Metropolitan Sewerage District of Buncombe County

System Performance Annual Report

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Asheville, North Carolina 28804

General Manager	Thomas E. Hartye, P.E.	(828) 254-9646
Director of Wastewater Reclamation Facility (WRF)	Bart Farmer (ORC)	(828) 225-8224
Operations Manager (WRF)	Schuyler Taylor (ORC—Back-up)	(828) 225-8204
Director of Technical Services (Collection System)	Ken Stines (ORC)	(828) 225-8244
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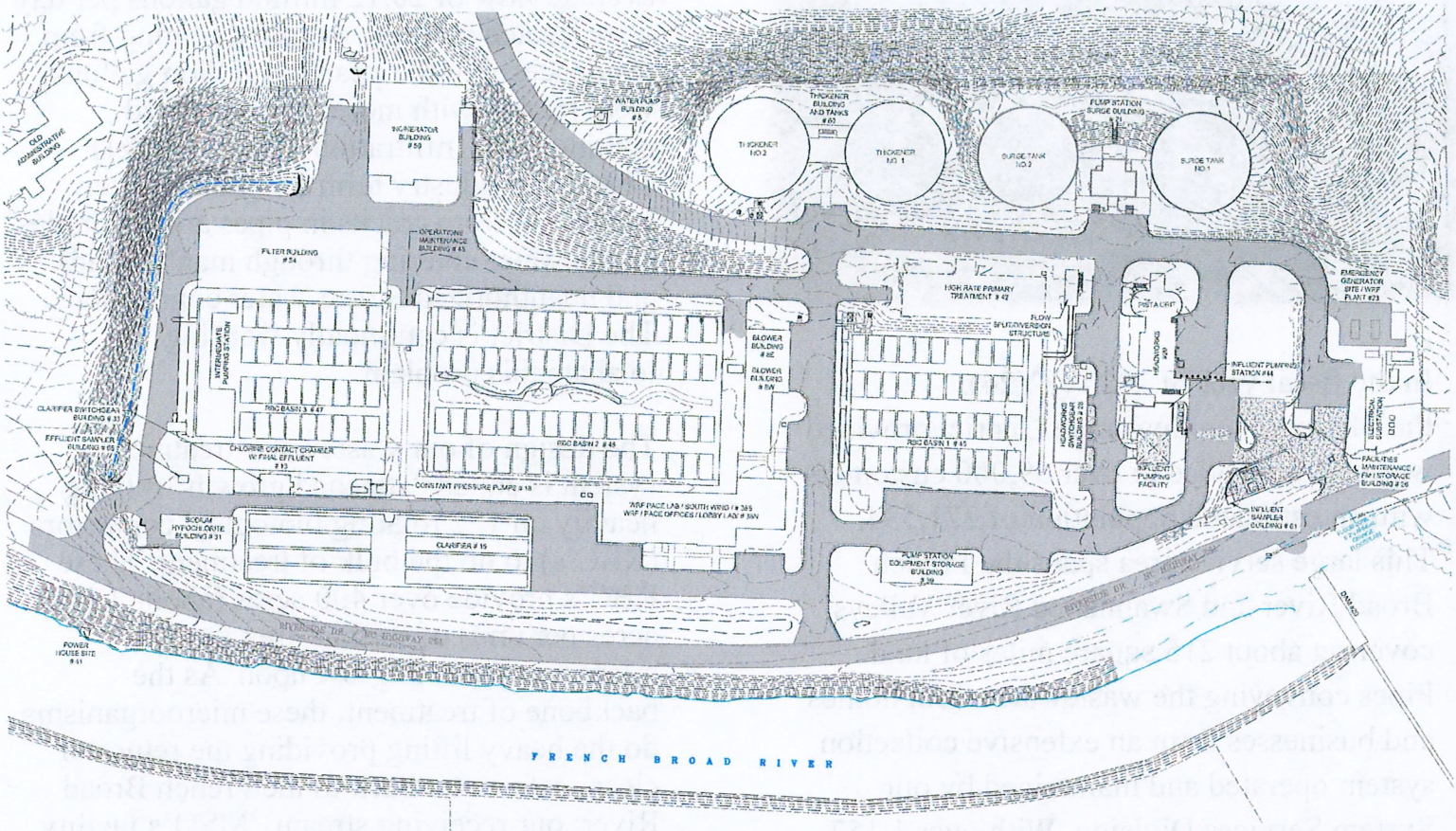
System Performance Annual Report

Fiscal Year 2024 (July 2023 - June 2024)

I. General Information



Permit Numbers:

NPDES Permit # NC0024911

General Storm Water Permit # NCG110000 COC # NCG110158

Air Quality (ABAQA) Title V Permit # 11-772-18

Collection System # WQCS00004

II. Description of Facilities

Collection System—System Services Division

In the fiscal year of 2024 (FY24), the Metropolitan Sewerage District provided wastewater service to over 59,000 customers with an estimated population of 271,534. This large service area spans the French Broad River and Swannanoa River Valleys covering about 215 square miles of land. Pipes conveying the wastewater from homes and businesses form an extensive collection system operated and maintained by our System Services Division. With over 1,157 miles of public sanitary sewer lines, 38 pump stations and approximately 34,700 manhole access points; significant manpower and equipment is required. Pipes vary in size from 66" diameter large interceptors down to 6" serving residential communities. Most of the piping within the District is between 50 and 100 years old and requires continual upkeep and/or replacement.

Water Reclamation Facility (WRF)

The Water Reclamation Facility (WRF) is rated at 40 million gallons per day (MGD) capacity serving most of Buncombe County (Asheville, Biltmore Forest, Black Mountain, Montreat, Weaverville, Woodfin and part of northern Henderson County). In FY24 an average flow of 20.12 million gallons per day were treated with the majority coming from residences. For the year, 7.3 billion gallons were treated with more than one-third coming from Infiltration & Inflow (I&I). That's the industry term for groundwater seeping in from cracks in pipes and manholes or rainwater entering through manhole lids and unauthorized Storm Water connections. The District is continually working to abate this problem.

