SANITARY SEWER OVERFLOW REDUCTION PLAN

FOR

CITY OF STRUTHERS, OH

PRESENTED TO:

Mr. Mark Ciccone
Wastewater Plant Superintendent
City of Struthers
Struthers, OH 44471

April 2025

STATE OF OHIO
GEORGE
WILLIAM
SENDREY
E-70227
REGISTERED
PROFESSIONAL ENGINEER

Background Information

In the most recent update to the City's NPDES permit, the permit requires the City to submit a plan for the elimination of the existing Sanitary Sewer Overflows (SSO's). Through our preliminary investigation efforts and in partnership with the City treatment staff, we reviewed possible improvements at the Wastewater Treatment Plant, the Bridge Street Retention Basin and Pump Station, and the City's overall sanitary collection system.

One mitigating factor with the investigation, planning, and the ultimate system improvements implemented by the City is the impact the Mahoning County owned sewers have on the Struthers collection and treatment system. The County contributes approximately 64.5% of the total flow that is collected and treated by the City of Struthers. While the County has been a good partner with the City, their collection system has been investigated and found to have inflow and infiltration (I/I) issues that impact the City's system during wet weather events. The County has been working to improve their collection system and is in the process of additional projects to reduce I/I. However, the impact the improvements will have on the Struthers sanitary system are still unknown.

This plan only addresses improvements within the Struthers sanitary system. However, we acknowledge and understand that the outcome and impact the County improvements make to the activity and frequency of the City's SSO's may lead to reduced improvements within the City's sanitary system or the possibility of additional improvements to address the SSO's. In addition, the Tentative Schedule below reflects our best estimate of timing and sequence of tasks considering the number of collection system unknowns, funding cycles, grant/loan timing and requirements, County improvement projects, cost escalations, supply chain, agency approval and review times, etc.

Along with the possible change in the type and scale of improvements required for the sanitary system after the County improvements are implemented, the tentative schedule is likely to have similar and unknown (at this time) changes that may result in a shorter or longer schedule depending on the planned system investigations and improvement outcomes. Overall, we believe this plan provides the needed flexibility to fully address the SSO's with the full intent on the City's part to protect and improve the environment.

Wastewater Treatment Plant

The construction of the current Struthers Wastewater Treatment Plant (WWTP) was originally completed in 1961 when a 3.0 Million Gallons per Day (MGD) primary treatment plant was constructed. This plant was upgraded to the current secondary treatment configuration of a 6.0 MGD Average Daily Flow (ADF) plant with a Peak Daily Flow (PDF) of 7.2 MGD in 1986.

The design population was 27,346 and the original design flows for the 6.0 MGD ADF WWTP were as follows:

Sanitary flow	1.88 MGD
Infiltration	2.32 MGD
Inflow From Retention Basin	1.55 MGD
Plant Recycle Side Stream Flows	0.25 MGD

The design loading for the 6.0 MGD ADF WWTP were as follows:

Biological Oxygen Demand	158 mg/l
Total Suspended Solids	186 mg/l
Ammonia	15 mg/l

The existing WWTP site is long and narrow, with a maximum width of approximately 180 feet. A site plan is shown in **Figure 1**. The site is constrained by the Lally Pipe & Tube Company, the Mahoning River, and CSX Transportation, Inc. on the North, Lowellville Road to the South, and Lowellville Road and CSX Transportation, Inc. on both the east and west. The topography of the site slopes sharply downward at 10-24% from the south to the north. The WWTP site is above the 200-year floodplain and is underlain by sandstone at a depth of approximately 12 feet.

The design of the current WWTP includes a diversion chamber that is designed to divert flows greater than 6.0 MGD to a multi-chamber 3.0 Million Gallon (MG) retention basin. During low flows, the retention basin flow is pumped out by three (3) wastewater pumps back to the headworks, just downstream of Parshall Flume. The original design of this basin included an overflow to Panther Creek when full; but at some point in the past, additional aeration and settling was added to the basin, along with a reconfiguration of the outlet to provide full secondary treatment for this additional flow. This modification has allowed the plant to provide treatment for flows up to 8.0 MGD with peaks as high as 14.0 MGD. However, flows in this range create operational issues for the plant and can also result in some flooding at the WWTP.

Bridge Street Retention Basin and Pumping Station

The Bridge Street Retention Basin and Pumping Station is an in-system combined purpose dry weather wastewater pumping station and a wet weather equalization and storage facility. This pump station collects and pumps to the WWTP approximately 60% of the Struthers collection system during dry weather and is located behind Bob Cene Park near Bridge Street. The dry weather portion of the pump station consists of an influent bar screen, a dry weather wet well and three (3) 1,000 gpm (1.4 MGD) submersible sewage pumps. These pumps transport the flow to the WWTP facility through a 14” diameter ductile iron force main. The dry weather wet well has an overflow weir that allows excess flow (greater than 2.8 MGD) to collect in an adjacent wet weather wet well.

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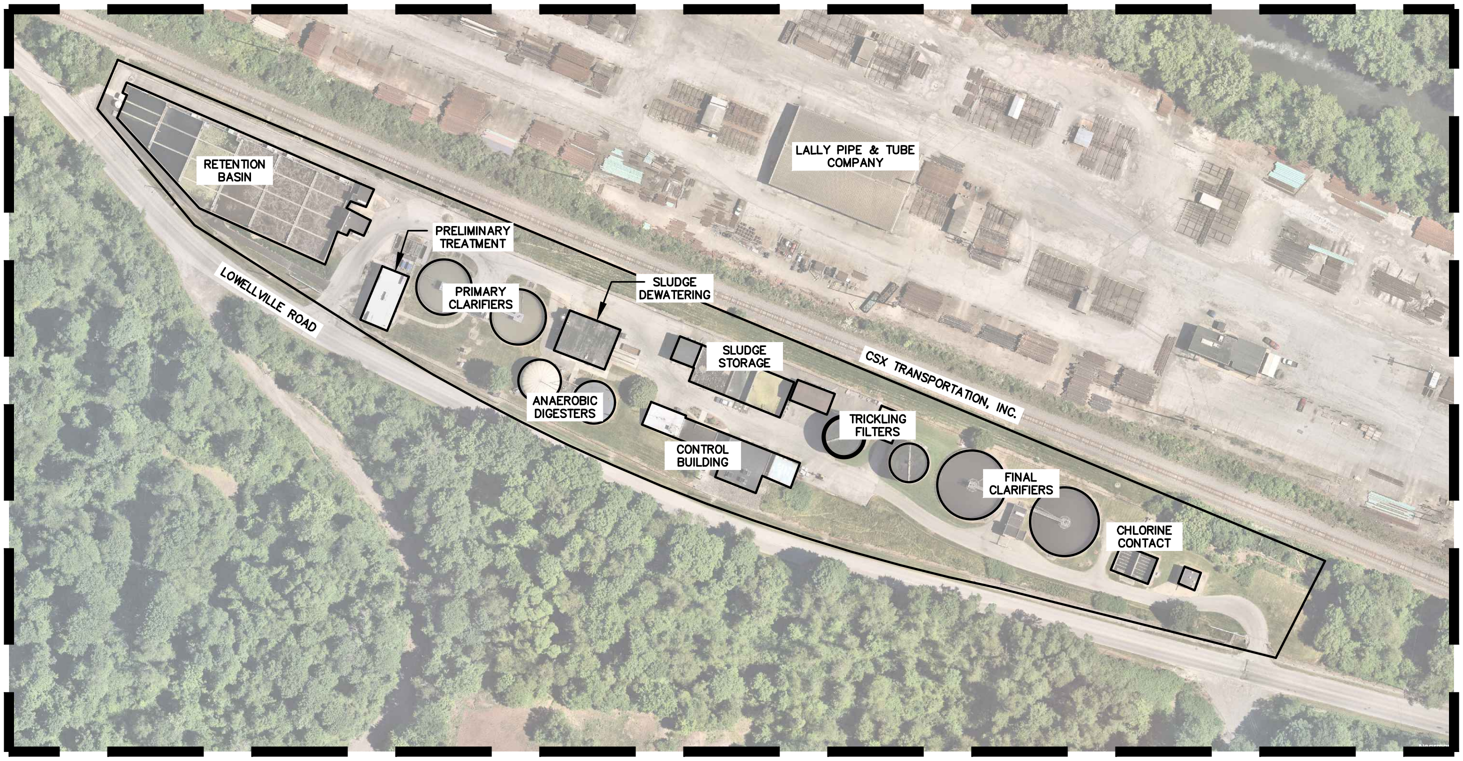

