



# City of Greensboro Water Resources Department



## Sewage Collection and Water Reclamation Plant Report for 2003

### INTRODUCTION

The Clean Water Act of 1999 (House Bill 1160) requires all entities that own or operate wastewater collection and treatment systems to make an annual report available to their customers. The report must detail how a system operates, how well it performed during the year, what violations occurred, and other information. This report is produced in compliance with these requirements and covers the calendar year January - December 2003.

The City of Greensboro Water Resources Department operates two water reclamation plants and a sewage collection system that collects and transports the sewage to these two plants; some transfer of sewage occurs between the two plants. Following are the professionals designated by the state as the "Operators in Responsible Charge" (ORC) of the respective systems and permits for the systems:

North Buffalo Water Reclamation Facility  
Permit No. NC0024325, ORC Barbara Hicks, 336-373-5913

T. Z. Osborne Water Reclamation Facility  
Permit No. NC0047384, Interim ORC Arthur White, 336-373-7740

Sewage Collection System  
Permit No. WQCS00006  
ORC Rick Roberts, 336-373-2033  
ORC Emory Stewart 336-373-2033

This report is being made available at all City Water Resources Facilities, Libraries, the Melvin Municipal Office Building, and on the City's web site. All customers will be notified of its availability by a printed notice in water and sewer bills that are generated after March 1, 2004. This report has been compiled by staff of the Water Resources Department and its approximate cost was \$1,000.

The information contained herein is accurate to the degree possible:

A handwritten signature in cursive script, appearing to read "Allan E. Williams", is written over a horizontal line.

Allan E. Williams, Director of Water Resources

## System Overview

The sewage collection and water reclamation system of the City of Greensboro begins with approximately 92,000 connections that serve homes, commercial establishments, and industries. Every day an average of 35.9 million gallons of sewage is generated in our homes and industries that must be collected, transported, and treated to very stringent standards before it is released back into our environment (in our streams). This service is provided by the City's Water Resources Department and is funded almost entirely from the user charges that are paid either monthly or quarterly by our customers.

Nearly all of the sewage or wastewater that is generated by customers flows by gravity through sewers that range from 6 to 72 inches in diameter. Greensboro operates over 1,340 miles of these gravity sewer lines. As the lines leave neighborhoods they increase in size to accommodate the flows that are collected from the many areas that are served. These sewers generally follow terrain to take advantage of gravity flow but at certain low points pumping stations are used to push the flow uphill to the next drainage basin and set of lines. The City currently operates 44 pumping stations that range in capacity from 30 to 2,600 gallons per minute.



**Rock Creek Pump Station**

Our sewer collection system transports Greensboro's wastewater to two large water reclamation facilities. The wastewater is processed so that it can be returned to our streams with minimal environmental impact. The North Buffalo Facility and the T.Z. Osborne Facility are permitted to process up to 16 and 40 million gallons of wastewater per day, respectively.



**North Buffalo Plant  
(located off of White Street)**



**T. Z. Osborne Plant  
(located off of Huffine Mill Road)**

Both City water reclamation facilities are large, complex, plants that use physical, chemical, and biological processes to clean the wastewater. It is screened and settled to remove most suspended materials, but the heart of the plant is a biological process that uses bacterial cultures to remove the largest part of the suspended and dissolved wastes that are produced within the city. This biological process, called activated sludge, is sensitive to temperature, high flows produced by rainfall leaking into sewers, and toxic discharges that can be produced by industries or even homes. This sensitivity to factors largely beyond the control of the operators of the plants makes them susceptible to process upsets that can result in discharging constituents beyond the amount permitted by regulating authorities.

## Greensboro's Difficult Location

Many of Greensboro's residents recognize that our location is not ideal for water supply development; our streams are very small because we are at the "top" of the watershed where our streams drain limited amounts of land. What they do not recognize is that this makes wastewater reclamation very

difficult also. The permitting of treated wastewater discharges makes the assumption that streamflow is at the lowest volume so as to offer the protection needed when streamflow is at its lowest. In North Carolina, this means the "7 Q 10" flow, or the lowest seven day flow expected every ten years. The permit limits for discharges takes this level of stream protection into account in calculating the limits; yet it applies 24 hours per day, 7 days per week, 365 days per year. Since Greensboro's limits are calculated for discharging to such small streams, our limits are very low. Not only does North Carolina have some of the most stringent stream standards in the country, Greensboro is a large city located on very small streams. Our discharge flow constitutes over 97% of the stream below our discharge points at the lowest stream-flows; therefore our permits are written so as to protect the streams at all times as though such minimal flow was present.