The design of our wastewater treatment system is called "attached growth" relying heavily on 152 rotating biological contactors (RBC's) to do the bulk of treatment. These RBC's provide over 400 acres (about 2.5 acres per unit) of surface area for microorganisms to grow upon. As the backbone of treatment, these microorganisms do the heavy lifting providing the return of clean, safe water back to the French Broad River; our receiving stream. MSD's facility is believed to be the largest RBC plant in the United States.

II. Description of Facilities — WRF Treatment Components

Preliminary Treatment Components

- Influent Multi-rake Barscreens (2 units, ½ inch Bar Spacing, 40 MGD each) with screenings washer/compactor and shaftless screw conveyer
- Influent Pumps (3 units) - 35 MGD rated capacity each
- Perforated Plate Fine Screens (3 units, ¼ inch openings, 40 MGD each) with screenings washer/compactor
- Vortex Grit Removal (2 units rated at 50 MGD) - Removal Rate 95% of Grit > 140 Mesh
- Storm Surge System - Utilizes three pumps rated at 5MGD each and two storm surge tanks rated at 2.1 million-gallons each

Primary Treatment Components

- Primary Clarification - Chemically Enhanced Kruger ACTIFLO system (Construction substantially complete in December of 2021)

Secondary Treatment Components

- 1st Stage RBC's (44 units)
- 2nd Stage RBC's (72 units)
- 3rd Stage RBC's (36 units)
- Intermediate Pumps (3 units) - pump water to clarifier from 3rd RBC stage
- Intermediate Clarifier (4 cells - total volume 2 MG)
- Microfiltration via AASI AquaDisk Units (16 units)

Disinfection Components

- Sodium Hypochlorite solution - average feed 1000 gallons/day at 6.5% solution strength

Residuals Handling Components

- Gravity Thickeners (2 units) - 100 foot-diameter each
- 2.5 Meter Belt Presses (2 units)
- Fluidized Bed Incinerator (3,317 dry pounds per hour)

Energy Management Components

- Two separate power circuits from Duke Energy for plant, with Automatic Transfer Switch if one fails
- 4-Megawatt total from three Diesel Generators (emergency backup power for WRF; will maintain full treatment processes during a power outage)
- 850 Kilowatt Hydro Turbines (3 units) - induction units (French Broad River source). These generate power using the District's dam/flume. The power is sold back to Duke Energy.

Automation Components

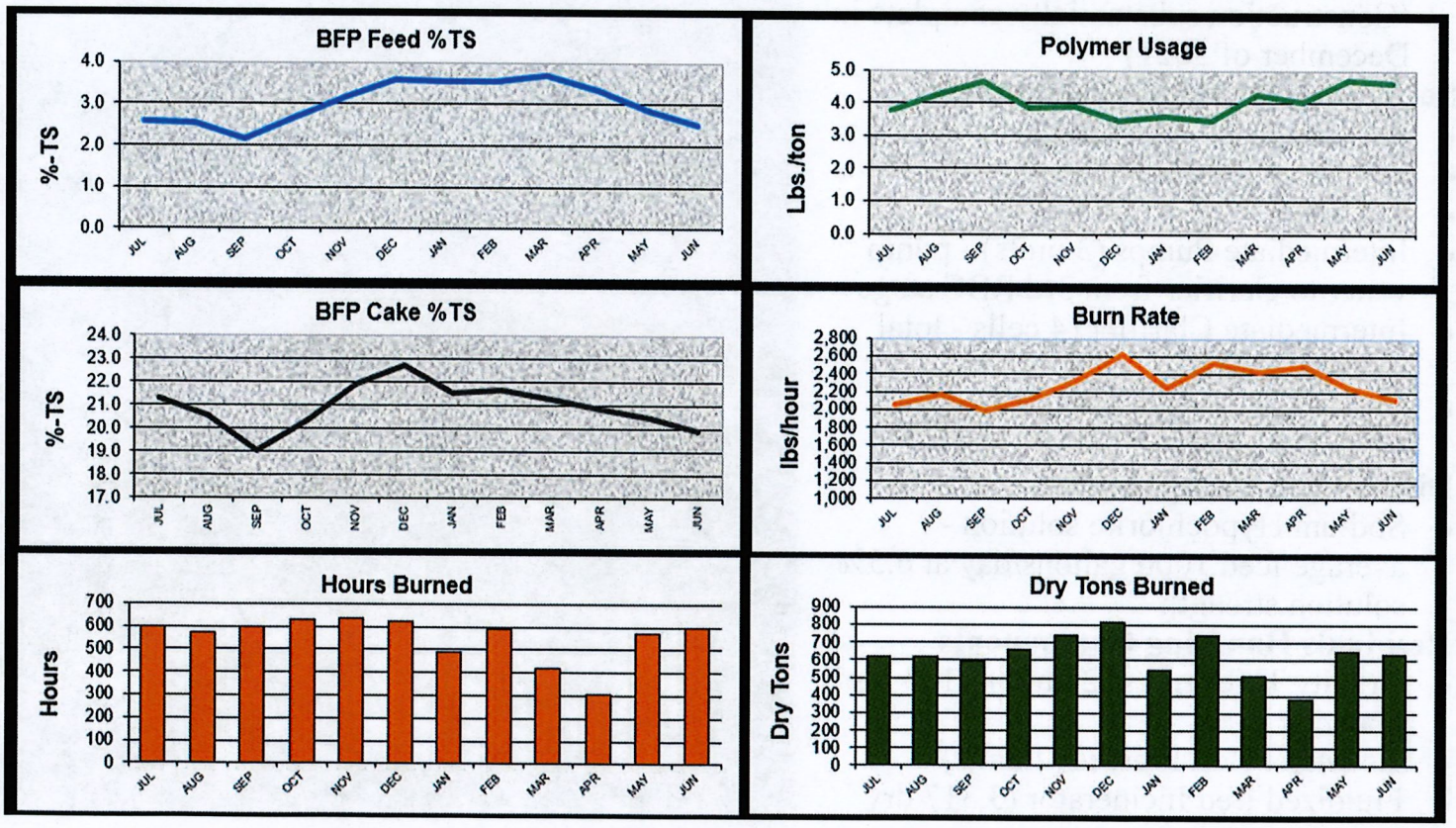
- SCADA (Supervisory Control and Data Acquisition) - full automated control of WRF

MSD utilizes its Fluidized Bed Incinerator as its primary residual management option. Presently the facility is managing 17-20 dry tons per day of residuals. The facilities are designed for 3,317 dry pounds per hour. Due to the lack of true primary clarifiers, most of the sludge generated at the facility is secondary in nature (i.e. sloughings from the RBC's).

