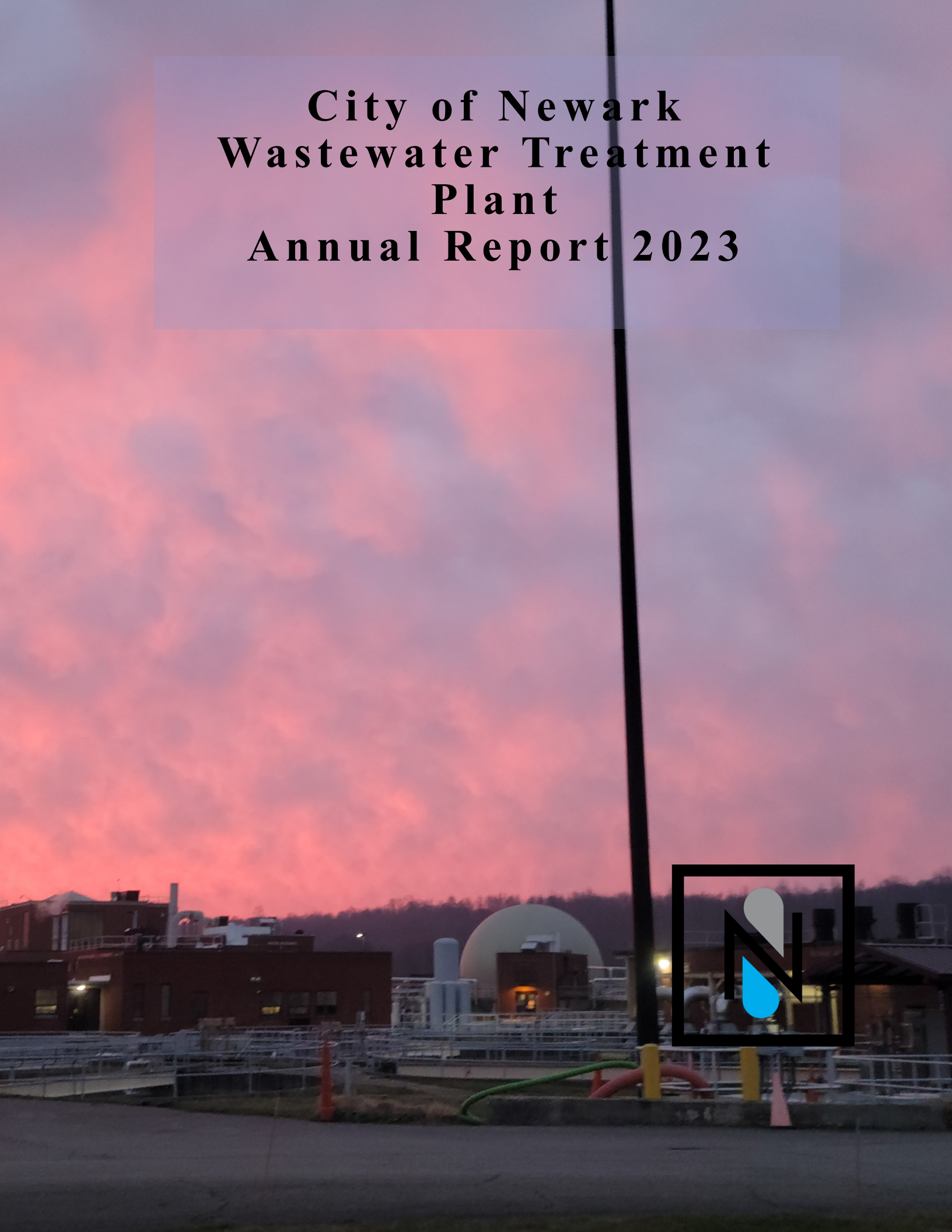
City of Newark Wastewater Treatment Plant Annual Report 2023



Introduction

The Newark Wastewater Treatment Plant represents the City's ongoing commitment to serve the community's needs while protecting the environment.

The City of Newark's original plant was built in 1948, and was later modified to better serve the wastewater treatment needs of residential, commercial and industrial users. In 1984, faced with more stringent treatment requirements, and a July 1, 1988 Clean Water Act deadline imposed by the U.S. EPA, the City began planning its modifications and improvements with the goal of designing a cost effective treatment system. Not only did the City meet the July 1, 1988 deadline, but also the project has improved the water quality in the Licking River, enhancing both the aquatic habitat and the river's recreational potential.

The Wastewater Treatment Plant has continued work to improve the plant with several major capital projects over the years. Two major capital improvement projects completed in 1999 & 2000 included construction of a new Influent Screen Building and a new Supervisory Control and Data Acquisition (SCADA) System. The Screen Building Project included fine screening along with equipment to process screenings for final disposal. The SCADA System provides real time data and operational information that gives Plant Operators the ability to operate the plant with more accuracy and efficiency.

