

August 2013

UNION COUNTY, NORTH CAROLINA

DEPARTMENT OF PUBLIC WORKS



WASTEWATER SYSTEM PERFORMANCE SUMMARY

(FISCAL YEAR 2012-2013)

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1.0 INTRODUCTION

House Bill 1160, the Clean Water Act of 1999, was ratified by the North Carolina General Assembly on July 20, 1999 and signed into law by the Governor on July 21, 1999. This legislation placed significant reporting requirements on entities that own or operate wastewater systems. This Performance Summary is intended to establish compliance with this rule.

Union County Public Works (UCPW) is charged with the management, operation and maintenance of the County's sanitary sewer system. During the 2012-2013 fiscal year the wastewater system was comprised of 5 active wastewater treatment plants (WWTP), approximately 65 wastewater pumping stations, and over 600 miles of pipe with 30,306 connections. In addition to the 5 WWTPs which have a combined rated treatment capacity of 8.1 million gallons per day (MGD), the County, through contractual agreement, has 2.65 MGD and 3.0 MGD of purchased capacity at the City of Monroe WWTP and Charlotte's McAlpine Creek WWTP respectively.

Public Works' Mission Statement is as follows:

Develop water, sewer and solid waste infrastructure that supports residential, commercial, industrial and agricultural needs while meeting Federal/State regulations and providing our customer base with acceptable levels of service at cost effective rates

2.0 DEFINITIONS

For the purposes of this Performance Report the following definitions apply:

- **Aerobic** – A condition in which atmospheric or dissolved molecular oxygen is present in the aquatic environment.
- **Automatic Telephone Dialer or ATD** – A device connected to the telephone system that will call programmed telephone numbers to alert people of equipment status.
- **Biological Nutrient removal** – The process of removing nitrogen and phosphorus from wastewater using biological processes as opposed to chemical means.
- **Biosolids** – A primarily organic solid product, produced by wastewater treatment processes that can be beneficially recycled. The word *biosolids* replaces the word *sludge*.
- **BOD – Biochemical Oxygen Demand** – The rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. The BOD Test is a procedure that measures the rate of oxygen use under controlled conditions of

time and temperature. BOD is typically used to express the “strength” of wastewater.

- **CL₂ – Chlorine Residual** – The amount of chlorine present in the final effluent after disinfection. Typically measured in micrograms per liter or milligrams per liter.
- **D.O. – Dissolved Oxygen** – Molecular (atmospheric) oxygen dissolved in a liquid.
- **Effluent** – Treated wastewater flowing from the treatment system.
- **Extended Aeration** – A type of wastewater treatment facility in which the wastewater is retained and treated for a minimum of 24 hours at design flow before discharge occurs.
- **Impeller**- A rotating set of vanes in a pump designed to pump or lift water.
- **Inflow and Infiltration (I&I)** - extraneous water that enters the sanitary sewer system through openings and/or defects in the collection system.
- **Fecal Coliform** – The coliform (bacteria) found in the feces of warm blooded animals. The presence of coliform-group bacteria is an indication of possible pathogenic bacterial contamination.
- **MGD – Million Gallons per Day** – Volumetric measurement of flow converted to millions. Example 150,000 gallons per day (gpd) / 1,000,000 = 0.150 MGD.
- **NH₃ – Nitrogen as Ammonia** – A compound found naturally in wastewater. The compound is produced by the deamination of organic nitrogen containing compounds.
- **NPDES Permit – National Pollutant Discharge Elimination System - Permits**, required by the Federal Water Pollution Control Act Amendments of 1972, which regulate discharges to surface waters.
- **pH** – The expression of the intensity of the basic or acidic condition of a liquid.
- **Pump Station** – A holding tank with pumps that forces wastewater uphill when flow by gravity is not possible.
- **Reclaimed Water** – Highly treated wastewater that has undergone advanced treatment processes to remove solids, organics, and pathogens meeting the State’s Health and Safety Standards for Beneficial Reuse.
- **SCADA** – Acronym for “*supervisory control and data acquisition*”, a computer system for gathering and analyzing real-time data.
- **SBR – Sequencing Batch Reactor** – A type of wastewater treatment facility that treats and discharges water in batches as opposed to continuous flow.
- **SSO** – Acronym for “**sanitary sewer overflow**”
- **Telemetry** – A system by which information pertaining to remote equipment status is transmitted via radio waves to a central location.
- **TSS – Total Suspended Solids** – Particles suspended in a liquid.