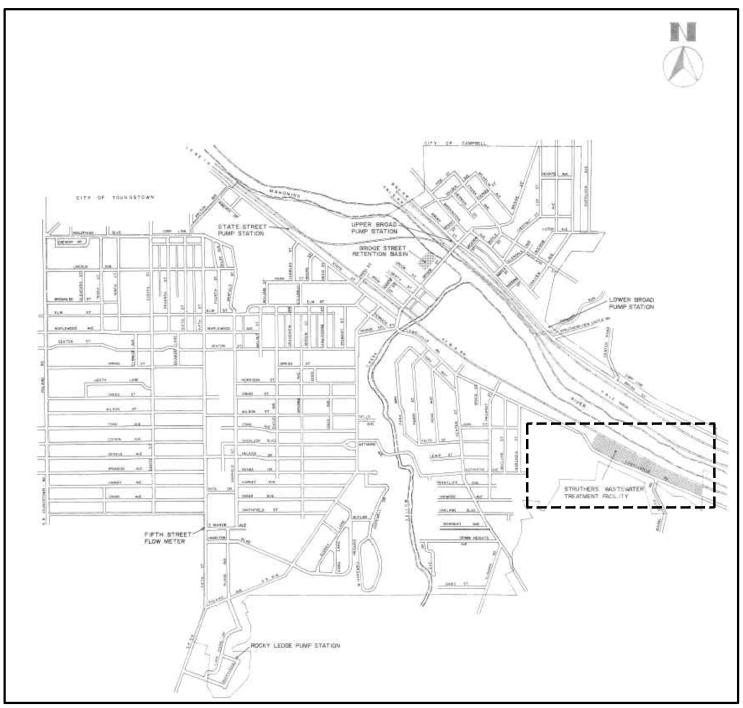

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3875 EMBASSY PARKWAY, SUITE 280
AKRON, OH 44333
PHONE: 216-505-7775
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EXISTING WASTEWATER TREATMENT PLANT
FIGURE 1

The wet weather portion of the Bridge Street Retention Basin and Pumping Station system consists of a wet weather wet well, three (3) wet weather pumps (two (2) 2,100 gpm (3.0 MGD) pumps and one (1) 700 gpm (1.0 MGD) pump), plus six (6), 600,000-gallon interconnected concrete storage tanks, each with mixers and aeration equipment. The wet weather pumps pump the excess water from the wet weather wet well into the storage chambers during the storm event. If the chambers fill up, the overflow is directed to the Mahoning River. Once the influent flow to the pump station decreases and the WWTP has sufficient capacity to treat the flow, the basin is drained back to the dry weather wet well and directed to the WWTP. An overview of the pump station and retention basins are shown in **Figure 2**.

Collection System

The collection system for the Struthers sanitary sewer system consists of more than 50 miles of gravity sanitary sewer and five (5) sanitary sewer pump stations. In addition, the Mahoning County Sanitary Engineering department operates a collection system in the unincorporated areas surrounding the city that conveys this flow into the Struthers system at manhole (MH) G-91 on Fifth Street for treatment. The County flow is conveyed down Fifth Street to an overflow at MH G-13. At MH G-13, excess flows from the influent county line are redirected to the State Street Pump Station via a 12" diameter sanitary sewer in an easement from Garfield Street to State Street. Following the easement, the flow is directed to the State Street pump station in the area known as Garfield Hill, which is operated as a sports park. The State Street pump station lifts this flow up into a gravity collection system further west on State Street. This flow ultimately winds up via gravity at the Bridge Street pumping station. The remainder of the county flow that is not re-directed, flows by gravity to the WWTP, unrestricted through the Struthers collection system. Mahoning County provides approximately 64.5% of the flow for the system as measured at the influent flume in MH G-91.

The Struthers collection system originally contained numerous constructed sanitary sewer overflows to provide protection for residents and the sanitary system. Through diligence and effort, the city has been successful in removing most of the original thirteen (13) overflows, however three identified overflows remain. Bridge Street Retention Basin and Pumping Station, the Garfield Hill/State Street PS location, and Hawthorn Street.

SSO Mitigation Alternatives

The mitigation of the SSOs experienced by the City of Stuthers can be broken down into two distinct areas of focus. The first being the WWTP and the second being the collection system. The existing WWTP has an ADF of 6.0 MGD with a peak capacity of 7.2 MGD. From our review of daily records over the past few years, it is apparent that the treatment process works well during dry weather, but the system struggles during wet weather events. In essence, the record review demonstrates the WWTP does not have a dry weather capacity issue, but rather a wet weather capacity issue. The evidence does not support the need to modify the current ADF, but rather a need to address high flows during wet weather events.