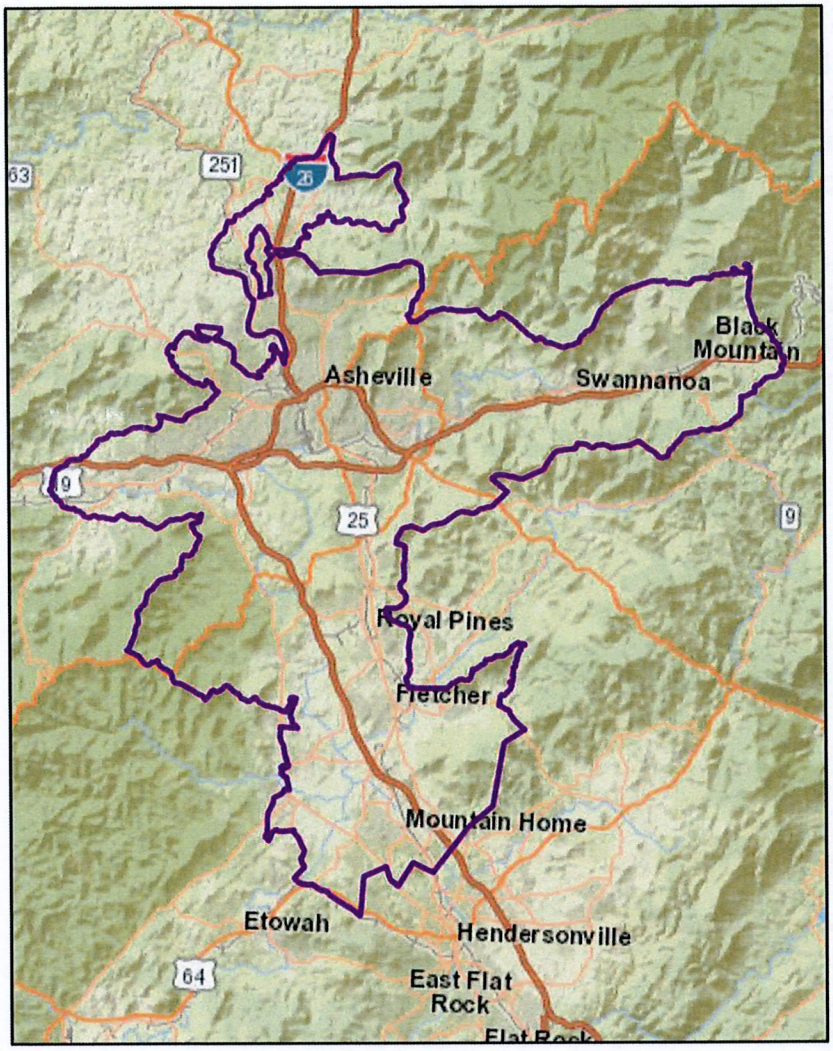
Sludge is thickened in on-site gravity thickeners to a consistency of 2-5% solids at which time it is then pumped to the 2 1/2-meter belt presses. These units dewater the sludge to over 22% solids and then it is pumped to the incinerator. Air emissions from the incinerator are of excellent quality, and air quality is further enhanced by a new filtration system added in 2016. Incinerator ash is thickened on-site via a gravity ash thickener and then pumped to an on-site lagoon. Ground-water is monitored in accordance with NCDEQ requirements (up & down gradient).

The incinerator system provides the most cost-effective method for sludge management. Supplementary fuel is sometimes required due to the 22% solids content - natural gas via Dominion Energy is utilized for this purpose.

MSD also maintains an agreement with the local county landfill (lined) to dispose of dewatered sludge during emergency and/or maintenance activities. This provides a second residuals management alternative, when or if needed.



Collection System Improvements



MSD assumed ownership and maintenance of the various local public collection systems in 1990, and since that time MSD has undertaken an aggressive program to correct existing known collection system problems. Between 1990 and 2024, over 1,412,514 linear feet (or 267 miles) of pipe have been replaced and over $502 million has been re-invested in plant and collection system rehabilitation projects. However, due to the large size of the MSD system, there is much work still to be done. From FY 2025 to FY 2034, the District expects to rehabilitate or replace an additional 368,133 linear feet.

Approximately $610.7 million will be spent for the District's Capital Improvement Program (CIP) over the next ten years. Of this, 7% will be spent on rehabilitating medium to large Interceptors, 23% on rehabilitating or replacing small collection lines, and 63% on the treatment plant and pump station projects.