- **Turbidity** – The measurement of the clearness or cloudiness of a liquid.

3.0 SYNOPSIS OF WASTEWATER TREATMENT FACILITIES (Fiscal Year 2012-2013)

During the 2012-2013 fiscal year the Department of Public Works operated and maintained a total of five (5) active wastewater treatment facilities and maintained one (1) inactive facility. Although each Permit requires facility visitation daily, excluding weekends and holidays, Public Works' wastewater treatment facilities are checked 7 days per week, 365 days per year. All treatment facilities are equipped with emergency back-up power generators. In addition to SCADA, each facility has both audible and visual trouble alarms. Wastewater treatment plant staff rotate "call duty" for after hour situations that may arise.

A brief overview of each facility and a performance summary table for each facility is provided herein.

3.1 Twelve Mile Creek Water Reclamation Facility

Permit No. NC0085359. Twelve Mile is an extended aeration facility utilizing biological nutrient removal and tertiary filtration. Disinfection is accomplished via UV (ultraviolet light). Twelve Mile effluent is discharged into Twelve Mile Creek, which is part of the Catawba River Basin. The facility is permitted to discharge up to 6.0 MGD of treated wastewater. Twelve Mile Creek WWTP is located at 8299 Kensington Drive and serves Waxhaw as well as portions of Indian Trail, Stallings and Weddington. Please refer to Table 3-1.

3.2 Crooked Creek Water Reclamation Facility

Permit No. NC0069841. Crooked Creek is an extended aeration facility utilizing tertiary filtration. Disinfection is accomplished via UV (ultraviolet light). Crooked Creek effluent is pumped over 17,000 feet to discharge into the North Fork Crooked Creek which lies in the Yadkin Pee Dee River Basin. This facility is permitted to discharge up to 1.9 MGD of treated wastewater. Crooked Creek is located at 4015 Sardis Church Road and serves the Indian Trail, Lake Park and Stallings areas. Please refer to Table 3-2.

3.3 Hunley Creek Wastewater Treatment Plant

Permit No. NC0072508. The facility was taken out of service May 10, 2006, via a flow diversion project and remains inactive. Hunley Creek is located at 6913 Stevens Mill Road. Due to "Inactive Status" of the Hunley Creek WWTP, there was no data to report to Table 3-3 for fiscal year 2012-2013.

3.4 Olde Sycamore Water Reclamation Facility

Permit No. WQ0011928. Olde Sycamore is an extended aeration facility with tertiary filtration. Disinfection is accomplished via UV (ultraviolet light). This facility is permitted to discharge up to .150 MGD of treated wastewater. Olde Sycamore was “up-fitted” in early 2012 to improve operating efficiency (reduced electrical consumption) by implementing usage of fine-bubble diffused aeration versus the former “coarse- bubble” aeration. Olde Sycamore serves the Olde Sycamore Golf Community located off Highway 218 and Rock Hill Church Road. Olde Sycamore effluent is discharged to a man-made impoundment from which it is then pumped onto the Olde Sycamore Golf Course as a source of irrigation. Please refer to Table 3-4.

3.5 Tallwood Estates Wastewater Treatment Plant

Permit No. NC0069523. Tallwood is an extended aeration facility with tertiary filtration. Disinfection is accomplished via UV (ultraviolet light). This facility is permitted to discharge up to .05 MGD of treated wastewater. Tallwood was under construction with a “re-build” project as the older steel structure had served beyond its useful life expectancy. Completion of the new concrete facility occurred and startup happened on April 17, 2013 and the former facility was demolished. Tallwood is located within and serves the Tallwood Subdivision off Brief Road. Tallwood effluent is discharged to Clear Creek, which lies in the Yadkin Pee Dee River Basin. Please refer to Table 3-5.