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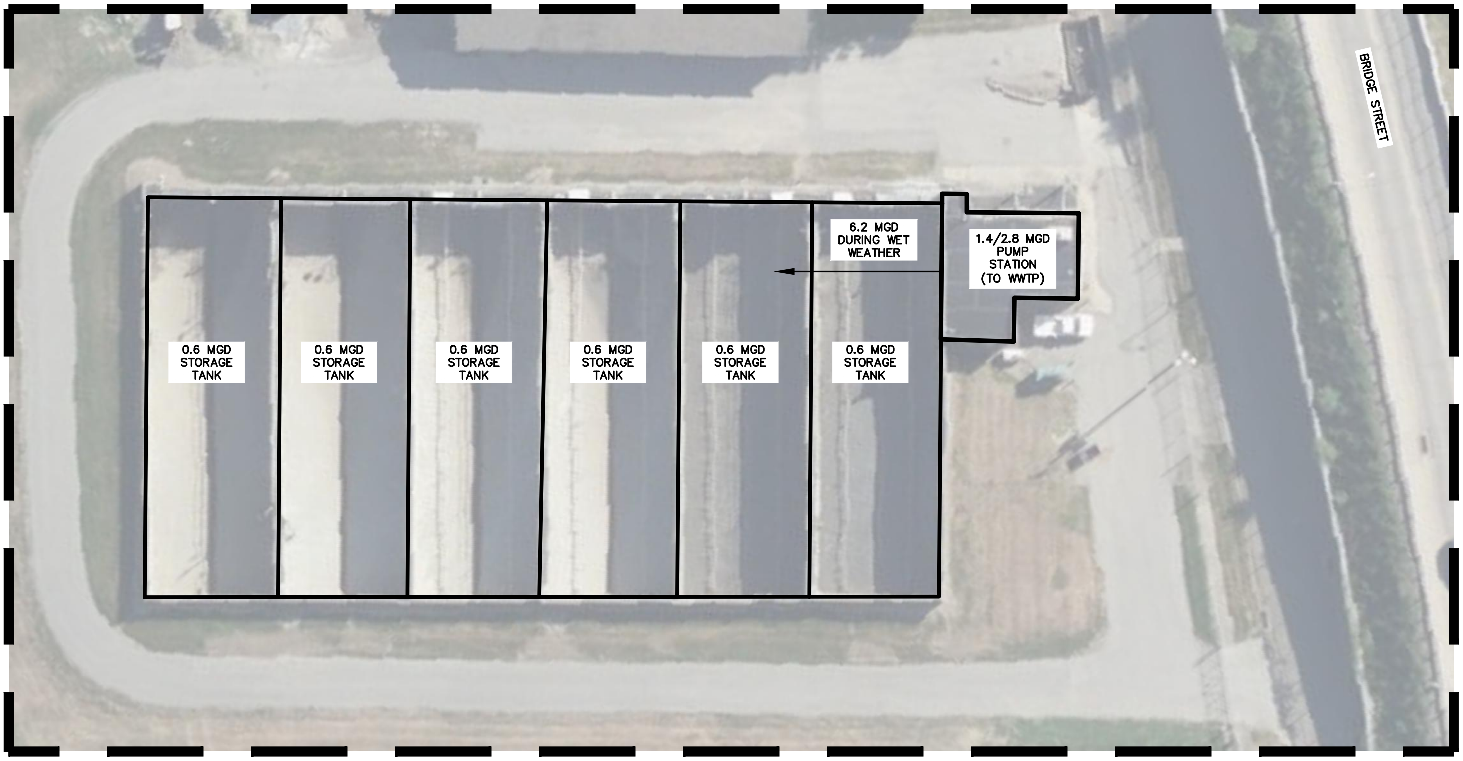

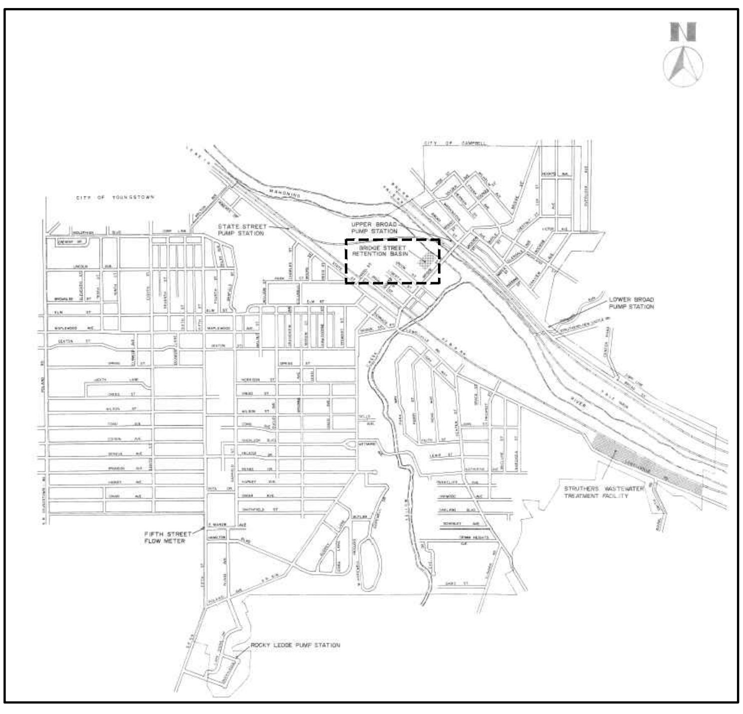

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AKRON, OH 44333
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WWW.KIMLEY–HORN.COM

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BRIDGE STREET RETENTION BASIN & PUMP STATION
FIGURE 2

The peaking factor of 1.2 (ADF of 6.0 MGD with a peak capacity of 7.2 MGD) is insufficient to properly handle the range of wet weather flows experienced by the WWTP. During the peak wet weather events, the WWTP operators are required to artificially restrict the flows entering the WWTP to limit flooding within the WWTP footprint that could impact treatment equipment and the treatment process. The restrictions contribute to system back-ups that can sometime lead to SSO events within the collection system. Based on the discussion below, we recommend that the wet weather capacity of the WWTP expand to 14.0 MGD to allow secondary treatment for a range of wet weather flows historically experienced by the WWTP.

During the 107-day period from January 9, 2024 to April 24, 2024 the Struthers WWTP experienced 73 days with flows exceeding 6.0 MGD. Within this period of exceedance, there were 50 consecutive days, from March 6, 2024 through April 24, 2024 where the flows exceeded 6.0 MGD. Kimley Horn developed a predictive flow model that allows us to calculate the required wastewater storage so that the WWTP flow does not exceed the peak plant flow. Utilizing the model, and the existing peak flow capacity of 7.2 MGD, a total of 77.7 MG of storage would have been required during the 50-day consecutive period to eliminate flow above the plant peak capacity. Refer to Appendix A for the rainfall, flow rate and storage data for the 7.2 MGD peak plant capacity.

If the WWTP wet weather peak flow rate is expanded to 14.0 MGD, the required storage for the same 50-day event is reduced to 1.0 MG. This volume of storage is well within the capacity of the existing system since the Bridge Street Pump Station has approximately 3.5 MG of storage. While 50 consecutive days is an unusual event, given the increase in storm intensities that we have been experiencing, the City prefers to have additional storage to protect the sanitary collection system, the WWTP, and the environment from possible impacts. Refer to Appendix B for the rainfall, flow rate and storage data for the 14.0 MGD peak plant capacity. Based on the available data and investigation, Kimley Horn recommends that the first step to address the SSO issue in Struthers is to focus on the wet weather flow by adding secondary treatment capacity that is to specifically address storm events at the WWTP. While the improvements are in the design and construction process, the focus will shift to the collection system with additional flow monitoring, testing, and other field investigation to identify and reduce/eliminate hydraulic bottlenecks and reduce Inflow and Infiltration (I/I) in the collection system.

There is insufficient data currently available to determine the peak flows with confidence and to identify potential bottlenecks in the collection system. A flow study was completed by the IBI group in 2019, however this study was limited in scope and did not produce any significant findings that could be used for projects that reduce SSOs. Kimley Horn recommends a more comprehensive flow and I/I study be completed as the design and construction of the WWTP improvements move forward to better understand issues within the collection and to identify what improvements would assist in reducing the SSO events.

