliform (col/100mls)	200	7	6	2.3
Biological Oxygen Demand (mg/l)	5.00	0.30	0.00	0.50
Total Suspended Solids (mg/l)	30.00	0.10	0.00	0.30
Total Phosphorous (mg/l)	2.00/1.00/2.00	1.33	0.42	0.39
Total Nitrogen(annual pounds)		Permit Limit 687,373 pounds	Permit Limit 26,660 pounds	Permit Limit 70,814 pounds
		Actual Pounds 247,897	Actual Pounds 5,591.26	Actual Pounds 36,306.28
Average Daily Flow (MGD)	75.0/2.20/3.0	46.301	0.832	2.102



# Reuse Water Program

Reuse or reclaimed water [used interchangeably] is defined in North Carolina as effluent from a wastewater treatment plant that is treated to an exceptional high level. Traditionally, reuse or reclaimed water has been utilized primarily to replace potable water in applications where non-potable water is sufficient such as golf course irrigation and industrial cooling towers. Following the severe droughts of 2002, 2005 and 2007, the construction of a reuse water system was an important part of the City's overall strategy to reduce potable water demand and improve drought resilience. This benefit remains a critical element of the City's future drinking water supply plans, as there is also potential to use direct potable reuse water at the Dempsey E. Benton Water Treatment Plant to augment current drinking water resources.

However, due to a Federally promulgated nutrient management strategy adopted in 2003 for the Neuse River basin, reuse water has increasingly become a highly valuable tool to help municipal wastewater treatment facilities comply with these rules. The Neuse River nutrient management strategy strictly limits nutrient (total nitrogen) discharges from wastewater point sources such as the Neuse River Resource Recovery Facility. Raleigh Water was allotted a total nitrogen allocation, or total maximum daily limit (TMDL), which translates to a total nitrogen poundage limit on an annual basis. In response, Raleigh Water upgraded its treatment facilities to comply with the requirements and has been a national leader in nitrogen removal performance.

The ongoing expansion of the reuse system is also a crucial part of this effort, as it diverts treated wastewater and the associated nitrogen poundage from being discharged to the Neuse River.





# Reuse Water Distribution System

The NRRRF uses reuse water for irrigation of the agricultural land that serves the facility. From July 1, 2019 to June 30, 2020, approximately 24 million gallons of reuse water was used to irrigate cropland.

The reuse system has bulk reuse water loading stations at the Neuse River Resource Recovery Facility and Little Creek Resource Recovery Facility . “Bulk” distribution of reuse water allows certified landscape contractors or citizens to obtain reclaimed water at no cost if that person will transport and responsibly use the reclaimed water for approved purposes. The location of the bulk reuse facilities are as follows:

*Neuse River RRF - 8500 Battle Bridge Road, Raleigh, NC*

*Little Creek RRF - HWY 39 (behind the Mudcats Stadium), Zebulon, NC*

The Raleigh service area system also includes a reuse pipeline distribution system and an elevated storage tank. The construction of the fourth pipeline phase to North Carolina State University’s Centennial Campus has been completed.

The Department also operates the Zebulon service area reclaimed water distribution system, which takes treated effluent from the Little Creek Resource Recovery Facility and provides the product to seven permitted customers through 21,400 linear feet of distribution pipe and a 250,000 gallon elevated storage tank.

The following chart shows the total amount of reuse water distributed by the various reuse systems for the reporting period of July 1, 2019 through June 30, 2020.

NRRRF Bulk Reuse Flow	LCRRF Reuse Distribution Flow (inc. bulk)	NRRF Reuse Irrigation Flow	NRRRF Reuse Distribution (off-site)
767,888 gal	55,067,300 gal	24,515,000	316,741,400 gal

No permit violations were experienced during the 2019-2020 reporting period. Further information concerning the reuse program can be obtained by calling 919-996-3700 or by email at [Water.reuse@raleighnc.gov](mailto:Water.reuse@raleighnc.gov).