The Electrical Switchgear and Substation/Septic Receiving Projects were completed in 2007. The new septic receiving unit consists of an automatic screening unit, with a screenings compactor located inside a new building. An operator control panel is located on the outside of the building for the haulers to initiate the off-loading cycle. A new automated truck scale was installed, that uses a swipe card system for the haulers to weigh in and out without interaction from the plant employees. A report of all waste hauled here by each hauler is automatically generated for the billing office to enter into the billing software. The new Electrical Building houses the new switchgear and the old plant generator.

In 2006 we completed the Licking River Interceptor Project. The new 54" Interceptor and two new siphons at the confluence of the North Fork Licking River and South Fork Licking River, combined with the existing 42" sewer line, conveys more flow to the plant during rain events therefore causing fewer overflows of our Combined Sewer Overflows (CSO's). This is in accordance with the EPA's goal of reducing or eliminating CSO's. We have been in the planning and construction stages of separating, reducing or eliminating all of our CSO's, and we built a $25 million high rate treatment (HRT) system on the west side of the wastewater treatment plant. This facility began operating in early 2011, with construction substantially completed in 2012. We received a $5 million grant in ARRA stimulus money for the HRT project.

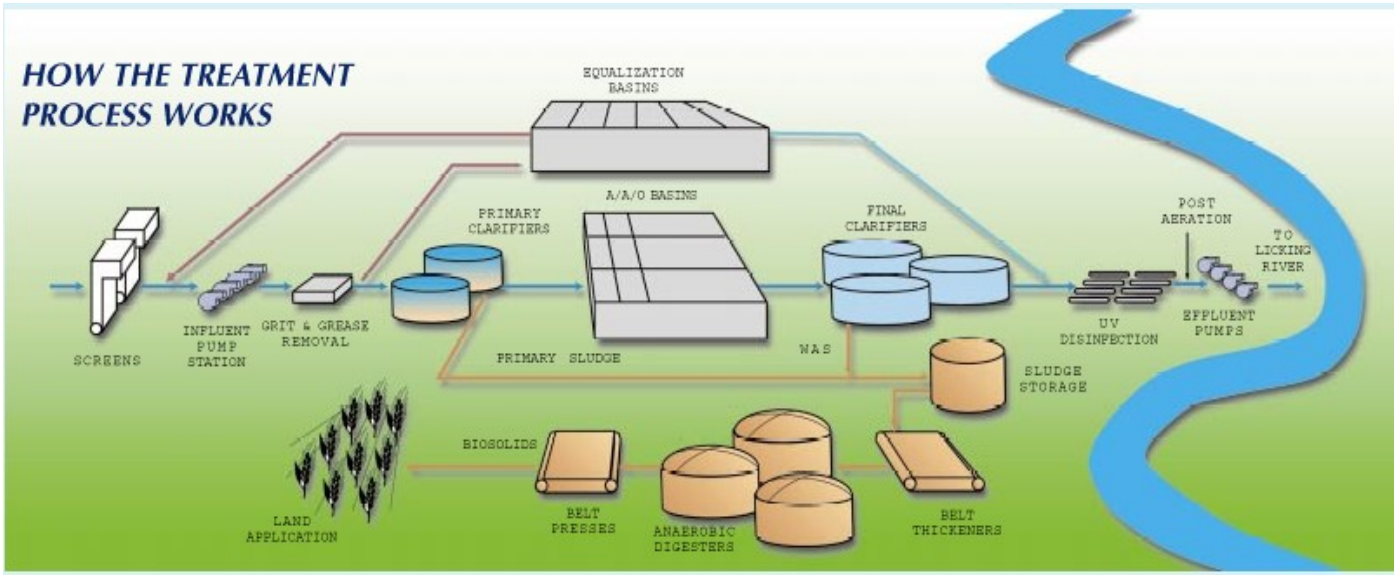
In 2013-2014 we upgraded our aeration blowers and diffusers for increased efficiency, providing substantial energy savings, along with the ability to provide full treatment while on standby generator power.

Since October 2017 the solar array has been producing electricity that is used by the Wastewater Plant. The solar array has produced over 6.3 Gigawatt hours of energy.