## Treatment Plant Performance

The City of Greensboro's treatment plants operate under what are called NPDES permits, or National Pollutant Discharge Elimination System permits. These are highly complex permits that include monitoring requirements and discharge limits, some of which vary with seasons and have different maximums for daily values, weekly averages, monthly averages, and quarterly averages. Some limits protect streams from oxygen depletion, such as biochemical oxygen demand (BOD) and ammonia-nitrogen (which exerts oxygen demand over a delayed yet prolonged basis). Some limits are to protect aquatic life in the receiving stream, such as metals like cadmium or selenium or other constituents like fluoride or cyanide. These constituents are limited as low as 2.0 parts per billion and in many cases are lower than drinking water standards, because aquatic life is more sensitive than humans to these materials. One standard, fecal coliform, is designed to test for indicator bacteria to determine whether or not sufficient chemicals have been applied to disinfect the flow prior to discharge. The permits are complex and can be viewed at our treatment plants upon request.



Compliance with these permits requires that our laboratory must conduct over 10,500 tests per year. Any one of these tests may result in a value that causes us to violate the limits of the NPDES permit. When a sample is taken at its specified time, to even accidentally drop it or allow it to linger longer than permitted before refrigeration or analysis can result in a violation. There are some limits, such as cyanide, fluoride, selenium, and cadmium, over which the operators of the treatment plant have no control other than through regulating what industry and households can discharge to the sewers.

During 2003 the Water Resources Department treated over 13.1 billion gallons of wastewater and returned it to our streams.



**Clean Water returned to our streams**

We are proud of the outstanding performance of these facilities that was made possible by the dedicated efforts of the professionals who operate, maintain, and conduct tests for these facilities. However, despite these efforts we reported the following violations of the NPDES permit to the state. Each and every one of these was reported to the State of North Carolina in compliance with all reporting regulations and is included

at the end of this report as **Table 1** (T. Z. Osborne) and **Table 2** (North Buffalo). There were no detected environmental impacts from any of these permit excursions.

### Collection System Performance

The City of Greensboro operates a sewage collection system comprised of 1,340 miles of gravity line, 35,665 manholes, 44 pump stations, and 42.3 miles of pressurized sewage force main. The system is subject to many rules and regulations that are now in effect. Most notably, if sewage escapes from the collection system for whatever reason and exceeds 1,000 gallons, it must be reported to all outlets of the news media. In addition, all spills of any volume reaching a water body must be reported to the State.

Sewage spills from a collection system can be caused by a number of reasons. Tree roots can find their way into sewer lines obstructing them, grease from residences or commercial establishments can collect in sewers and obstruct them, foreign objects can be dropped in sewers or manholes, rainwater can find its way into sewers overloading them, and pump stations can fail for mechanical or electrical reasons. Greensboro, like all cities, has experienced these problems in the last year of operation. A list of sewage spills in excess of 1,000 gallons that reached surface waters is included at the end of this report as **Table 3**. There were no detected environmental impacts from any of these incidents.

The City of Greensboro has an on-going cleaning and inspection program to monitor and maintain our sewer system, including rodding, high pressure flushing, and closed circuit television inspection of lines. The City has an aggressive program to rehabilitate old leaking sewer lines to begin reducing the amount of rainwater entering our collection system. Spending for rehab exceeds \$1.75 million per year.




**Sewer Line Rehabilitation**

We are also enhancing our regulation of grease discharge in those areas where we are experiencing grease buildup in lines. While we maintain generators at many stations and can move mobile generators to the others, we are investigating the installation of automatic backup at stations that experience repeat loss of power that cannot be restored quickly. It should be noted that of the 13.1 billion gallons of sewage produced in Greensboro in 2003 less than 1.2 million gallons escaped our system, which is only 92 gallons per million transported.

### Summary

The Greensboro Water Resources Department is proud that given the capacity of our treatment plants and the age of our collection system, our permit departures have been minimal, especially when compared to similar cities. We recognize however, that in the changing climate of environmental concern, total compliance is demanded by the public. For this reason, the City of Greensboro has embarked on a major capital outlay program to expand and enhance our treatment processes, as well as to begin refurbishing our collection system. This is being paid for in higher sewer and water user fees, but we feel that the public must support this major effort to protect our surface water resources.