# Biosolids Program

Sludge is a by-product of all wastewater treatment plants. Biosolids are defined as treated, stabilized sludge and are produced at two of the City's wastewater treatment plants. The city chooses to beneficially reuse these biosolids by processing them into products that can be utilized by local farmers, landscapers and homeowners on both public and privately owned land. Close monitoring of these biosolids product constituents, environmental conditions and the utilization of extensive pretreatment methodologies allow the city to ensure that these products are safe for their intended use.

## Putting Biosolids to Work

The sludge from the Smith Creek Resource Recovery Facility is discharged into the city's sewer collection system and is recovered and processed into biosolids at the Neuse River Resource Recovery Facility. The Little Creek Resource Recovery Facility solids, and a portion of the solids produced at the Neuse River facility, are processed into a Class B biosolids product. This product is then beneficially reused on the City's farm and by local farmers as a fertilizer on agricultural crops. The nutrients in the biosolids are taken up by the crops, which are then harvested and sold for non-human uses such as animal feed.

The Neuse River facility also processes a large percentage of its biosolids into lime stabilized Class A biosolids. In this process, sludge is dewatered with belt presses and blended with lime kiln dust to produce Class A biosolids by raising the product pH and temperature. This material is marketed under the name "Raleigh Plus" and is distributed as a soil amendment to agricultural and institutional properties in the region. Interested customers should call 919-996-3700 Monday through Friday, 8 a.m. to 4 p.m. The final process utilized at the Neuse River facility is to ready its sludge for beneficial reuse through additional processing. A private firm receives a portion of the dewatered primary sludge and produces a Class A biosolids product in the form of compost. Once regulatory requirements are met, the compost is distributed to the public as a soil amendment and growing media. Further information concerning the biosolids program can be obtained by calling 919-996-3700 or by email at:

[Biosolids@raleighnc.gov](mailto:Biosolids@raleighnc.gov)

## Environmental Management Systems

The biosolids Environmental Management System (EMS) at the Neuse River Resource Recovery Facility was first verified through the independent third party process in December of 2006 to become a National Biosolids Partnership (NBP) certified agency, making the biosolids program at the plant an accredited model program. The following year the biosolids EMS earned the designation of Platinum Level Certification. The Platinum Level designation represents the highest achievement of biosolids management and environmental stewardship.

## Internal and Interim Audits

Internal audits help identify strengths and weaknesses of the environmental management program and allow for opportunities to improve the system. Nine internal audits were conducted in 2019 on Control of Contractors; LCRRF Sample Collection; SCRRF Sample Collection; NRRRF Operations Sample Collection; Risks & Opportunities; Operational Controls; Environmental Impacts & Aspects; Biosolids Use; and Internal/External Communication to verify that these processes were functioning effectively and as intended. Findings identified during these audits were addressed through the corrective action process.

The ISO 14001:2015 EMS requires the environmental management system be re-verified every three years with annual surveillance audits conducted in the years between re-verification audits. The third-party audit was conducted in mid-February 2020. During this year's audit, one minor nonconformity and two opportunities for improvement were identified. The nonconformity was addressed through the corrective action process.

If you would like more information on the Environmental Management System or the audit, please contact Emily Fentress: 919-996-3680 or [emily.fentress@raleighnc.gov](mailto:emily.fentress@raleighnc.gov)

Additional information may also be found on our website at:

<https://www.raleighnc.gov/environment/content/PubUtilAdmin/Articles/Biosolids.html>





# Biosolids Program

To coincide with its biosolids EMS, the NRRRF implemented an ISO 14001 EMS for the wastewater treatment operations at the plant. In February of 2014, the NRRRF received ISO 14001:2004 certification for its wastewater EMS; NRRRF was recertified in 2017 to the upgraded ISO 14001:2015 standard. Results of the third party audits are available by contacting Emily Fentress, Utilities Coordinator at: [Emily.Fentress@raleighnc.gov](mailto:Emily.Fentress@raleighnc.gov) or calling 919-996-3680.