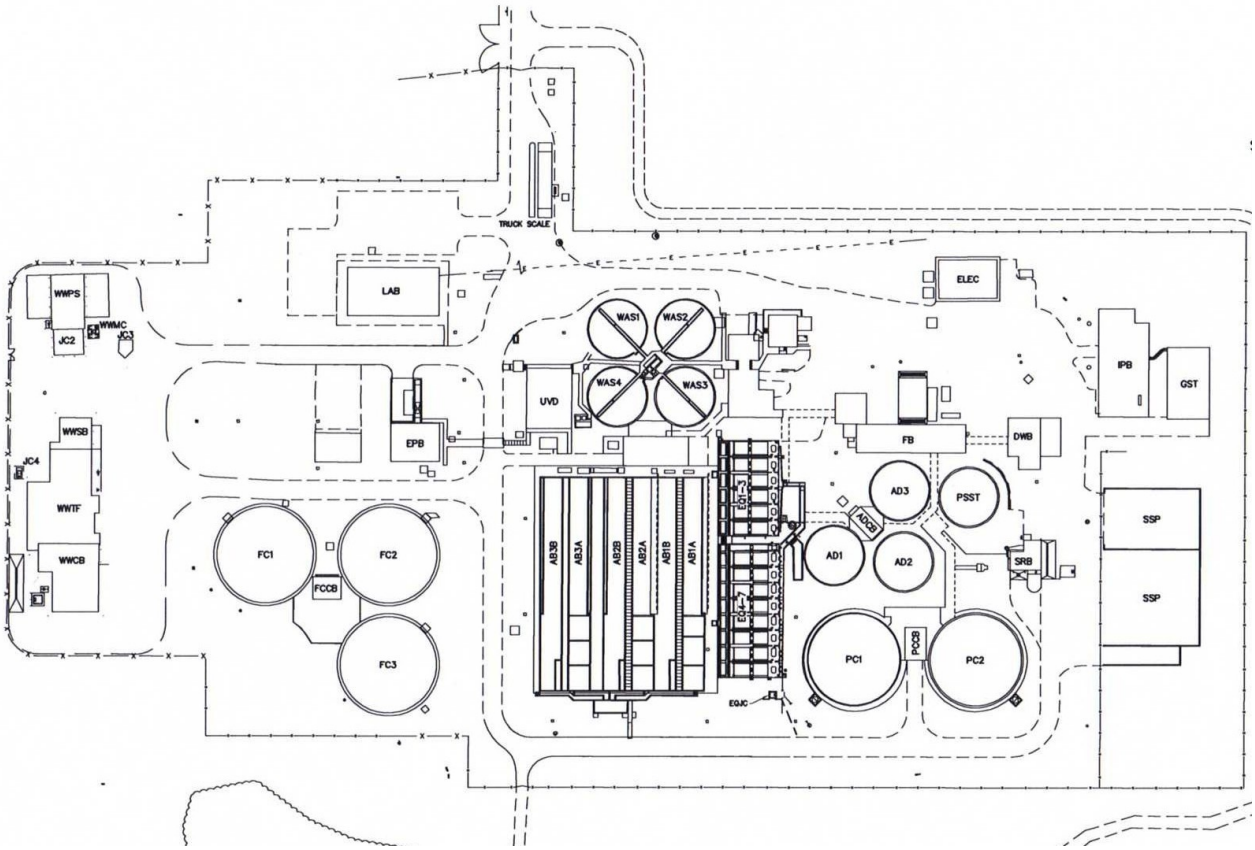
The Anaerobic Digesters project was completed in 2020. The digester lids were replaced with concrete covers. The digesters were completely rehabbed with new heating, mixing and circulating equipment. Along with the new equipment we replaced all electrical controls, breakers and switches. The project removed all equipment, plumbing and electrical and replaced with new. This project will allow us to further reduce waste products while making beneficial use of the by-products (Bio-solids). Bio-solids are land applied to area farm fields for beneficial reuse of the nutrients it contains.

Replacement of the Ultraviolet Disinfection System (UV) was completed in 2022. The original UV unit had been in service since 1998. For 24 seasons the UV unit ran with I believe no violations for Fecal Coliform or E.Coli. The new Trojan Signa unit will be easier to maintain and use 60% less electricity than our old Trojan 4000 unit.

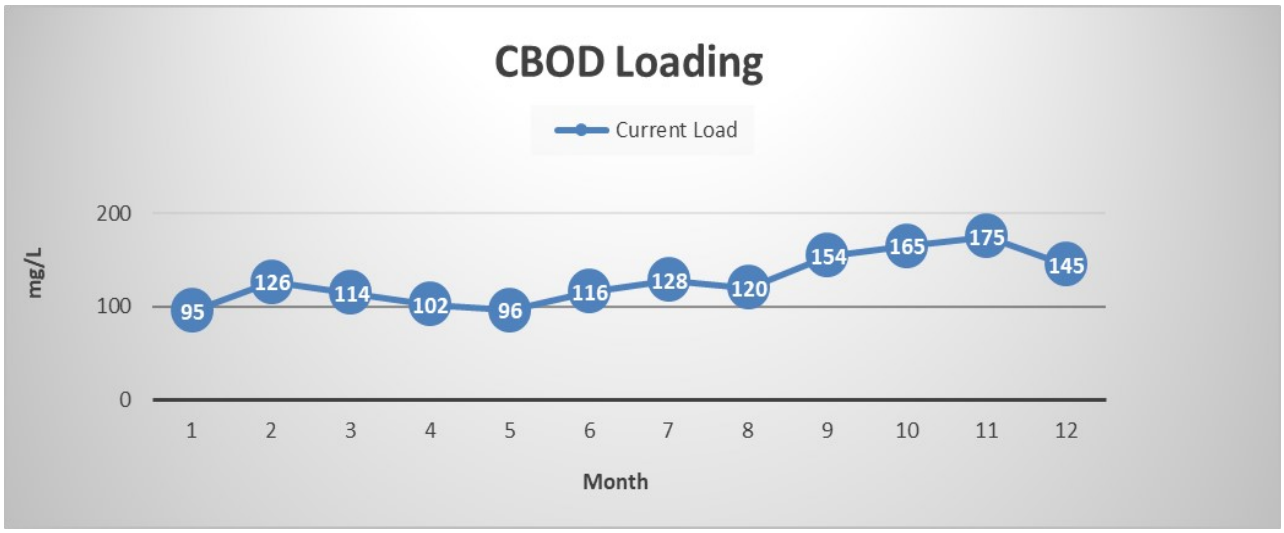
The diagram below illustrates the wet stream and solids handling processes of the treatment plant:

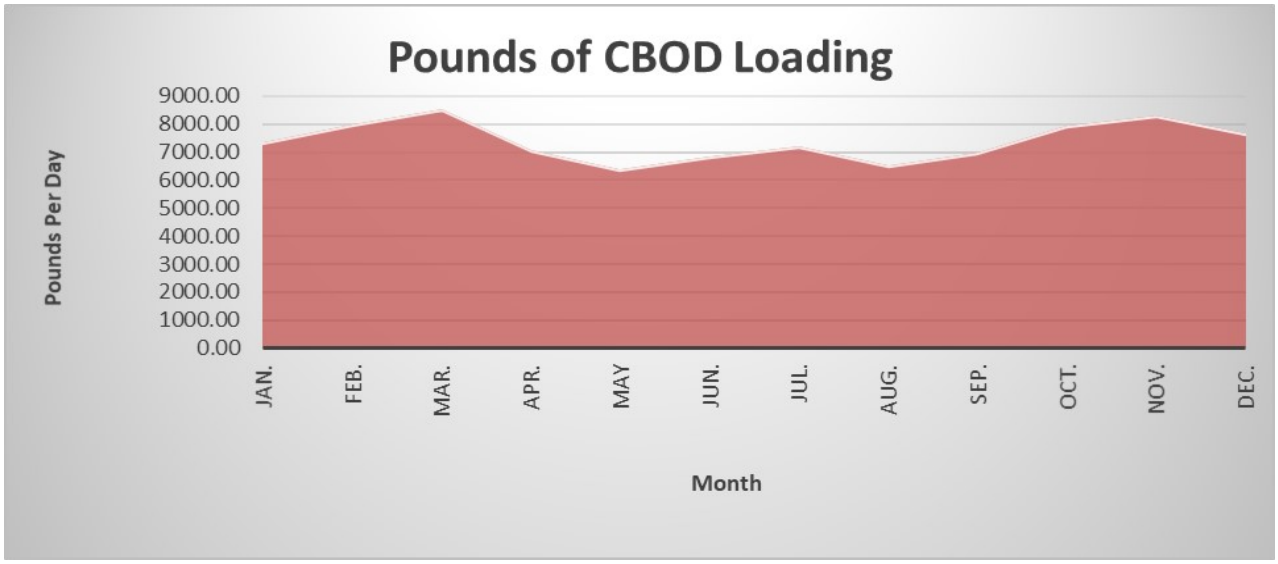


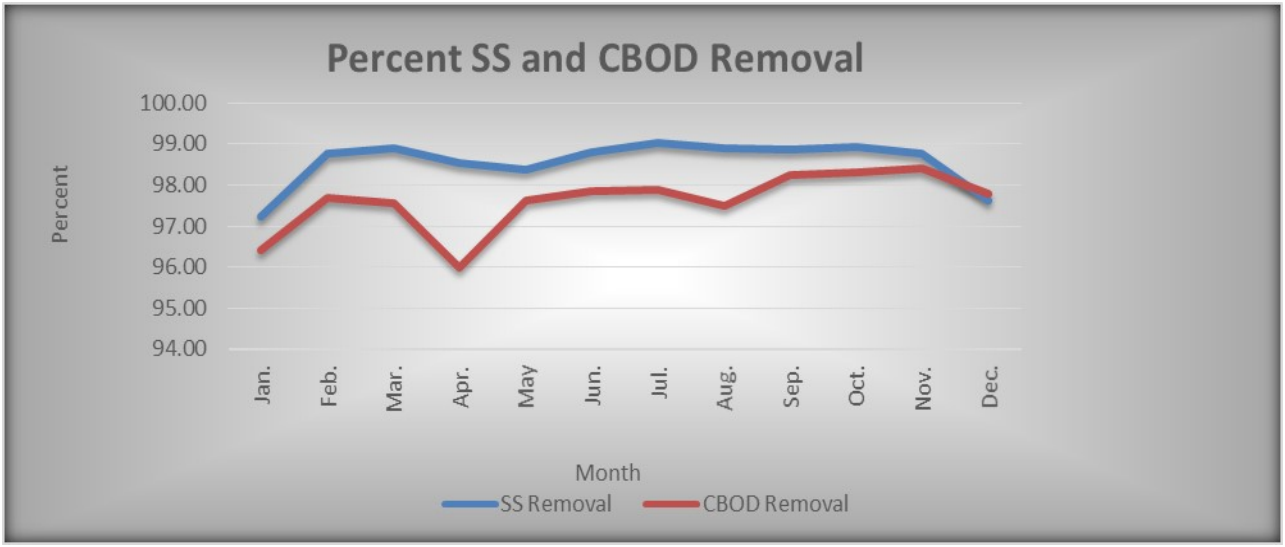
The following diagram represents an actual plant overview:

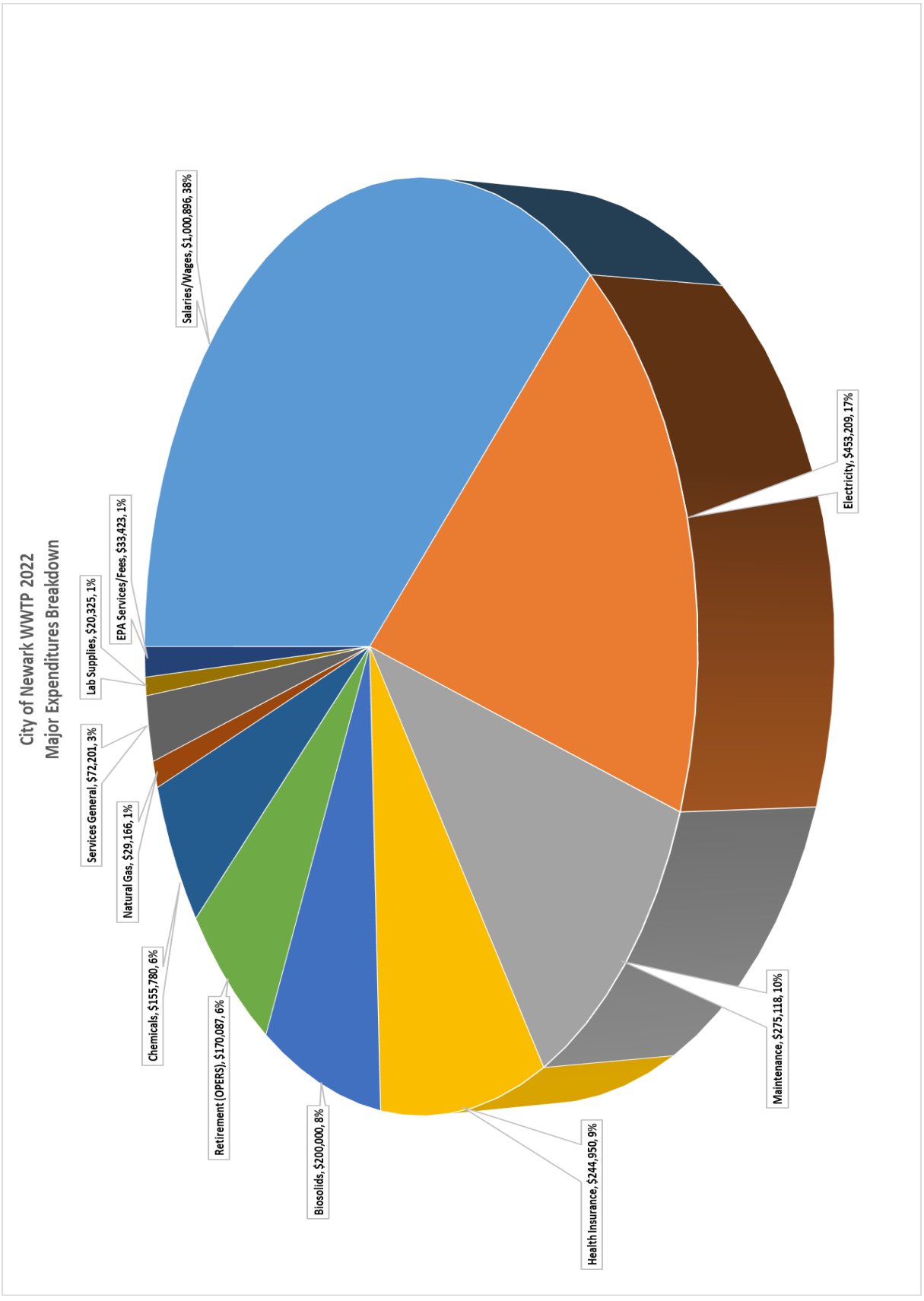


	Total Flow	Ave. Flow	SS				CBOD				Raw	Final	F/M	MCRT
	MG	MGD	Raw	Sett	Final	% Rem.	Raw	Sett	Final	% Rem	NH3	NH3	Ratio	Days
Jan.	286.49	9.24	122	56	3.4	97.21	95	111	3.4	96.42	10.4	2.8	0.09	16.4
Feb.	212.40	7.59	195	81	2.4	98.77	126	110	2.9	97.70	14.5	8.8	0.08	10.5
Mar.	278.80	8.99	181	69	2	98.90	114	96	2.8	97.54	13	1.9	0.08	9.8
Apr.	249.54	8.32	206	100	3	98.54	102	84	4.1	95.98	11.7	4.3	0.08	8.3
May	246.42	7.95	154	74	2.5	98.38	96	67	2.3	97.60	11.5	2.1	0.06	18.4
Jun.	212.10	7.07	210	69	2.5	98.81	116	73	2.5	97.84	13.7	0.1	0.06	14.0
Jul.	209.36	6.75	268	74	2.6	99.03	128	78	2.7	97.89	14.3	0.1	0.09	17.9
Aug.	202.17	6.52	274	116	3	98.91	120	110	3.0	97.50	11.7	0.2	0.11	22.9
Sep.	163.49	5.45	185	64	2.1	98.86	154	104	2.7	98.25	17.8	0.8	0.10	16.7
Oct.	172.65	5.76	194	66	2.1	98.92	165	116	2.8	98.30	19	0.8	0.10	16.7
Nov.	170.30	5.68	194	61	2.4	98.76	175	96	2.8	98.40	18.6	0.4	0.09	16.1
Dec.	196.51	6.34	173	60	4.1	97.63	145	103	3.2	97.79	15.1	1.0	0.11	12.7
Total	2600.23													
Ave.	216.69	7.1	196.3	74.2	2.7	98.6	128.0	95.7	2.9	97.6	14.3	1.92	0.09	15.0