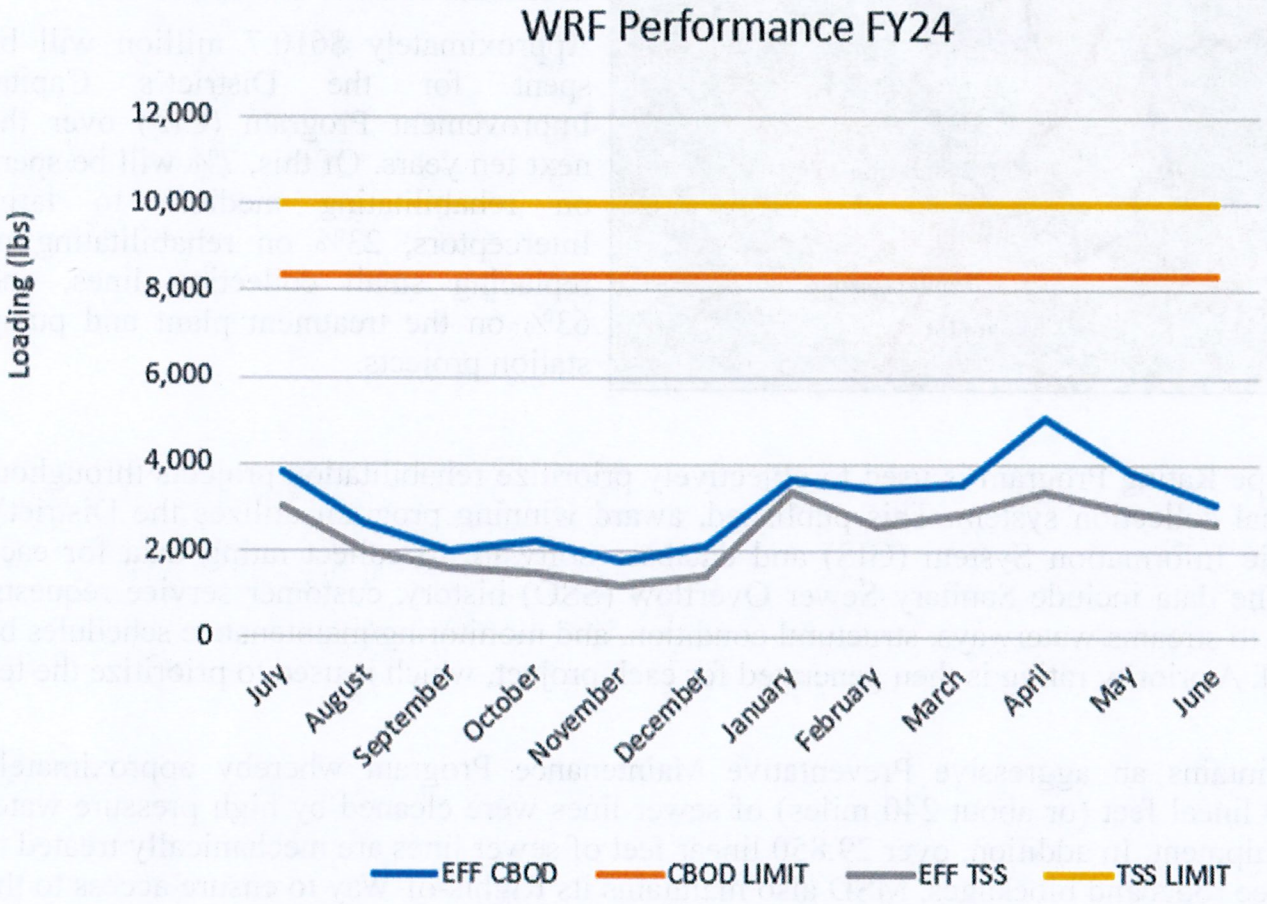
MSD's Pipe Rating Program is used to objectively prioritize rehabilitation projects throughout the regional collection system. This published, award winning program utilizes the District's Geographic Information System (GIS) and database software to collect rating data for each project. The data include Sanitary Sewer Overflow (SSO) history, customer service requests, proximity to streams/waterways, structural condition, and monitoring/maintenance schedules by MSD staff. A priority rating is then generated for each project, which is used to prioritize the ten -year CIP.

MSD maintains an aggressive Preventative Maintenance Program whereby approximately 1,288,370 lineal feet (or about 240 miles) of sewer lines were cleaned by high pressure water jetting equipment. In addition, over 29,850 linear feet of sewer lines are mechanically treated to remove tree roots and blockages. MSD also maintains its Rights-of-Way to ensure access to the system for cleaning and maintenance activities. During FY 2024 over 105,930 ft. were cleared.

Water Reclamation Facility (WRF) Performance Measures

During the FY24 annual reporting period, high performance measures were again achieved. The WRF continues to provide effective/efficient treatment services to the community averaging wastewater CBOD & TSS removal efficiencies of 92% and 95% respectively (state permit requires a minimum of 85% removal rates for compliance). The volume of flow to the WRF continues to remain well below hydraulic capacity for the plant averaging 20.12 million gallons per day.

MSD maintains a service contract agreement with Pace Analytical, Inc. (NC certified lab). This progressive opportunity continues to yield significant long-term savings to MSD. Also, the WRF successfully participated in surveillance audits regarding ISO14001 certification , coming through with zero (0) non-conformances. This program, also referred to as an Environmental Management System, continues to provide significant benefits to MSD both in the short & long-term.



III. Improvements to Facilities

Water Reclamation Facility Improvements

Several projects were completed in the past year:

- RBC Basin #1 Cleaning
  Over the years of operation, heavy sediments accumulate on the floor of the RBC basins, some times up to several feet thick. A vendor was contracted to enter the basin and remove the debris with heavy equipment.

- Disabled RBC Removal
  A number of RBCs were disabled due to broken shafts. When a shaft breaks, the RBC cannot be repaired and sits ,unmoving. These units were impeding flow and treatment. A 550 ton crane was employed to remove the broken units and restore flow to these areas.

- RBC Gate Replacement
  Each RBC Basin is made up of four treatment trains. Gates (valves) at the start (influent) and end (effluent) of each train enable staff to isolate trains for cleaning, repairs, etc. Many gates were rusted or otherwise inoperable. These gates were replaced with new, stainless gates. This project enables staff to efficiently control flow to each train.

- Heat Exchanger Replacement
  A heat exchanger captures waste heat from the incinerator and transfers it back into the process via blowers. Our old heat exchanger had reached the end of its life span and was requiring frequent, costly repairs. A new heat exchanger was built and installed. This unit is more efficient at capturing and returning heat, saving energy and money.

- Pre-Heat Burner Control System Replacement
  Another key component on the incinerator is the Pre-Heat Burner (PHB) and Gas Management System. This unit manages the natural gas used to pre-heat the incinerator, as well as the gas used to supplement the bio-solids incineration process. The PHB is comprised of multiple automated valves and sensors that work together to make the process safe and efficient. The PHB was installed in 1996 and was due for replacement. The new PHB has updated valves and a new array of sensors designed to increase safety and efficiency.