3.6 Grassy Branch Wastewater Treatment Plant

Permit No. NC0085812. Grassy Branch is an extended aeration facility with tertiary filtration. Disinfection is accomplished via UV (ultraviolet light). This facility is permitted to discharge up to .05 MGD of treated wastewater. Grassy Branch is located at 1629 Old Fish Road and currently serves the Unionville Elementary, Piedmont Middle and Piedmont High School as well as one individual residence, Loxdale Farms Subdivision, and Smith Field Subdivision. Grassy Branch effluent is discharged to Crooked Creek which lies in the Yadkin Pee Dee River Basin. Please refer to Table 3-6.

TABLE 3-1

**Twelve Mile Creek Water Reclamation Facility
NPDES Permit #: NC0085359
Fiscal Year: 2012-2013 Effluent Limits and Performance**

PARAMETER	LIMIT	JUL '12	AUG '12	SEP '12	OCT '12	NOV '12	DEC '12	JAN '13	FEB '13	MAR '13	APR '13	MAY '13	JUN '13
FLOW	6.0 MGD	3.42	3.58	3.48	3.42	3.22	3.02	3.15	3.32	3.35	3.31	3.58	3.53
pH	6-9 SU	7.1-7.5	7.2-7.5	7.2-7.6	7.2-7.6	7.2-7.6	7.2-7.4	7.0-7.3	6.9-7.5	7.0-7.3	6.9-7.2	6.8-7.4	7.1-7.4
BOD₅	5 mg/l	0.1	1.9	4.3	0.0						1.2	0.4	0.5
	10 mg/l					0.2	1.6	0.0	2.5	1.5			
AMMONIA NITROGEN	1 mg/l	0.0	0.0	2.2	0.0						0.0	0.0	0.0
	2 mg/l					0.0	0.0	0.0	0.0	0.0			
TOTAL SUSPENDED RESIDUE	30 mg/l	0.0	0.0	0.0	0.0	0.0	0.4	0.0	5.5	4.4	3.5	3.6	220.0
FECAL COLIFORM	200/100 ml	1	1	2	1	1	2	4	2	2	3	6	12
DISSOLVED OXYGEN	≥ 6 mg/l	8.2	8.2	8.7	8.6	9.0	9.2	9.5	10.0	10.5	9.6	8.3	8.8
COPPER	13.2 ug/l	0.0	1.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZINC	175.0 ug/l	58.0	44.0	31.0	52.0	55.0	56.0	55.0	52.0	51.0	53.0	50.0	48.00
TOTAL PHOSPHOROUS	41.7 #/day	6.77	20.20	0.65	1.26	1.41	1.26	22.85	14.33	18.42	24.97	14.86	17.09

September 2012-Weekly and monthly permit exceeded for ammonia nitrogen due to equipment failure.
February 2013-Copper and zinc were not sampled the week of the 11th as required by permit.

TABLE 3-2

Crooked Creek Water Reclamation Facility
NPDES Permit #: NC0069841
Fiscal Year: 2012-2013 Effluent Limits and Performance

PARAMETER	LIMIT	JUL '12	AUG '12	SEP '12	OCT '12	NOV '12	DEC '12	JAN '13	FEB '13	MAR '13	APR '13	MAY '13	JUN '13
FLOW	1.900 MGD	1.04	1.08	1.04	0.97	0.89	1.01	1.12	1.27	1.18	1.25	1.22	1.37
pH	6-9 SU	6.3-7.4	6.5-7.7	6.9-7.5	6.3-7.7	6.7-7.6	6.6-7.5	6.6-7.6	6.8-7.5	6.9-7.5	6.8-7.3	6.6-8.9	6.7-7.4
Cl ₂	17 ug/l	-	-	-	-	-	-	-	-	-	-	-	-
BOD ₅ SUMMER (APR.1 - OCT.31)	5 mg/l	2.8	1.9	1.4	6.3						4.0	2.7	3.0
WINTER (NOV.1 - MAR.31)	10 mg/l					3.7	3.4	4.7	3.3	2.0			
AMMONIA NITROGEN SUMMER	2 mg/l	0.0	0.0	0.0	1.0						0.0	0.2	0.3
WINTER	4 mg/l					0.4	0.0	0.1	0.0	0.2			
TOTAL SUSPENDED RESIDUE	30 mg/l	0.5	0.0	0.0	2.0	0.4	3.0	4.7	3.4	3.3	2.3	2.4	4.3
FECAL COLIFORM	200/100 ml	12	7	2	5	20	13	23	58	5	3	27	54
DISSOLVED OXYGEN	≥ 6 mg/l	7.5	8.1	9.0	8.4	9.6	10.1	10.3	10.6	10.5	9.7	9.2	8.8