CBOD Loading
Current Load
mg/L
200
100
0
95
126
114
102
96
116
128
120
154
165
175
145
1
2
3
4
5
6
7
8
9
10
11
12
Month


Pounds of CBOD Loading
Pounds Per Day
9000.00
8000.00
7000.00
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
Month


Percent SS and CBOD Removal
Percent
100.00
99.00
98.00
97.00
96.00
95.00
94.00
Jan.
Feb.
Mar.
Apr.
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Month
SS Removal
CBOD Removal


City of Newark WWTP 2022
Major Expenditures Breakdown
Salaries/Wages, $1,000,896, 38%
Electricity, $453,209, 17%
Maintenance, $275,118, 10%
Health Insurance, $244,950, 9%
Biosolids, $200,000, 8%
Retirement (OPERS), $170,087, 6%
Chemicals, $155,780, 6%
Natural Gas, $29,166, 1%
Services General, $72,201, 3%
Lab Supplies, $20,325, 1%
EPA Services/Fees, $33,423, 1%

Human Resources: *To have a highly competent, motivated work staff that is adequately trained and informed to run the plant in an efficient and proper manner.*

Position	Name	Years of Service
Industrial Waste Inspector	Randy McDaniel Class II Operator	35.8
Chemist	Nancy Taylor Class III Operator Class IV Lab Analyst	33.8
Instrumentation Technician	Jeff Krauskopf Class I Operator	31.5
Facilities Manager	Bryan Curry Class IV Operator	30.6
Maintenance Supervisor	Jay Fisher Class I Operator	21.2
Laboratory Technician	Angela Reischman Class II Lab Analyst	19.1
Operator	Josh Wilson Class II Operator	17.2
Maintenance Mechanic/ Operator	Fred Nance	13.0
Assistant Facilities Manager	Scott Knighton Class IV Operator	11.3
Electro-Mech. Technician	Keith Doles	8.8
Operations Technician	Eric Mitchell Class III Operator	7.8
Operator	Christopher Sims Class II Operator	4.5
Operator	Colton Curry	3.0
Operator	Gay Dornbirer Class I Operator	2.5
Operator	Ben Petersheim	1.0
Operator	Shawn Brooks	0.6

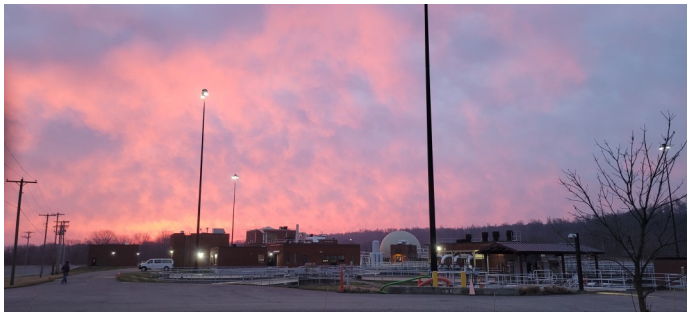
Operations: *To operate the wastewater plant as efficiently as possible with the highest degree of treatment that our facility is capable of performing.*

Trojan Signa UV Disinfection

As shown by the data listed on page 4, the treatment operation achieved nearly full compliance for removal of CBOD, ammonia, and suspended solids, while treating over 2.6 billion gallons of wastewater.

During this year we have been in the process of replacing Programmable Logic Controllers (PLCs). The PLCs for each building or process are programmed to operate equipment automatically with input from other processes or Operator inputs. The PLCs that we are replacing have become obsolete in the 35 years they have been operating. Along with replacing PLCs we have also been upgrading our Supervisory Control and Data Acquisition system (SCADA). SCADA gives the operator the ability to monitor, adjust and operate equipment from a centralized computer.

The successful operation of the wastewater treatment plant (WWTP) would not be possible without the dedication and hard work of the employees. The management and staff at the WWTP strive to provide the best service possible while surpassing EPA standards for effluent quality.