## 2019 Biosolids Program Annual Report

The biosolids program at the Neuse River Resource Recovery Facility (NRRRF) is continuing to improve through the use of an EMS approach to managing the program. Some of the highlights of this year's program include:

### Regulatory Compliance:

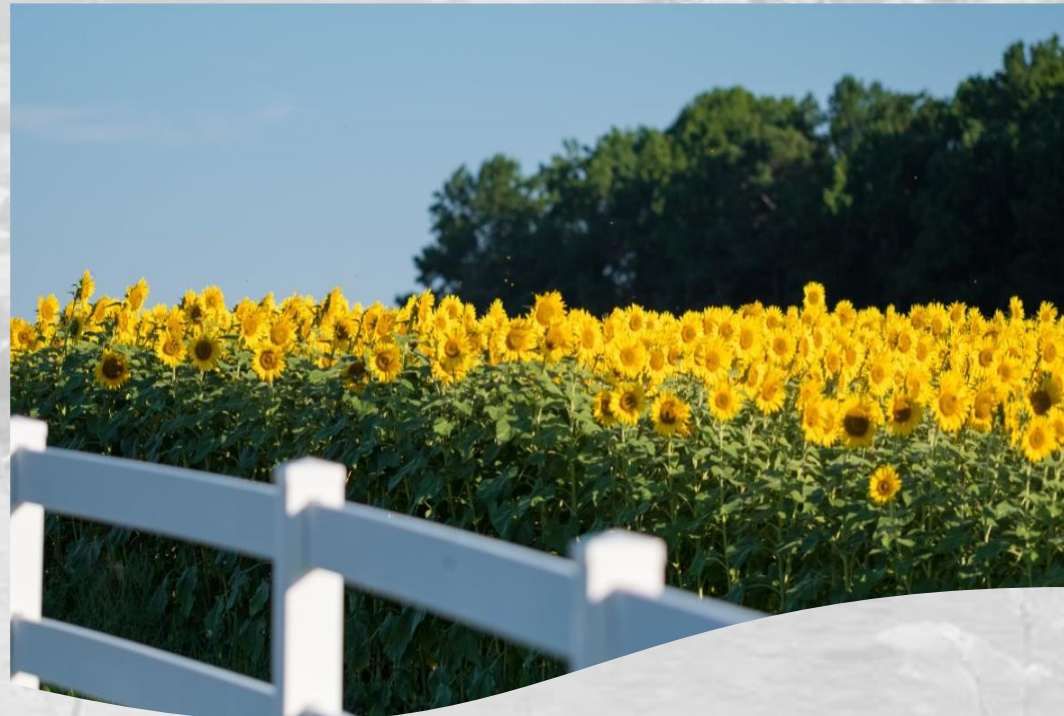
- ◆ 100% regulatory compliance by NRRRF, LCRRF, & SCRRF
- ◆ All of the City's biosolids contractors achieved 100% compliance with City contract requirements
- ◆ Contractor activities include hauling, spreading, and composting. Routine observations are performed by City staff to ensure contractor adherence to applicable regulations.
- ◆ All biosolids produced and distributed met all EPA 40 CFR 503 compliance requirements
- ◆ NRRRF, SCRRF, and LCRRF received Platinum awards from the National Associations of Clean Water Agencies (NACWA) for 100% regulatory NPDES compliance
- ◆ Received recertification of ISO 14001 EMS

### FY2020 Targets & Objectives

100% of established objectives and targets are on target or were completed

### FY 2021 Objectives and Initiatives

- ◆ Provide staff remote access to relevant electronic documents
- ◆ Educate public stakeholders about actions being taken to reduce transient odor impacts
- ◆ Reduce energy intensity
- ◆ Reduce waste
- ◆ Monitor, measure, and maintain risk aversion plans and strategies (SPCC, SPPP, dam EAP, and CSCR)
- ◆ Identify rate of potential needed expansion and/or I & I assessment at LCRRF
- ◆ Monitor contaminants of emerging concern
- ◆ Maintain 100% regulatory compliance/certifications for all Resource Recovery Division facilities





# How You Can Help

The City of Raleigh is committed to protecting the quality of the Neuse River and the environment. The water returned to the Neuse River from the NPDES permitted wastewater treatment plants is of higher quality water by most parameters than when it was removed for drinking water treatment from Falls Lake.