The recommended I/I study will also potentially consider operational changes to the Bridge Street Pump Station and / or relief sewers to deal with peak flows entering the collection system from Mahoning County. As noted above, Mahoning County has several sewer improvement projects in construction or in the planning and design stage that are expected to reduce wet weather flow into the Struthers sanitary system. Focusing, as the first step, on the recommended wet weather treatment improvements at the WWTP will allow the City to investigate the collection system and provide Mahoning County time to complete their proposed improvements. As the County projects are completed, the City can more accurately determine what steps/projects need to be implemented within the Struthers sanitary system to further reduce and/or eliminate the potential for SSO events. The results of the County improvements could lead to the need for more or less improvements within the City's sanitary system, as well as lengthening or possibly shortening the Tentative Schedule shown below. The City will notify the OEPA with adjustments in the proposed projects and the schedule as the results become available and next steps identified.

WWTP Peak Flow Alternatives

The existing Struthers WWTP consists of two independent treatment trains, a conventional extended aeration treatment train and a trickling filter treatment train that total 6.0 MGD with a peak flow of 7.2 MGD. A total of three different supplemental treatment options were considered to expand the treatment process to address the wet weather peak capacity of the WWTP. Based on the variations in diurnal flow, and the existing footprint available at the WWTP that does not provide room for expansion, two different types of sequencing batch reactor technology were evaluated as replacements for the existing treatment process. Though a smaller footprint in size, the existing WWTP site is too small to accommodate either of the two sequencing batch reactor processes rated at a higher treatment capacity. The two were analyzed with the following parameters: an Average Design flow (ADF) of 6.0 MGD, Maximum Design Flow (MDF) of 10.0 MGD and a peak hydraulic flow (PDF) of 14.0 MGD. The third option would supplement the treatment process. Option 3 would be a 'wet weather only' disk filter that would treat wet weather flow after the screening and grit removal. The disk filter would provide an additional 8.0 MGD of secondary treatment to supplement the existing 7.2 PDF capacity of the existing treatment process.

1.1. SEQUENCING BATCH REACTOR – AQUANEREDA.

The AquaNereda process is a true batch, granular sludge technology that utilizes a robust structure of a granule that withstands fluctuations in chemical spikes, loading variations, salt, pH and toxic shocks. It does not require secondary clarifiers, selectors, separate compartments, or return sludge pumping stations. The settling properties with a sludge volume index (SVI) value of 30-50 mL/g allow MLSS concentrations of 8,000 mg/l or greater and provides enhanced biological nutrient removal (ENR). The system is provided with controls that provide simplified operation.

The benefits of the AquaNereda process are listed below.

- Optimal biological treatment is accomplished in one effective aeration step
- Four times less space required compared to conventional activated sludge systems
- Energy savings up to 50% compared to activated sludge processes
- Robust process without a carrier

- Significant reduction of chemicals for biological nutrient removal due to the layered structure and biopolymer backbone of the granule
- Lowest life-cycle cost

AquaNereda Basic Design Parameters are shown below. Refer to **Figure 3** for the equipment layout. The SBR will not fit within the existing WWTP footprint, so additional property must be acquired to allow this option. The City of Struthers already owns property across the road from the existing WWTP, so the SBR is shown on that expanded parcel.

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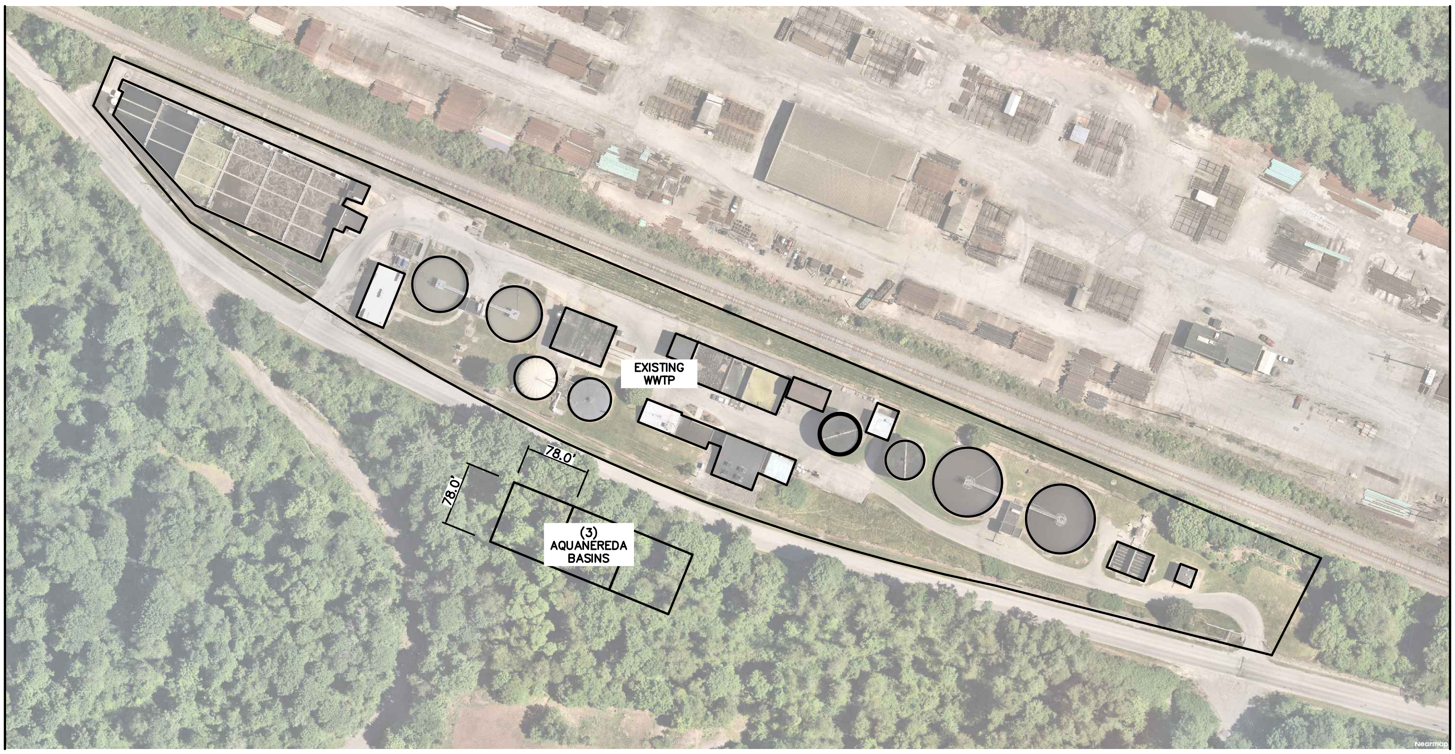

Kimley»Horn

3875 EMBASSY PARKWAY, SUITE 280
AKRON, OH 44333
PHONE: 216-505-7775
WWW.KIMLEY-HORN.COM

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SEQUENCING BATCH REACTOR - AQUANEREDA