Projects Completed in 2023

- Replaced all obsolete PLC's with new Allen Bradley Control Logix PLC's.
- Replaced roof on the Influent pump building .
- Minor repairs to several of the plant roofs .
- Added radar level indicators to influent wet well.
- Painted #2 Final Bridge and baffle.
- Replaced VFD for #2 Belt Thickener.
- Painted Environmental Lab cabinets.
- Replaced old rusty faucets in the Environmental Lab.
- Replaced mag meter for #1 thickener.
- Replaced mag meter for WAS flow.
- Replaced Roof Hatch on Dewater Building.
- Replaced grit trough lining.

2024 Projects List

- Replace impellers on Return Activated Sludge pumps
- Replace Mixed Liquor Suspended Solids meter.
- Replace #1 Influent pump wear rings.
- Finish Replacing mag meter for #2 thickener.
- Continue replacement of aging equipment.
- Replace #4 Influent Pump Motor.
- Replace Non-Potable Water system mag meter.
- Repair concrete throughout the plant site.

Environmental Laboratory and Industrial Pretreatment

- *To provide accurate and timely data for plant operational control, industrial pretreatment monitoring and regulatory reporting*
- *To ensure industrial facilities discharging to the Newark WWTP comply with local, state and federal regulations designed to protect both the integrity of the wastewater treatment process and the biological integrity of the surface waters receiving the WWTP outfall*

Highlights of 2023

The Newark Environmental Lab continues to provide data for WWTP process control, provide industrial surveillance, monitor discharge of a defunct City Landfill on Watson Rd., and enable investigative studies of the collection system. In 2023, a total of 20,265 lab tests were performed in-house. The following shows sample type, and number of analyses (including replicates).

- Quality Control 3998
- Process Control 7980
- Industrials 7382
- River 180
- HRT 221
- Landfill 252
- Benchscale Digester 252

Per OEPA, the recommended Quality Control analysis rate should be at least 10%. The Newark Environmental Lab exceeded that benchmark by producing a QA/QC rate of 24.58%

Industrial Pretreatment Program

The Newark Environmental Lab analyzed 1,868 industrial samples for various parameters as part of the City of Newark's Industrial Pretreatment Program. This Program is mandated by the Code of Federal Regulations, and is designed to protect the WWTP from toxicity that could be discharged from our industrial users. Toxic loads can kill off the bacteria used to treat wastewater at the WWTP, resulting discharge of untreated sewage to the Licking River.

Large industrial users can also discharge high amounts of treatable waste, so each industry that has a significant discharge to the City's sewer is billed based on pounds of cBOD, Solids, and Ammonia that are present in their wastewater. This bill is in addition to the standard water and sewer bill that all customers pay based on cubic feet of water used. While these parameters are present in all wastewater, even residential sewage, industrial contributions that are higher than the residential "background" levels can increase the amount of money required to effectively treat these waste streams.

Generally speaking, increased cost translates into more electricity required to achieve effective aeration, as well as increased trucking costs to haul biosolids (the end product of treatment) offsite. By billing industries for the pounds of "high strength" wastewater each discharges, the City can recoup some of the cost of treatment in a fair and consistent manner. In 2023, $355,023.86 was generated through Surveillance and Surcharge Fees to offset some of the increased cost of treatment.

Each industry is also charged a flat surveillance fee based on the number of times samples are collected at each facility. Frequent sampling of each significant industrial user helps to establish a waste profile of each industry's "baseline" discharge. Any departures from baseline are usually detected promptly and appropriate action is taken before the WWTP experiences a problem.

While all significant industries are billed based on excess loading, Tamarack Dairy is by far the largest source of revenue for the Surveillance and Surcharge Program. Typical Quarterly bills for Tamarack are generally in the $80,000—$110,000 range. Surcharge billing for Tamarack alone in 2022 was $468,097.26. In 2023, Tamarack eliminated production of cultured products (yogurt, sour cream-based dips, and cottage cheese). This change has cut their water use in half, as well as caused a decrease in the amount of TSS and cBOD present in their wastewater. As expected, the total surcharge in 2023 has decreased to $220,729.99 since the pounds of high strength waste has decreased.

Tamarack is expected to add a new product to their production line sometime in 2024 that will most likely create an increased amount of cBOD and solids discharged. The new coffee creamer product line will be high in sugar and canola oil. Construction of this plant expansion began in 2023, and will continue through, at least, the first half of 2024.

DMR-QA Study 43

In 2023, the Newark Environmental Laboratory participated in USEPA's DMR-QA Study 43. This mandatory laboratory proficiency study uses a single blind approach by sending participating laboratories samples of known value for various parameters. The Study Provider knows the value of each standard, but the participating laboratories do not know the value prior to analysis. After analysis, the labs submit the results for grading. Each year, Newark is required to analyze 19 parameters as part of the mandatory DMR-QA study. In 2023. all of the parameters required by Newark's NPDES permit were graded as "acceptable" for accuracy on the first attempt.