CONSTRUCTION TOTALS BY DATE COMPLETED - Monthly

From 7/1/2023 to 6/30/2024

	Dig Ups	Emergency Dig Ups	Dig Up ML Ftg	Dig Up SL Ftg	Manhole Repairs	Taps Installed	Creek Crossings Cleared	ROW Ftg	Service Line Bore Ftg	Service Line Burst Ftg
July 2023	15	5	173	490	22	20	1	9,974	0	0
August 2023	25	9	46	980	8	33	0	20,859	0	0
September 2023	22	11	54	826	8	25	0	41,142	0	0
October 2023	23	11	114	311	16	15	0	20	35	0
November 2023	28	7	301	753	12	25	0	0	34	0
December 2023	17	7	43	594	10	27	0	0	0	0
January 2024	25	13	211	328	15	12	2	20	0	40
February 2024	35	7	114	469	9	18	0	5	0	23
March 2024	30	9	164	649	15	23	0	0	0	0
April 2024	35	15	151	716	24	19	0	555	0	27
May 2024	32	13	84	872	20	24	0	7,000	0	45
June 2024	23	8	79	572	9	20	0	26,363	0	0
Grand Total	310	115	1,533	7,560	168	261	3	105,938	69	135

CONSTRUCTION REHAB TOTALS BY DATE COMPLETED - Monthly

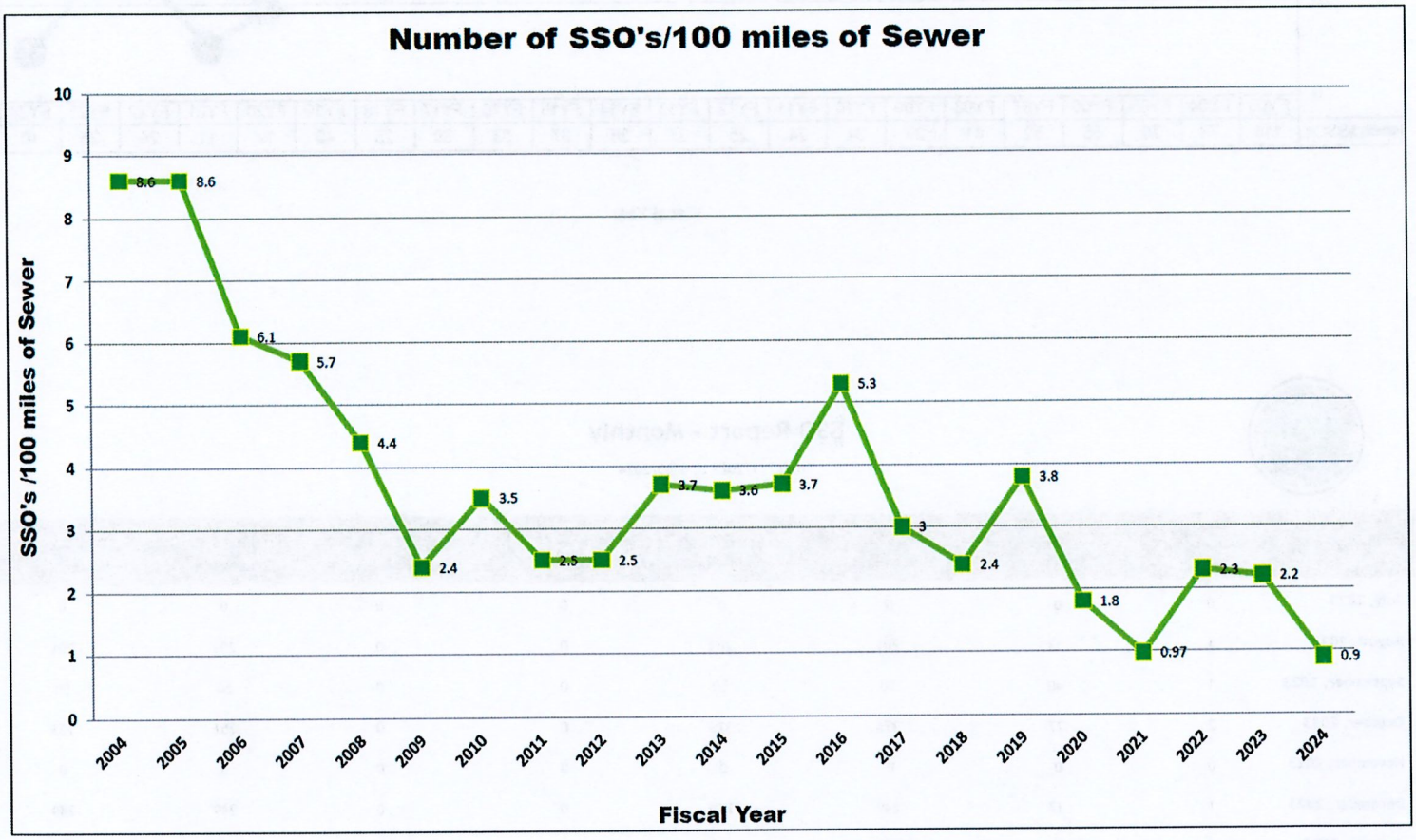
From 7/1/2023 to 6/30/2024

	# IRS Repairs	IRS Ftg	IRS Accept Ftg	Const Ftg	Const Accept Ftg	# D-R	D-R Ftg	#MH	Mainline PB Ftg	Mainline Bore Ftg	Total Rehab Ftg
July 2023	0	0	0	120	120	1	0	0	0	0	120
August 2023	2	318	318	115	115	1	225	6	94	0	752
September 2023	1	113	113	660	660	2	667	2	0	0	1440
October 2023	0	0	0	485	485	2	146	2	0	0	631
November 2023	0	0	0	159	159	1	750	7	0	0	909
December 2023	0	0	0	155	155	0	0	0	0	0	155
January 2024	0	0	0	27	27	1	702	4	0	0	729
February 2024	0	0	0	0	0	1	482	0	0	0	482
March 2024	0	0	0	1162	1162	0	0	4	0	0	1162
April 2024	0	0	0	545	545	1	540	6	0	200	1285
May 2024	0	0	0	248	357	2	530	5	0	0	887
June 2024	0	0	0	290	290	2	915	6	0	0	1205
Grand Totals	3	431	431	3966	4075	14	4957	42	94	200	9757