**WATER RESOURCES  
ADMINISTRATION**  
336-373-2055

**T. Z. OSBORNE WATER  
RECLAMATION FACILITY**  
336-373-7740

**NORTH BUFFALO WATER  
RECLAMATION FACILITY**  
336-373-5913

<b>TABLE 1</b>			
<b>T. Z. OSBORNE POTW-2003 ANNUAL REPORT VIOLATIONS LIST</b>			
<b>NPDES Permit #NC0047384</b>	<b>Number of Violations</b>	<b>Type of Violation(s)</b>	<b>Environmental Impact</b>
<b>February</b>			
Ammonia-Nitrogen	1	Monthly Average	None Noted
Cyanide	1	Daily Maximum	None Noted
Cyanide	4	Weekly Average	None Noted
<b>March</b>			
Ammonia-Nitrogen	1	Monthly Average	None Noted
Cyanide	2	Daily Maximum	None Noted
Cyanide	1	Weekly Average	None Noted
<b>April</b>			
Cyanide	3	Daily Maximum	None Noted
Cyanide	2	Weekly Average	None Noted
<b>October</b>			
Cadmium	1	Weekly Average	None Noted
<b>November</b>			
Cadmium	2	Weekly Average	None Noted

<b>TABLE 2</b>			
<b>NORTH BUFFALO POTW-2003 ANNUAL REPORT VIOLATIONS LIST</b>			
<b>NPDES Permit # NC0024325</b>	<b>Number of Violations</b>	<b>Type of Violation(s)</b>	<b>Environmental Impact</b>
<b>January</b>			
Cyanide	2	Daily Maximum	None Noted
Cyanide	2	Weekly Average	None Noted
Lab Error - Chlorine Curve Result 1/16	1	Monitoring	Not Applicable
Effluent Sampling Error 1/23	3	Monitoring	Not Applicable
<b>February</b>			
Ammonia-Nitrogen	1	Monthly Average	None Noted
Cyanide	4	Daily Maximum	None Noted
Cyanide	4	Weekly Average	None Noted
<b>March</b>			
Flow	1	Monthly Average	None Noted
Ammonia-Nitrogen	1	Monthly Average	None Noted
Cyanide	4	Daily Maximum	None Noted
Cyanide	4	Weekly Average	None Noted
<b>April</b>			
Ammonia-Nitrogen	1	Monthly Average	None Noted
CBOD	1	Weekly Average	None Noted
Cyanide	3	Daily Maximum	None Noted
Cyanide	4	Weekly Average	None Noted
Bioassay	1	Bioassay	None Noted
<b>November</b>			
Cyanide	1	Weekly Average	None Noted
<b>December</b>			
Cyanide	1	Weekly Average	None Noted

**Table 3**  
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<b>SEWAGE SPILLS FROM COLLECTION SYSTEM EXCEEDING 1,000 GALLONS</b>						
<b>Permittee</b>	<b>Permit Number</b>	<b>Incident Started</b>	<b>Volume Reaching Surface Waters</b>	<b>Surface Water Name</b>	<b>Location</b>	<b>Probable Cause</b>
North Buffalo	NC0024325	2/12/03	1,200	MIDDLE REEDY FORK	5302 SUMMIT AVE	CLAMP BLEW OUT ON CHECK VALVE PLUMBER HAD INSTALLED.
North Buffalo	NC0024325	2/13/03	1,000	NORTH BUFFALO #3	2 SOMMERTON DR	12" MAIN STOPPED WITH GREASE
North Buffalo	NC0024325	2/22/03	55,000	NORTH BUFFALO #2	337 CRIDLAND RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/22/03	75,000	NORTH BUFFALO #2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/22/03	30,000	NORTH BUFFALO #2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/22/03	1,000	EAST FORK DEEP RIVER	7049 ALBERT PICK RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/22/03	1,500	EAST FORK DEEP RIVER	6208 BURNT POPLAR RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/22/03	25,000	HORSE PEN CREEK	4400 OLD BATTLEGROUND RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/27/03	9,000	NORTH BUFFALO #2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	2/28/03	24,000	MIDDLE REEDY FORK CREEK	6430 N. US 29 HWY	POWER FAILURE FROM ICE STORM
North Buffalo	NC0024325	3/6/03	1,200	NORTH BUFFALO #4	2500 SUMMIT AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	1,500	NORTH BUFFALO #2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	40,000	NORTH BUFFALO #2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	45,000	NORTH BUFFALO #2	4400 OLD BATTLEGROUND RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	1,200	NORTH BUFFALO #2	411 PARKWAY AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	1,200	NORTH BUFFALO #2	419 WESTOVER TER	HIGH FLOW FROM RAIN

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North Buffalo	NC0024325	3/20/03	9,000	NORTH BUFFALO #2	337 WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	12,000	NORTH BUFFALO #2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	2,000	NORTH BUFFALO #2	2000 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	2,600	HORSEPEN CREEK	3700 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	1,000	NORTH BUFFALO #2	413 MIMOSA DR	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	3/20/03	2,500	NORTH BUFFALO #4	3306 GATESVILLE RD	HIGH FLOW FROM RAIN
T. Z. Osborne	NC0047384	3/20/03	25,000	EAST FORK DEEP RIVER	7049 ALBERT PICK RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/7/03	2,000	NORTH BUFFALO 2	1514 CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/7/03	30,000	NORTH BUFFALO 2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/7/03	2,000	NORTH BUFFALO 2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/7/03	3,000	NORTH BUFFALO 2	337 WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/7/03	5,000	NORTH BUFFALO 2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/9/03	2,000	NORTH BUFFALO 2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/9/03	3,000	NORTH BUFFALO 2	337 WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/9/03	2,000	NORTH BUFFALO 2	1514 CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/9/03	120,000	NORTH BUFFALO #2	1323 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/9/03	2,000	NORTH BUFFALO 2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/10/03	3,000	NORTH BUFFALO 2	1502 W. LAKE DR	HIGH FLOW FROM RAIN