No violations for fiscal year

TABLE 3-3

Hunley Creek Wastewater Treatment Plant
 NPDES Permit #: NC0072508
 Fiscal Year: 2012-2013 Effluent Limits and Performance

PARAMETER	LIMIT	JUL '12	AUG '12	SEP '12	OCT '12	NOV '12	DEC '12	JAN '13	FEB '13	MAR '13	APR '13	MAY '13	JUN '13
FLOW	0.231 MGD	<p>Hunley Creek WWTP is currently not in service. This facility was listed as inactive as of May 2006; therefore, there is no data reported for this fiscal year</p>											
pH	6-9 SU												
Cl ₂	20 ug/l												
BOD ₅ SUMMER (APR.1 - OCT.31)	5 mg/l												
WINTER (NOV.1 - MAR.31)	10 mg/l												
AMMONIA NITROGEN SUMMER	2 mg/l												
WINTER	4 mg/l												
TOTAL SUSPENDED RESIDUE	30 mg/l												
FECAL COLIFORM	200/100 ml												
DISSOLVED OXYGEN	≥ 5 mg/l												

No violations for fiscal year

TABLE 3-4

Olde Sycamore Water Reclamation Facility
NPDES Permit #: WQ0011928
Fiscal Year: 2012-2013 Effluent Limits and Performance

PARAMETER	LIMIT	JUL '12	AUG '12	SEP '12	OCT '12	NOV '12	DEC '12	JAN '13	FEB '13	MAR '13	APR '13	MAY '13	JUN '13
FLOW	0.150 MGD	0.059	0.060	0.058	0.056	0.053	0.051	0.050	0.050	0.048	0.051	0.053	0.061
pH	6-9 SU	6.2-7.2	6.1-7.2	6.1-7.9	6.3-7.6	6.4-7.4	6.4-7.5	6.7-7.5	6.9-7.5	6.9-7.3	6.4-7.4	6.4-7.7	6.6-7.2
BOD₅	10 mg/l	2.9	0.7	1.6	1.6	4.6	0.0	3.2	0.0	0.0	3.0	1.3	1.4
AMMONIA NITROGEN	4 mg/l	0.0	0.2	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL SUSPENDED RESIDUE	5 mg/l	0.0	0.0	0.0	0.0	0.0	0.0	1.3	2.5	2.5	4.2	2.1	1.7
FECAL COLIFORM	14/100 ml	3	2	1	1	1	1	5	1	1	1	3	3
TURBIDITY	≤ 10 NTU	1.2	1.1	0.4	1.5	1.4	1.3	1.1	0.8	2.7	1.6	3.8	0.9

November 27th ammonia nitrogen limit was exceeded. Sample for the following day was compliant and monthly limit was met.
 January 23rd daily maximum for fecal coliform was exceeded. A resample on the 25th demonstrated compliance and the weekly limit was met.