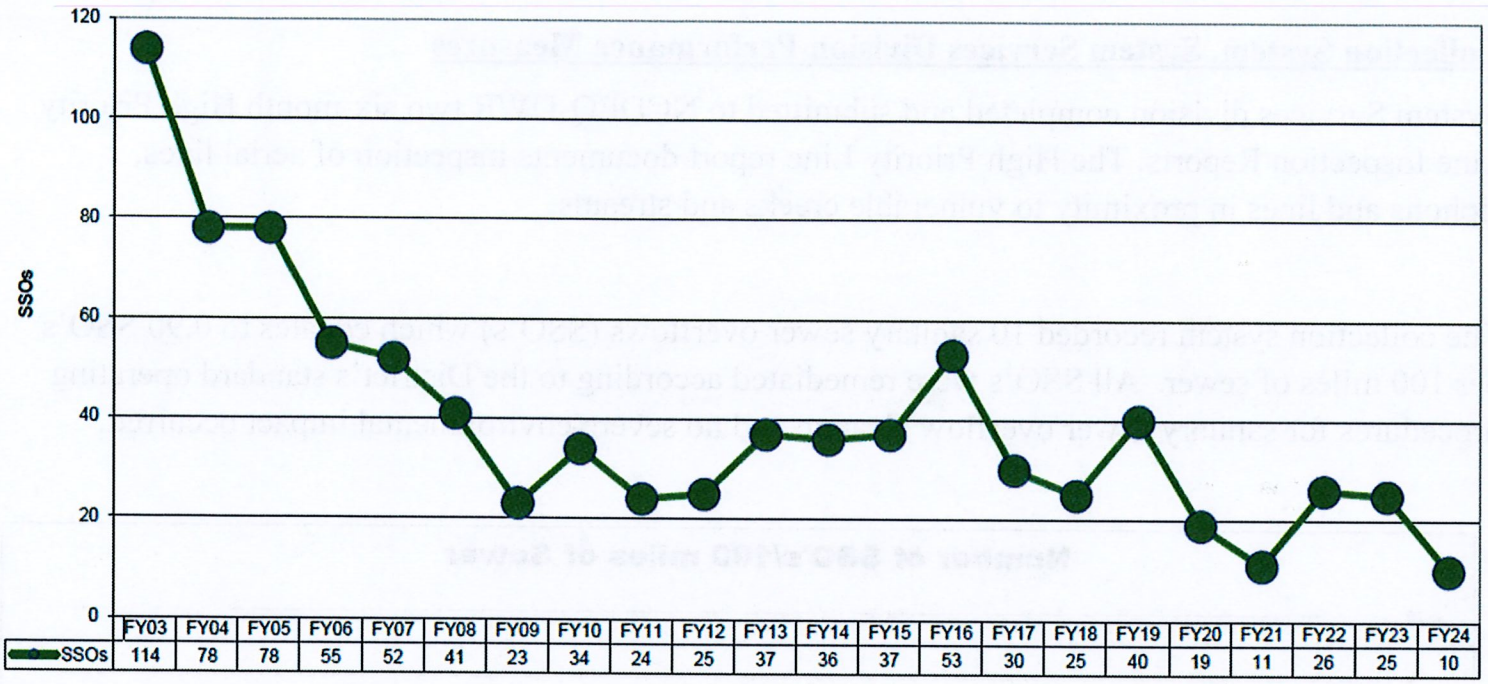
Collection System, System Services Division Performance Measures

System Services division completed and submitted to NCDEQ-DWR two six-month High Priority Line Inspection Reports. The High Priority Line report documents inspection of aerial lines, siphons and lines in proximity to vulnerable creeks and streams.

The collection system recorded 10 sanitary sewer overflows (SSO's) which equates to 0.90 SSO's per 100 miles of sewer. All SSO's were remediated according to the District's standard operating procedures for sanitary sewer overflow cleanup and no severe environmental impact occurred.



Sanitary Sewer Overflows



	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
SSOs	114	78	78	55	52	41	23	34	24	25	37	36	37	53	30	25	40	19	11	26	25	10

SSO Report - Monthly

From 7/1/2023 to 6/30/2024

	SSO Count	AVG Response Time (min.)	AVG SSO Volume (gal.)	AVG Surface Volume (gal.)	Spills >= 1000 Gallons	Spills >= 15,000 Gallons	Total SSO Volume (gal.)	Total Surface Volume (gal.)
July, 2023	0	0	0	0	0	0	0	0
August, 2023	1	33	201	201	0	0	201	201
September, 2023	1	40	50	50	0	0	50	50
October, 2023	2	77	376	376	0	0	751	751
November, 2023	0	0	0	0	0	0	0	0
December, 2023	1	17	249	249	0	0	249	249
January, 2024	1	35	54,000	54,000	1	0	54,000	54,000
February, 2024	0	0	0	0	0	0	0	0
March, 2024	3	38	337	337	0	0	1,012	1,012
April, 2024	0	0	0	0	0	0	0	0
May, 2024	0	0	0	0	0	0	0	0
June, 2024	1	17	145	145	0	0	145	145
Grand Totals:	10	41	5,641	5,641	1	0	56,408	56,408

CUSTOMER SERVICE REQUESTS
Monthly - All Crews

CREW	MONTH	JOBS	AVERAGE REPSONSE TIME	AVERAGE TIME SPENT
DAY 1ST RESPONDER				
	July, 2023	94	28	35
	August, 2023	112	23	32
	September, 2023	100	26	38
	October, 2023	83	25	38
	November, 2023	88	30	35
	December, 2023	101	30	35
	January, 2024	119	32	25
	February, 2024	122	23	33
	March, 2024	104	28	35
	April, 2024	129	29	36
	May, 2024	99	24	39
	June, 2024	89	23	36
		1,240	27	34
NIGHT 1ST RESPONDER				
	July, 2023	27	36	26
	August, 2023	26	28	17
	September, 2023	32	22	32
	October, 2023	42	33	23
	November, 2023	26	22	31
	December, 2023	32	33	29
	January, 2024	46	28	24
	February, 2024	46	30	21
	March, 2024	36	32	22
	April, 2024	39	29	35
	May, 2024	52	28	22
	June, 2024	35	28	29
		439	29	26
ON-CALL CREW *				
	July, 2023	21	45	31
	August, 2023	13	74	44

* On-Call Crew Hours: 8:00pm-7:30am (Jul. - Oct.) 11:30pm-7:30am (from Nov. onward) Monday-Friday, Weekends, and Holidays

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CUSTOMER SERVICE REQUESTS
Monthly - All Crews