While grease continues to be a significant cause of sanitary sewer overflows in the sewer collection system, you can help Raleigh Water reduce the number of overflows by following these simple steps:

- ◆ *Collect grease, fats and oils from cooking in a container and dispose of it in the garbage instead of pouring it down the drain.*
- ◆ *Place a wastebasket in each bathroom for the disposal of solid waste, disposable diapers, baby wipes, disinfecting wipes, condoms and personal hygiene products. These products **DO NOT** belong in the sewer system.*

Wastewater collection systems are designed to handle only three things – used water, human body waste and toilet paper. It is very important to keep all foreign materials, such as grease and other household debris from entering the system, as these can cause blockages. Most sewer backups occur between the house and the City's sewer main. The property owner is responsible for correcting this problem.

Many disinfecting wipes and baby wipes are touted as disposable, and some are even labeled as flushable, but both contribute to sanitary sewer overflows (SSOs) throughout the sanitary sewer system. Their cloth-like material doesn't break down in the sanitary sewer system like toilet paper but rather blocks sewer lines and clogs pumps throughout the system, which increases maintenance and repair costs. Please help the city reduce costs and protect the environment by disposing of these items in the trash rather than in the sewer system.

Managing unused or expired medications is a safety and an environmental concern. Proper disposal will prevent medications from entering soil and groundwater. Where available, take unwanted or expired medications to a local collection site. The following link includes medication drop locations:

<http://www.wakegov.com/humanservices/publichealth/Pages/dropbox>

Property owners are responsible for the care and maintenance of service lines from their homes or businesses to the sanitary sewer mains in the street. The Raleigh City Code also prohibits property owners from planting trees, shrubs and other vegetation on sewer lines and easements, covering manholes, erecting fences or permanent structures on sewer lines and easements, or damaging sewer lines in any manner.





# How You Can Help

**REPORT SANITARY SEWER OVERFLOWS (SSOs) AND WATER MAIN BREAKS:** To report a sanitary sewer backup, overflow or a water main break please call the City of Raleigh Public Utilities Department at **919-996-3245** (24/7). Thanks for your help!

## **\$50 SSO REWARD PROGRAM**

The City of Raleigh has a Sanitary Sewer Overflow (SSO) Reporting Reward Program. In this program, concerned citizens who are the first to notify the City of an SSO that they observe are rewarded monetarily with a **\$50** check. By promptly reporting the overflow, the City is able to minimize the impact of the overflow to the environment. Although the Public Utilities staff frequently inspect the sanitary sewer collection system every day, with 2,500 miles of sewer mains in the City's service area to maintain, the City certainly needs the help of customers and citizens to find and report these problems when they occur.

## **Illegal Dumping Reward Program - \$5,000 Reward**

Raleigh's service area currently has approximately 2,000 Food Service Establishments (FSEs) that generate grease and that are required to install grease interceptors. The Department is concerned that some of this wastewater from these grease interceptors is being illegally dumped into the sanitary sewer system. Grease and other materials illegally dumped can lead to sanitary sewer overflows (SSOs), which are a public health, environmental and regulatory concern. Reporting a problem or an illegal dumping incident could earn you a \$5,000 reward if you are the first to notify the Public Utilities Department of a confirmed illegal dumping incident. To report anything suspicious or a suspected illegal dumping incident, contact the City of Raleigh Public Utilities Department at 919-996-3245 (24/7).

## **Property Manager Grease Management Kit**

If you reside in an apartment or condo community, make sure your property manager is aware of our Grease Management Kit, which is available to any multi-family community in our service area. The kit is free of charge and includes grease pan scrapers, universal can lids (for grease storage), brochures and informational thumb drives that can be distributed to residents. Keeping grease out of the drain not only can help prevent SSO's in the sewer system, but can also help keep facility plumbing clear and avoid expensive plumbing bills. More information is available at our website or call 919-996-2334:

<https://raleighnc.gov/services/content/PubUtilAdmin/Articles/SanitarySewerOverflows.html>