TABLE 3-5

**Tallwood Estates Wastewater Treatment Plant
NPDES Permit #: NC0069523
Fiscal Year: 2012-2013 Effluent Limits and Performance**

PARAMETER	LIMIT	JUL '12	AUG '12	SEP '12	OCT '12	NOV '12	DEC '12	JAN '13	FEB '13	MAR '13	APR '13	MAY '13	JUN '13
FLOW	0.050 MGD	0.028	0.029	0.031	0.025	0.020	0.031	0.025	0.030	0.031	0.033	0.030	0.041
pH	6-9 SU	6.3-7.5	6.2-7.6	6.3-7.4	6.1-7.3	6.5-7.5	6.5-7.4	6.2-7.6	6.9-7.7	6.9-7.5	6.6-7.3	6.3-7.2	6.4-7.4
BOD₅ SUMMER (APR 1-OCT 31)	5 mg/l	1.8	1.8	0.5	2.7						1.3	0.0	1.7
WINTER (NOV.1 - MAR.31)	10 mg/l					0.0	1.0	0.0	0.0	0.6			
AMMONIA NITROGEN SUMMER	2 mg/l	0.0	0.0	0.0	0.0						0.0	0.0	0.0
WINTER	4 mg/l					0.0	0.0	0.2	0.0	0.0			
TOTAL SUSPENDED RESIDUE	30 mg/l	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.5	2.5	2.5	2.5	3.1
FECAL COLIFORM	200/100 ml	1	2	1	1	1	1	3	1	1	1	1	1
DISSOLVED OXYGEN	≥ 6 mg/l	7.1	8.4	8.0	7.7	12.1	10.1	10.1	10.1	10.6	9.6	8.4	7.9

On April 23rd a grab sample was collected when a composite sample was required due to a sampler malfunction.

TABLE 3-6

**Grassy Branch Wastewater Treatment Plant
NPDES Permit #: NC0085812
Fiscal Year: 2012-2013 Effluent Limits and Performance**

PARAMETER	LIMIT	JUL '12	AUG '12	SEP '12	OCT '12	NOV '12	DEC '12	JAN '13	FEB '13	MAR '13	APR '13	MAY '13	JUN '13
FLOW	0.050 MGD	0.023	0.034	0.032	0.028	0.021	0.025	0.034	0.038	0.031	0.031	0.031	0.033
pH	6-9 SU	6.8-7.6	6.6-8.2	6.4-7.9	6.1-7.4	6.8-7.7	6.3-7.7	6.5-7.6	6.5-7.6	6.5-7.6	6.3-7.7	6.5-7.6	6.9-7.7
Cl ₂	17 ug/l	-	-	-	-	-	-	-	-	-	-	-	-
BOD ₅	SUMMER (APR.1 - OCT.31)	1.7	0.6	1.8	0.9						2.9	1.3	2.3
	WINTER (NOV.1 - MAR.31)	10 mg/l				2.6	2.5	2.8	6.9	3.1			
AMMONIA NITROGEN	SUMMER	2 mg/l	0.0	0.0	0.0						0.4	0.3	0.6
	WINTER	4 mg/l				2.3	0.0	0.0	2.4	0.7			
TOTAL SUSPENDED RESIDUE	30 mg/l	0.0	0.0	0.0	0.0	0.0	0.0	1.7	3.5	2.7	2.0	3.4	4.0
FECAL COLIFORM	200/100 ml	23	8	3	2	9	5	8	7	5	11	91	7
DISSOLVED OXYGEN	≥ 6 mg/l	8.0	9.3	7.5	8.3	9.1	11.6	9.3	9.82	9.7	8.2	8.5	7.1

Weekly limit for fecal coliform was exceeded for the first week of May.
Grab samples were collected in the place of composites in May and June due to a failure of the automatic sampler.

4.0 BIOSOLIDS MANAGEMENT

Biosolids are managed and disposed of in accordance with Permit No. WQ0007486 issued by the North Carolina Department of Environment and Natural Resources. Biosolids are stored at both the Crooked Creek and Twelve Mile Creek WWTPs. The solids are aerobically digested and then applied as “fertilizer” to permitted sites. The solids are considered stabilized and thus suitable for land application when the volatile solids content is reduced by 38%. If this 38% volatile solids reduction can not be achieved, then alkaline stabilization, injection or incorporation is employed to insure permit compliance.