CREW	MONTH	JOBS	AVERAGE REPSONSE TIME	AVERAGE TIME SPENT
ON-CALL CREW *				
	September, 2023	21	46	38
	October, 2023	21	45	42
	November, 2023	24	72	42
	December, 2023	38	48	45
	January, 2024	32	60	33
	February, 2024	22	55	42
	March, 2024	36	62	36
	April, 2024	22	85	41
	May, 2024	26	45	51
	June, 2024	27	63	44
		303	58	41
Grand Totals:		1,982	32	33

* On-Call Crew Hours: 8:00pm-7:30am (Jul. - Oct.) 11:30pm-7:30am (from Nov. onward) Monday-Friday, Weekends, and Holidays

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IV. Performance Measures

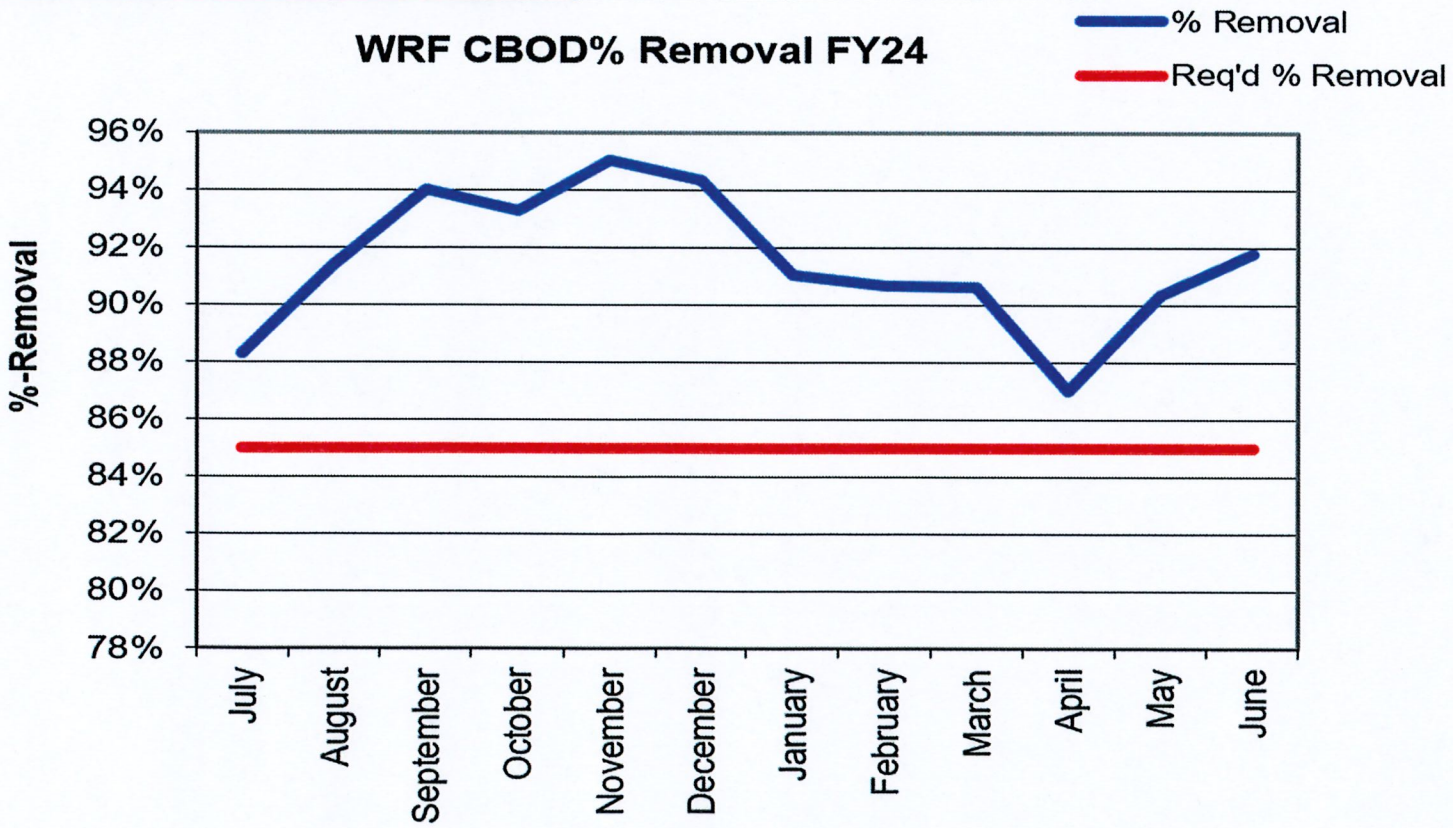
PIPELINE MAINTENANCE TOTALS BY DATE COMPLETED - Monthly

July 01, 2023 to June 30, 2024

	Main Line Wash Footage	Service Line Wash Footage	Rod Line Footage	Cleaned Footage	CCTV Footage	Smoke Footage	SL-RAT Footage
2023							
July	134,561	1,149	580	135,141	10,100	0	36,583
August	160,454	1,318	2,633	163,087	16,079	1,298	9,969
September	151,665	1,563	927	152,592	5,419	0	14,896
October	154,578	1,122	3,317	157,895	15,226	200	4,565
November	115,538	1,598	1,362	116,900	13,402	550	20,825
December	105,715	1,563	1,085	106,800	13,478	0	7,964
2024							
January	85,201	2,259	3,567	88,768	13,847	0	19,176
February	82,713	2,140	6,088	88,801	14,682	4,169	23,647
March	63,692	1,909	2,773	66,465	13,472	880	7,530
April	68,031	2,392	2,948	70,979	13,838	0	14,378
May	76,611	1,876	3,000	79,611	17,969	1,280	3,884
June	89,614	1,660	1,577	91,191	14,843	150	1,420
Grand Total:	**1,288,373**	**20,549**	**29,857**	**1,318,230**	**162,355**	**8,527**	**164,837**
Avg Per Month:	**107,364**	**1,712**	**2,488**	**109,853**	**13,530**	**711**	**13,736**