FIGURE 3

AQUANEREDA DESIGN PARAMETERS

DESIGN INFLUENT CONDITIONS

Avg. Design Flow	= 8.50 MGD	= 32,176 m³/day
Max Design Flow	= 10.00 MGD	= 37,854 m³/day
Peak Hyd. Flow	= 14.00 MGD	= 52,996 m³/day

			Effluent			
DESIGN PARAMETERS	**Influent**	**mg/l**	**Required**	**<= mg/l**	**Anticipated**	**<= mg/l**
Bio/Chem Oxygen Demand:	BOD5	158	CBOD	25	CBOD	25
Total Suspended Solids:	TSS	186	TSS	30	TSS	30
Total Kjeldahl Nitrogen:	TKN	35	--	--	--	--
Phosphorus:	Total P	8	--	--	--	--

SITE CONDITIONS	**Maximum**		**Minimum**		**Elevation (MSL)**
Ambient Air Temperatures:	85 F	29.0 C	32 F	0.0 C	1,007 ft
Influent Waste Temperatures:	68 F	20.0 C	50 F	10.0 C	307.0 m

AGS BASIN DESIGN VALUES			**Water Depth**			**Basin Vol./Basin**	
No./Basin Geometry:	3 Rectangular Basin(s)		**Process Level (PWL):**	22.5 ft	(6.9 m)	1.02 MG	(3,876 m³)
Freeboard (from PWL):	2.5 ft	(0.8 m)	**Discharge Level (DWL):**	23.3 ft	(7.1 m)		
Length of Basin:	78.0 ft	(23.8 m)	**Top of Wall (TOW):**	25.0 ft	(7.6 m)		
Width of Basin:	78.0 ft	(23.8 m)					

PROCESS DETAILS

Cycle Duration:	= 3.0 Hours/Cycle	
Food/Mass (F/M) ratio:	= 0.055 lbs. BOD5/lb. MLSS-Day	
MLSS Concentration:	= 8000 mg/l	
Hydraulic Retention Time:	= 0.36 Days	
Solids Retention Time:	= 19.00 Days	
Est. Net Sludge Yield:	= 0.87 Lbs. WAS/lb. BOD5	
Est. Dry Solids Produced:	= 9729.0 lbs. WAS/Day	= (4413.0 kg/Day)

AERATION DETAILS

Lbs. O2/lb. BOD5	= 1.50	
Lbs. O2/lb. TKN	= 4.60	
Peak O2 Factor:	= 1.00	
Actual Oxygen Required:	= 28214 lbs./Day	= (12797.8 kg/Day)
Max. Discharge Pressure:	= 11.32 PSIG	= (78 KPA)
Max. Air Flowrate/Basin:	= 3,731 SCFM	
Min. Air Flowrate/Basin:	= 933 SCFM	
Max. Simultaneous Air:	= 5,487 SCFM	
Min. Simultaneous Air:	= 1,911 SCFM	

RETURN FLOW ESTIMATES

Daily Estimated Return Flow:	= 1.24 MGD
Max. Instantaneous Return Flow:	= 1,178 GPM

POWER CONSUMPTION

Average Aeration Power Consumption:	= 2776 kWh/day (at 80% design load)

The estimated Opinion of Probable Construction Cost (OPCC) for this option is $14,217,160, which makes it the most expensive option.

1.2. SEQUENCING BATCH REACTOR AQUASBR

The AquaSBR is also a true batch SBR process, but it utilizes standard active sludge technology instead of granular sludge. It provides true batch reactor technology with all phases of biological treatment accomplished in a single tank (known as a reactor). All components are easily accessible and the advanced decant system allows for optimum quality effluent withdrawal.

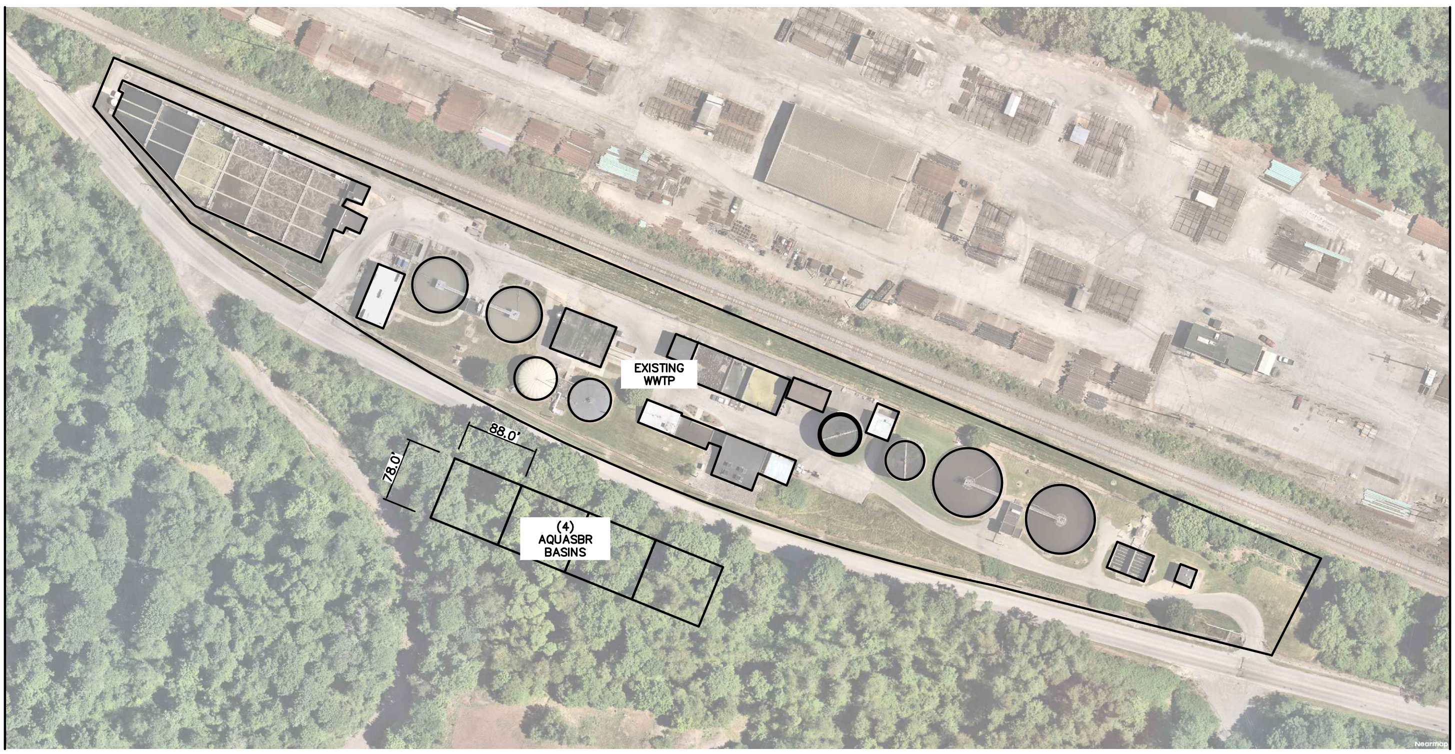
The benefits of the AquaSBR process are listed below.