5.0 SYNOPSIS OF WASTEWATER COLLECTION SYSTEM (Fiscal Year 2012-2013)

UCPW currently operates and maintains over 600 linear miles of sewer lines and 65 wastewater pumping stations and force mains, providing service to population of approximately 87,887 customers (30,306 wastewater accounts x an average of 2.90 people per account). All pump stations are equipped with both audible and visual alarms as well as either automated telephone dialers (ATD) or telemetry which alert staff when alarm conditions are present. Inspections of all pump stations meet or exceed State requirements. Approximately 80% of all pump stations are checked a minimum of twice weekly with 20% checked once a week. Emergency auxiliary power is provided to all stations via portable or permanent mounted generators. Wastewater personnel are on call rotation and available 24 hours a day, 7 days a week, and 365 days a year.

UCPW maintains emergency response equipment in a ready state at all times. This emergency equipment varies in nature from spare electrical parts and plumbing supplies, to vacuum trucks, pumps, and backhoes. Workers safety is of utmost importance. Safety equipment such as night lighting, gas monitors, trenching and shoring equipment, and reflective cones/signs are always readily available.

UCPW has ongoing programs to identify and correct deficiencies associated with the wastewater collections system. One project underway to meet the collection system needs is the **East Side Sewer System Improvements**. The proposed project consists of approximately 14,300 LF of 24-inch, 8,900 LF of 18-inch, 14,800 LF of 16-inch sewer force main and pump station improvements at all three existing East Side pump stations. The objectives of these improvements are to provide the necessary sewer system upgrades to reduce/eliminate SSO's within the existing sewer system in order to improve water quality and public health and safety. In addition these improvements will allow UCPW the ability to maximize our 2.65 MGD contractual wastewater allocation to the City of Monroe's WWTP.

The following programs listed are the results of this year's efforts to maintain the collection system.

LINE MAINTENANCE (min. 10%)		
	FEET	MILES
SEWER LINES CLEANED	343024	65
CCTV MAIN LINE	106947	20
SMOKE TESTING	130577	25
INFLOW/INFILTRATION (I & I)		
	REPAIRS	REHAB
MANHOLES	410	0

High priority lines such as aerial creek crossings, lines subject to erosion and/or problematic areas are visually inspected at a minimum semi-annually. High priority lines are inspected more frequently after periods of heavy rain and flooding.

Another important program is the FOG (Fats, Oils, and Grease) program. This program is aimed at reducing grease-related back-ups and overflows by educating the public of the hazards associated with the disposal of grease and grease related by-products into the wastewater system. A grease trap inspection program has provided better data ensuring that restaurants and other food preparation facilities properly maintain grease traps and interceptors.

During the Fiscal Year 2012-2013, Union County's wastewater system collected and conveyed approximately 2.5 billion gallons of wastewater. There were nine (9) sanitary sewer overflows with a combined estimated volume of 107,000 gallons that occurred within the collection system.

Sanitary Sewer Overflows – Fiscal Year 2012-2013

DATE	LOCATION/ADDRESS	CAUSE	SURFACE WATER		TOTAL VOLUME
			WATER BODY	VOLUME	
8/14/2012	MH #4204	Grease	12 Mile Creek	500	500
8/29/2012	MH #2729	Severe Natural Condition/Heavy Rain	Grassy Branch	3000	3000
9/18/2012	MH #2699	I&I	Meadow Branch	2500	2500
11/21/2012	5006 Sentinel Dr MH #8948	Grease	NONE	0	100
1/10/2013	MH #11442	Grease	Six Mile Creek	400	400
1/17/2013	MH #2698	Severe Natural Condition/Heavy Rain/I&I	Meadow Branch	30000	33000
1/17/2013	MH#2646	Severe Natural Condition/Heavy Rain/I&I	New Salem Branch	20000	27000
1/17/2013	Sardis Ch Rd outside Crooked Creek WWTP	Severe Natural Condition/Heavy Rain/I&I	Crooked Creek	33000	36000
6/28/2013	MH# 5206, 5223, 5226	I&I	Crooked Creek	4500	4500
			Total	93,900	107,000

For questions concerning this Wastewater System Performance Summary or additional information please contact UCPW:

(704) 296-4210

Or write to:

Union County Public Works
500 North Main Street, Suite 500
Monroe, NC 28112-4730

This document can also be viewed at: <http://ucpw.co.union.nc.nc>