**Table 3**  
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North Buffalo	NC0024325	4/10/03	2,000	HORSEPEN CREEK	4455 OLD BATTLEGROUND RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/10/03	2,500	NORTH BUFFALO 2	1100 CORNWALLIS DR	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/10/03	9,000	NORTH BUFFALO 2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
T. Z. Osborne	NC0047384	4/10/03	117,000	EAST FORK DEEP RIVER	7049 ALBERT PICK RD	HIGH FLOW FROM RAIN & POWER FAILURE
North Buffalo	NC0024325	4/10/03	5,000	NORTH BUFFALO 2	405 PARKWAY DR	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/10/03	40,000	NORTH BUFFALO 2	337 W. WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/10/03	40,000	NORTH BUFFALO 2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	4/10/03	35,000	NORTH BUFFALO 2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	5/15/03	2,000	NORTH BUFFALO	1321 LATHAM RD	HIGH FLOW FROM RAIN
T. Z. Osborne	NC0047384	5/15/03	1,500	EAST FORK DEEP RIVER	7049 ALBERT PICK RD	POWER OUTAGE DUE TO STORM
North Buffalo	NC0024325	5/22/03	60,000	NORTH BUFFALO #2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	5/22/03	10,000	NORTH BUFFALO #2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	5/22/03	5,000	NORTH BUFFALO #2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	5/22/03	4,000	NORTH BUFFALO #2	337 W. WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	5/22/03	2,000	NORTH BUFFALO #2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	5/23/03	4,000	NORTH BUFFALO #2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	40,000	NORTH BUFFALO #2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	1,500	NORTH BUFFALO #2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN

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North Buffalo	NC0024325	6/7/03	1,500	NORTH BUFFALO #2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	2,500	NORTH BUFFALO #2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	2,000	NORTH BUFFALO #2	905 CRIDLAND RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	1,500	NORTH BUFFALO #2	1100 CORNWALLIS DR	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	2,500	NORTH BUFFALO #2	1100 CORNWALLIS DR	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/7/03	2,500	NORTH BUFFALO #2	337 W. WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	6/8/03	1,800	NORTH BUFFALO #2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	7/4/03	150,000	HORSEPEN CREEK	7 PICCADILLY CIR	BROKEN 20" SEWER FORCE MAIN
North Buffalo	NC0024325	7/5/03	1,500	HORSEPEN CREEK	3812 BATTLEGROUND	STATION SHUT DOWN FOR REPAIRS ON SEWER FORCE MAIN
North Buffalo	NC0024325	7/7/03	1,300	HORSEPEN CREEK	3812 BATTLEGROUND	COMPLETION OF REPAIRS TO SEWER FORCE MAIN
T. Z. Osborne	NC0047384	8/17/03	1,000	EAST FORK DEEP RIVER	7049 ALBERT PICK	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	8/31/03	2,500	NORTH BUFFALO 1	1323 LATHAM RD	HEAVY FLOW FROM RAIN
North Buffalo	NC0024325	9/4/03	2,000	NORTH BUFFALO 2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/4/03	1,500	NORTH BUFFALO 2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/18/03	3,500	NORTH BUFFALO 2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/18/03	2,500	NORTH BUFFALO 2	1514 N. CHURCH ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/18/03	22,000	NORTH BUFFALO 2	1321 LATHAM RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/23/03	3,000	NORTH BUFFALO 2	1018 BATTLEGROUND AVE	HIGH FLOW FROM RAIN



**Table 3**  
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North Buffalo	NC0024325	9/23/03	5,000	NORTH BUFFALO 2	337 W. WENDOVER AVE	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/23/03	2,000	HORSEPEN CREEK	4455 OLD BATTLEGROUND RD	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/23/03	1,200	NORTH BUFFALO 2	1514 N. CHURCH ST	HGH FLOW FROM RAIN
North Buffalo	NC0024325	9/23/03	2,000	NORTH BUFFALO 2	2200 FAIRVIEW ST	HIGH FLOW FROM RAIN
North Buffalo	NC0024325	9/23/03	30,000	NORTH BUFFALO 2	1321 LATHAM RD	HIGH FLOW FROM RAIN