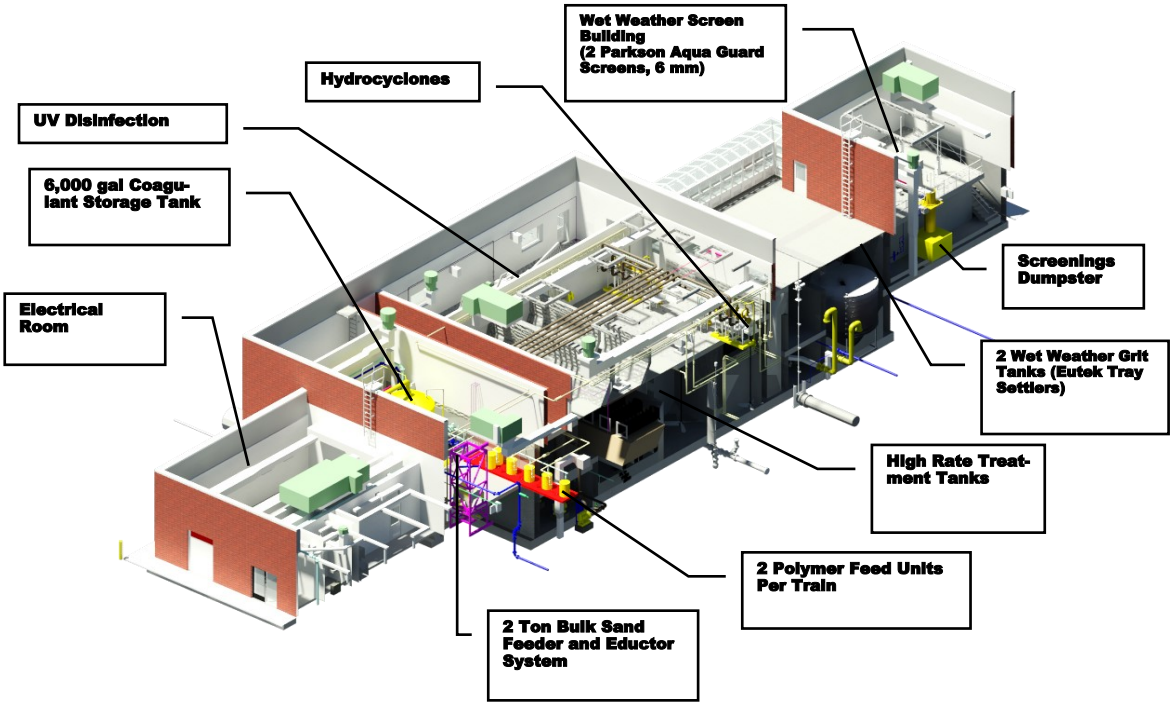
2023 Completed Project List

- Continued employee training
- Continued inventory control program
- Identified other laboratory equipment that will be replaced as funds become available

Goals for 2024

- Continue employee training
- Dispose of more hazardous chemical waste generated from lab operation, including FAA source lamps
- Continue inventory control program
- Continue with equipment replacement plan
- Continue updating SOPs, benchsheets and Quality Assurance Plan as needed
- Update Pretreatment Enforcement Plan
- Update sections of the Sewer Use Ordinance for July 2024 review

Tour Groups



High-Rate Treatment

Our High Rate Treatment facility began operating while still under construction in 2011, before it was completed in 2012. This process treats wet weather flows that have been re-routed here after several planned collection system improvements. During heavy rains, when the collection system gets above its capacity to convey flow to the wastewater treatment plant, the system was previously designed to relieve itself by overflowing into the river. The EPA has given us requirements to reduce these overflows, and we are achieving this by treating these flows in a high-rate treatment system. This process consists of influent pumping, screening, grit removal, coagulation and flocculation, disinfection, and discharging up to 28 million gallons per day of treated water into the Licking River. Phase II of our Long Term Control Plan was recently completed, with recommendations for future projects. Construction has already began on the next phase of sewer separations and improvements to the Collection system.

Through the collective efforts of everyone in our department, we strive to make this addition to our facility a successful operation.

Final Comments from the Facilities Manager:

This past year we have been able to accomplish many upgrades to the treatment plant along with maintaining the equipment already in place. This year we look forward to maintaining the high quality that we have become accustomed, along with preparing for the future growth that is expected in our area. The continued dedication of the Wastewater Treatment staff will ensure that clean recreational water is returned to the Licking River.

Why do we put so much time and energy into treating used water? Isn't water just about everywhere? Three quarters of the earth's surface is covered by water, but of that, only 3% is usable freshwater. To make matters worse 77% of the freshwater is frozen in polar ice caps and glaciers. Another 22% is groundwater. It is amazing to think that of all the water in the world only a small fraction is available for us to use. We cannot treat water as if we have an unlimited source. Water is definitely a finite, precious resource in need of protection.

The City of Newark, through proper operation of its wastewater treatment plant, makes a small, but important contribution to preserving the nation's water supply. Preventing the discharge of pollutants into the waterways of this area preserves the water for others and allows people to continue their way of life. We can never take this unique and precious resource for granted. We must continue to be protective of our vital water resources. The employees of the City of Newark Wastewater Treatment Plant can be proud of the work they have accomplished in 2023 and look forward to meeting challenges of preserving our water resources in 2024.

-Bryan Curry, Wastewater Facilities Manager