- Optimal biological treatment is accomplished in one effective aeration step
- Less space required compared to conventional activated sludge systems
- Energy savings when compared to activated sludge processes
- Significant reduction of chemicals for biological nutrient removal due to the nature of the SBR process cycles
- Lower life-cycle cost when compared to conventional extended aeration systems.

AquaSBR Basic Design Parameters are shown on the following page. Refer to **Figure 4** for the equipment layout. The SBR will not fit within the existing WWTP footprint, so additional property must be acquired to allow this option. The City of Struthers already owns property across the road from the existing WWTP, so the SBR is shown on that expanded parcel.

The estimated OPCC for this option is $6,973,400, which makes it the second most expensive option.

NOT TO SCALE



Kimley»Horn
3875 EMBASSY PARKWAY, SUITE 280
AKRON, OH 44333
PHONE: 216-505-7775
WWW.KIMLEY-HORN.COM

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SEQUENCING BATCH REACTOR - AQUASBR

FIGURE 4

AQUASBR DESIGN PARAMETERS

DESIGN INFLUENT CONDITIONS

Avg. Design Flow (ADF)	= 8.5 MGD	= 32,176 m³/day
Max Design Flow (MDF)	= 10 MGD	= 37,854 m³/day
Peak Hyd. Flow (PHF)	= 14 MGD	= 52,996 m³/day (modifying cycles)

DESIGN PARAMETERS			**Effluent**			
	Influent	**mg/l**	**Required**	**<= mg/l**	**Anticipated**	**<= mg/l**
Bio/Chem Oxygen Demand:	BOD5	158	CBOD	25	CBOD	25
Total Suspended Solids:	TSS	186	TSS	30	TSS	30
Total Kjeldahl Nitrogen:	TKN	35	--	--	--	--
Total Phosphorus:	TP	8	--	--	--	--

SITE CONDITIONS	**Maximum**		**Minimum**		**Elevation (MSL)**
Ambient Air Temperatures:	85 F	29.4 C	32 F	0.0 C	1,007 ft
Influent Waste Temperatures:	68 F	20.0 C	50 F	10.0 C	306.9 m

SBR BASIN DESIGN VALUES			**Water Depth**			**Basin Vol./Basin**		
No./Basin Geometry:	= 4 Rectangular Basin(s)		**Min (LWL)**	= 14.9 ft	= (4.5 m)	**Min (Vlwl)**	= 0.764 MG	= (2,893.1 m³)
Freeboard:	= 2.0 ft	= (0.6 m)	**Avg (AWL)**	= 21.8 ft	= (6.6 m)	**Avg (Vawl)**	= 1.118 MG	= (4,233.9 m³)
Length of Basin:	= 88.0 ft	= (26.8 m)	**Max (HWL)**	= 23.0 ft	= (7.0 m)	**Max (Vhwl)**	= 1.181 MG	= (4,470.5 m³)
Width of Basin:	= 78.0 ft	= (23.8 m)						

Number of Cycles:	= 6 per day/basin	
Cycle Duration:	= 4.0 hr/cycle	
Food/Mass (F/M) ratio:	= 0.098 lbs. BOD5/lb. MLSS-Day	
MLSS Concentration:	= 4,500 mg/l @ LWL	
Hydraulic Retention Time:	= 0.526 days @ AWL	
Solids Retention Time:	= 10.6 days	
Est. Net Sludge Yield:	= 0.774 lbs. WAS/lb. BOD5	
Est. Dry Solids Produced:	= 8,665.3 lbs. WAS/day	= (3,930.6 kg/day)
Est. Solids Flow Rate:	= 300 gpm (103,896 gal/day)	= (393.3 m³/day)
Decant Flow Rate @ MDF:	= 9,259 gpm (as avg. from HWL to LWL)	= (584.1 l/sec)
LWL to CenterLine Discharge:	= 1.9 ft	= (0.6 m)
Lbs. O2/lb. BOD5	= 1.5	
Lbs. O2/lb. TKN	= 4.6	
Actual Oxygen Required:	= 28,214 lbs./day	= (12,797.9 kg/day)
Air Flowrate/Basin:	= 3,162 SCFM	= (89.7 Sm³/min)
Max. Discharge Pressure:	= 11.5 PSIG	= (80 KPA)
Daily Max. Month Avg. Estimated Power*:	= 6,531.2 kWh/day	

1.3. HIGH FLOW DISK FILTER

A high flow disk filter with a cloth media filtration system is designed to be an economical and efficient solution for the treatment of wet weather applications. This system utilizes a disk configuration and the exclusive pile cloth filtration media to effectively filter high solids waste streams with or without the use of chemicals, if necessary, for applications that are looking to achieve a specific water quality. This system is ideal for wet weather applications due to its proven removal efficiencies and high-quality effluent, even under varying influent conditions. This system has the following features:

- Vertically oriented cloth media disks reduce the required footprint
- Each disk is lightweight, with removable segments for ease of maintenance and replacement of a disk
- Effective backwash system that fluidizes cloth fibers to release stored solids
- Can be configured for dual use application for tertiary and wet weather operation
- Simple start-up and shutdown with unattended operation for remote locations
- Automatic storage procedure for cleaning and draining the unit for offline storage

Benefits

- Specifically designed floatable and solids removal zones
- Available in several configurations
- Fully automatic PLC control with color touchscreen HMI
- Use with or without chemicals, depending on site-specific water quality requirements
- Improves disinfection of wet weather flows

The disk filter basic design parameters are shown on the following page. Refer to **Figure 5** for the equipment layout. The disk filter will fit on available land within the existing WWTP footprint, so no additional property is required.

The estimated OPCC

for this option is $2,020,280 which makes it the least expensive option. The disk filter is the recommended option to address the peak wet weather flow at the WWTP.