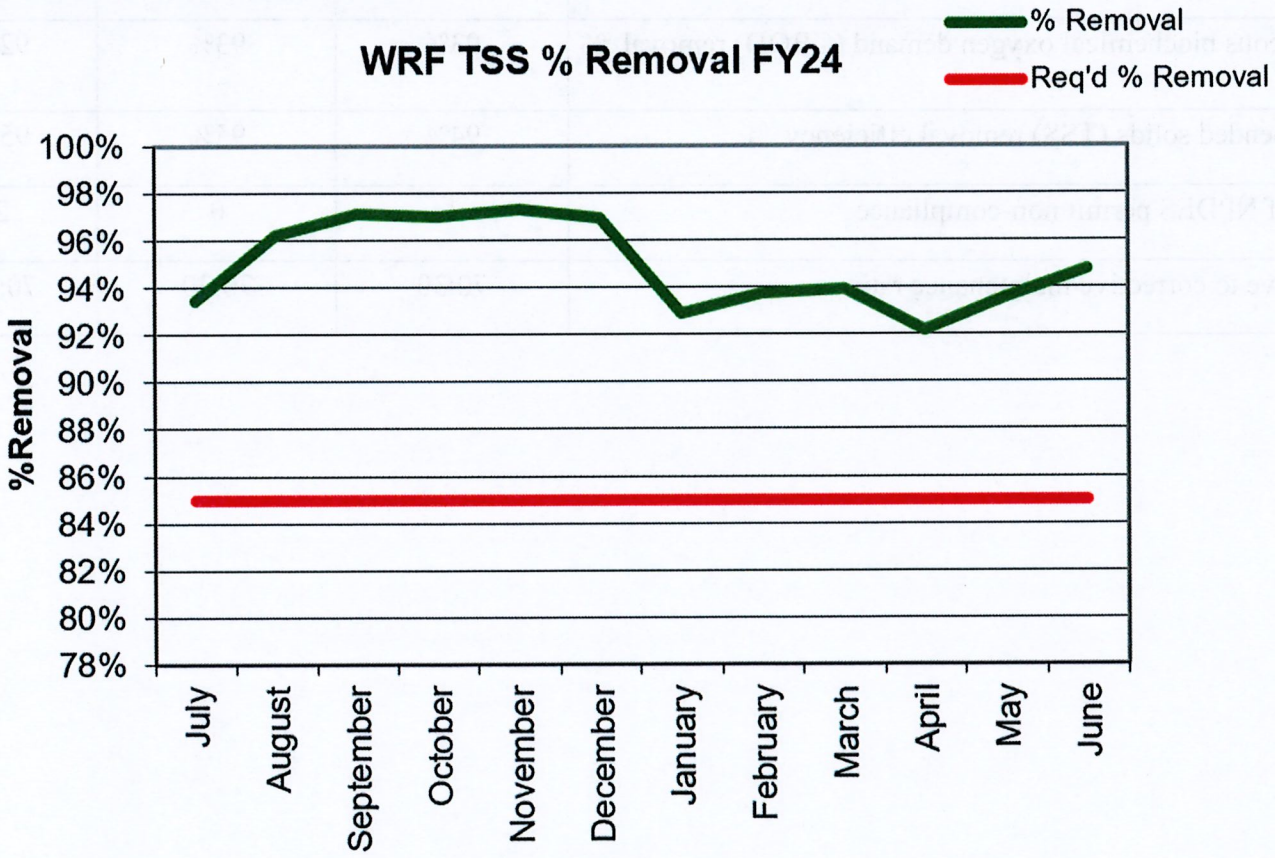
Water Reclamation Facility (WRF) Performance Measures

Month	INF CBOD	EFF CBOD	% Removal	Req'd % Removal
July	201.4	23.5	88%	85%
August	194.0	16.6	91%	85%
September	228.8	13.7	94%	85%
October	233.5	15.7	93%	85%
November	250.1	12.4	95%	85%
December	225.3	12.8	94%	85%
January	189.0	17.0	91%	85%
February	217.1	20.2	91%	85%
March	196.2	18.4	91%	85%
April	231.2	30.0	87%	85%
May	213.3	20.6	90%	85%
June	240.6	19.7	92%	85%
Average	218.4	18.4		
% Removal		92%		



Water Reclamation Facility (WRF) Performance Measures

Month	INF TSS	EFF TSS	% Removal	Req'd % Removal
July	287.4	18.9	93%	85%
August	328.5	12.4	96%	85%
September	374.8	10.8	97%	85%
October	350.2	10.5	97%	85%
November	312.9	8.5	97%	85%
December	287.3	8.8	97%	85%
January	221.3	15.8	93%	85%
February	246.7	15.4	94%	85%
March	241.2	14.7	94%	85%
April	252.0	19.8	92%	85%
May	242.4	15.6	94%	85%
June	325.4	16.9	95%	85%
Average	289.2	14.0		
% Removal			95%	



Hydroelectric Performance Measures

MSD operates a hydroelectric facility with three (3) horizontal turbines that produce electrical power. This energy is then sold back to the electrical grid to Duke Energy. These turbines benefit MSD because it offsets the cost of energy used to operate the WRF. The treatment of wastewater is an energy hungry process, but the hydroelectric facility allows MSD to save $300,000 to $600,000 in energy costs per year. The variation in savings is dependent on rainfall and maintenance requirements that occur during the year.

Task	FY22	FY23	FY24
Daily (average) Flow, treated MGD	22.2	20.88	20.12
Maximum daily flow treated, MGD	53.7	60.00	71.70
Dry tons of bio-solids processed	7834	5419	7,524
Cost per million gallons (MG), treated	$575	$730	$793
Energy cost per MG. treated	$136	$139	$141
Carbonaceous biochemical oxygen demand (CBOD) removal, %	93%	93%	92%
Total suspended solids (TSS) removal efficiency, %	94%	95%	95%
Number of NPDES permit non-compliance	1	0	2
Preventative to corrective maintenance ratio	70:30	70:30	70:30

V. Certification

I certify under penalty of law that this report is complete and accurate to the best of my knowledge. I further certify that this report has been made available to the users and customers of the MSD system and that those users have been notified of its availability.

Thomas E. Hartye, P.E.
General Manager
Metropolitan Sewerage District of Buncombe County, NC

August 27, 2024

If you would like more information please email webmaster@msdbc.org