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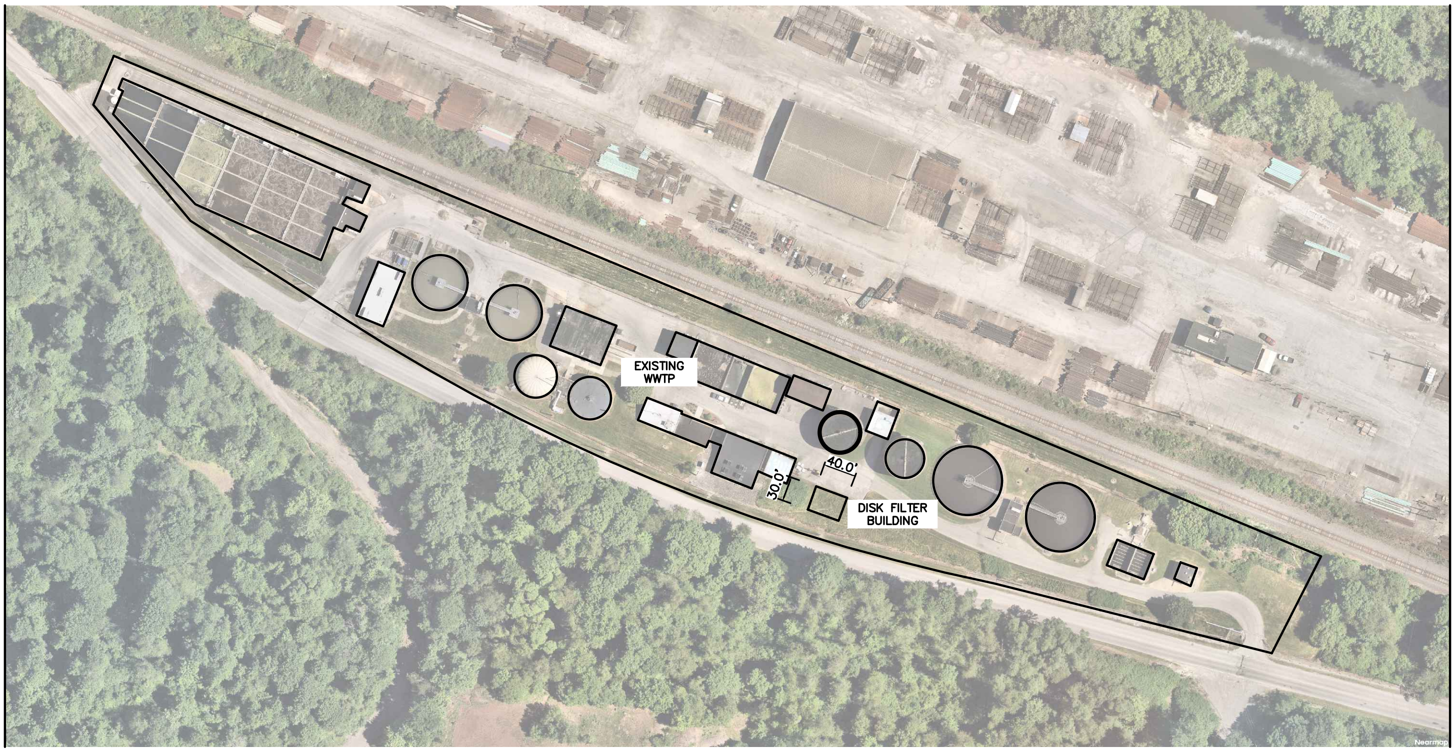

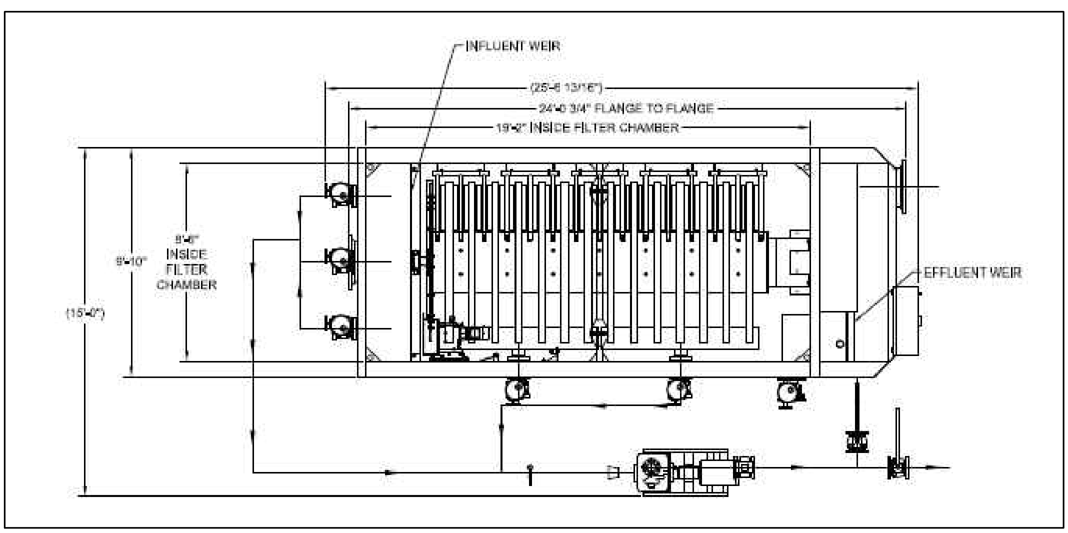

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DISK FILTER - AQUA-AEROBICS
FIGURE 5

AQUASTORM DISK FILTER DESIGN PARAMETERS

DESIGN INFLUENT CONDITIONS

Pre-Filter Treatment: Screen and Grit Removal

Peak Design Flow (PDF) = 6.00 MGD = 4166.67 gpm = 22712.47 m^3/day

DESIGN PARAMETERS	Influent	<= mg/l	Effluent	<= mg/l
Suspended Solids at PDF:	TSSp	200	TSSp	45

AquaStorm FILTER RECOMMENDATION

Qty Of Filter Units Recommended	= 1
Number Of Disks Per Unit	= 14
Total Number Of Disks Recommended	= 14
Total Filter Area Provided	= 753.2 ft^2 = (69.97 m^2)
Filter Model Recommended	= AquaStorm Package: Model ASDFP-54 x 14E-PC
Filter Media Cloth Type	= OptiFiber PF-14®

AquaStorm FILTER CALCULATIONS

Filter Type: Vertically Mounted Cloth Media Disks featuring automatically operated vacuum backwash.

Flow Conditions:

Hydraulic Loading = Design Flow (gpm) / Recommended Filter Area (ft^2)
= 5.53 gpm/ft^2 (13.53 m/hr) at Peak Design Flow

Solids Loading Conditions

Solids Loading = (lbs. TSS/day) / Recommended Filter Area (ft^2)
= 13.29 lbs. TSS/day/ft^2 (64.87 kg. TSS/day/m^2) at Peak Design Conditions

Recommendations

Construction of a vertical disk filter with a capacity of 8.0 MGD is the recommended option to address the peak wet weather flow issue at the Struthers WWTP. This is the first step of several that will be completed to ultimately address the three existing SSOs within the sanitary system. Increasing the secondary capacity with the use of this disk filter will allow the existing treatment trains to operate within the original design guidelines of 6.0 MGD ADF and 7.2 MGD PDF and will simplify the plant operation during the wet weather peak flow events. Depending on the timing of the WWTP improvements, it is possible that addressing the peak hydraulic capacity of the WWTP will allow for an improved evaluation of the collection system since artificial restrictions such as the redirection of the County flow will no longer be required.

As previously mentioned, concurrent with the design and construction of the WWTP disk filter, the City will complete a comprehensive flow monitoring study, field testing, and collection system investigation to identify and address hydraulic bottlenecks and reduce I/I within the system. During this period of time the County will be moving forward with their own system improvements that will be monitored by the City to determine impacts to their collection system and WWTP. In addition, the County improvements and the City's flow monitoring study results may impact the schedule, the project mix, and the sequence of the projects. The Tentative Schedule, based on the information that is known today, is provided on the following page.

Tentative Schedule

Submittal of SSO status report	September 2025
OEPA review	September – October 2025
Struthers apply for WPCLF for design	May 2027
Begin design of disk filters	July – August 2027
Struthers apply for WPCLF for construction	October 2027
Submit disk filter design to OEPA	December 2027 – January 2028
OEPA review period	January 2028 – February 2028
Struthers Flow Study	February – May 2028
Public bid & contract award for disk filters	March 2028 – June 2028
Construction disk filters	June – December 2028
Flow study recommendation report	June 2028
Struthers apply for WPCLF for design	June 2028
Design sewer improvements	August 2028 – February 2029
Struthers apply for WPCLF for construction	October 2028
Public bid & contract award for sewer imp	March – June 2029
Construction sewer improvements	June 2029 – March 2030

NOTE: The Tentative Schedule is based on funding availability, and the results of the Flow Monitoring Study. The Study results might require additional testing to determine the extent of needed improvements. In addition, the identified improvements in the collection system found through the Flow Study could result in schedule modifications in terms of sequencing and phasing of construction. The collection system construction could require an elongated schedule or a change in the schedule sequence to minimize disruption of sanitary service for customers and, more importantly, reduce potential basement backups and/or SSO's that are a result of major disruption to the collection system that are the result of the construction activity. The Tentative Schedule will be revised accordingly and submitted to the OEPA for your records.

APPENDIX A

DATE	PLANT FLOW MGD	RAIN INCHES	COUNTY FLOW MGD	Struthers flow (est)	Storage Required	Cumulative storage required
1/9/2024	9.38	0.5	6.25	3.13	2.18	2.18
1/10/2024	9.14	0.62	4.59	4.55	1.94	4.12
1/11/2024	8.14	0	3.56	4.58	0.94	5.06
1/12/2024	8.3	0.62	3.75	4.55	1.1	6.16
1/13/2024	8.74	0.02	4.03	4.71	1.54	7.7
1/14/2024	7.11	0	3.31	3.8	-0.09	7.61
1/24/2024	7.01	0.27	3.94	3.07	-0.19	0
1/25/2024	9.42	0.17	5.31	4.11	2.22	2.22
1/26/2024	10.29	0.11	6.12	4.17	3.09	5.31
1/27/2024	9.04	0.08	4.18	4.86	1.84	7.15
1/28/2024	13.59	0.79	8.53	5.06	6.39	13.54
1/29/2024	9.59	0.01	5.58	4.01	2.39	15.93
1/30/2024	7.98	0	4.41	3.57	0.78	16.71
1/31/2024	8.18	0	3.86	4.32	0.98	17.69
2/1/2024	8.5	0	3.6	4.9	1.3	18.99
2/2/2024	8.13	0	3.33	4.8	0.93	19.92
2/3/2024	6.64	0	3.2	3.44	-0.56	19.36
2/4/2024	6.06	0	3.14	2.92	-1.14	18.22
2/22/2024	6.32	0.56	2.94	3.38	-0.88	0
2/23/2024	7.24	0.01	2.84	4.4	0.04	0.04
2/28/2024	6.3	0.23	2.77	3.53	-0.9	0
3/2/2024	6.56	0.04	3.44	3.12	-0.64	0
3/3/2024	6.23	0.21	3.27	2.96	-0.97	0
3/6/2024	7.23	0.34	3.99	3.24	0.03	0.03
3/7/2024	7.37	0	3.95	3.42	0.17	0.2
3/8/2024	6.84	0	3.59	3.25	-0.36	0
3/9/2024	8.23	0.59	4.85	3.38	1.03	1.03
3/10/2024	8.62	0.05	4.6	4.02	1.42	2.45
3/11/2024	6.79	0	4.18	2.61	-0.41	2.04
3/12/2024	7.63	0	3.82	3.81	0.43	2.47
3/13/2024	7.07	0	3.49	3.58	-0.13	2.34
3/14/2024	6.61	0.69	3.85	2.76	-0.59	1.75
3/15/2024	10.13	0.04	7.04	3.09	2.93	4.68
3/16/2024	9.04	0	4.61	4.43	1.84	6.52
3/17/2024	7.93	0.15	4.47	3.46	0.73	7.25
3/18/2024	7.11	0.1	4.09	3.02	-0.09	7.16
3/19/2024	7.66	0.05	4.04	3.62	0.46	7.62
3/20/2024	7.44	0.01	3.78	3.66	0.24	7.86
3/21/2024	7.21	0	3.51	3.7	0.01	7.87
3/23/2024	8	0.17	4.51	3.49	0.8	8.67
3/24/2024	6.31	0	3.89	2.42	-0.89	7.78
3/25/2024	6.22	0	3.69	2.53	-0.98	6.8
3/26/2024	9.44	1.06	6.57	2.87	2.24	9.04
3/27/2024	9.41	0.01	6.56	2.85	2.21	11.25
3/28/2024	8	0	5	3	0.8	12.05
3/29/2024	7.72	0	4.51	3.21	0.52	12.57
3/30/2024	8.86	0.14	4.3	4.56	1.66	14.23
3/31/2024	7.68	0	3.94	3.74	0.48	14.71
4/1/2024	7.6	0.55	4.98	2.62	0.4	15.11
4/2/2024	12.88	2.13	10.55	2.33	5.68	20.79
4/3/2024	15	0.37	11.02	3.98	7.8	28.59
4/4/2024	10.78	0.08	7.69	3.09	3.58	32.17
4/5/2024	9.79	0.12	6.47	3.32	2.59	34.76
4/6/2024	8.83	0	5.52	3.31	1.63	36.39
4/7/2024	7.58	0	4.85	2.73	0.38	36.77
4/8/2024	9.68	0.01	4.44	5.24	2.48	39.25
4/9/2024	9.24	0.21	4.27	4.97	2.04	41.29
4/10/2024	8.54	0.08	4.53	4.01	1.34	42.63
4/11/2024	10.62	0.9	7.11	3.51	3.42	46.05
4/12/2024	11.51	0.97	10.89	0.62	4.31	50.36
4/13/2024	13.9	0	9.71	4.19	6.7	57.06
4/14/2024	12.7	0.06	6.52	6.18	5.5	62.56
4/15/2024	10.06	0.01	5.49	4.57	2.86	65.42
4/16/2024	9.94	0	4.75	5.19	2.74	68.16
4/17/2024	10.9335	0.6	4.93	6.0035	3.7335	71.8935
4/18/2024	8.45	0.01	5.27	3.18	1.25	73.1435
4/19/2024	9.25	0.01	4.63	4.62	2.05	75.1935
4/20/2024	8.72	0	4.18	4.54	1.52	76.7135
4/21/2024	8.22	0	3.87	4.35	1.02	77.7335
4/22/2024	6.16	0	3.64	2.52	-1.04	76.6935
4/23/2024	6.3	0.02	3.56	2.74	-0.9	75.7935
4/24/2024	6.1	0.06	3.47	2.63	-1.1	74.6935

APPENDIX B

DATE	PLANT FLOW MGD	RAIN INCHES	COUNTY FLOW MGD	Struthers flow (est)	Storage Required	Cumulative storage required
1/9/2024	9.38	0.5	6.25	3.13	-4.62	0
1/10/2024	9.14	0.62	4.59	4.55	-4.86	0
1/11/2024	8.14	0	3.56	4.58	-5.86	0
1/12/2024	8.3	0.62	3.75	4.55	-5.7	0
1/13/2024	8.74	0.02	4.03	4.71	-5.26	0
1/14/2024	7.11	0	3.31	3.8	-6.89	0
1/24/2024	7.01	0.27	3.94	3.07	-6.99	0
1/25/2024	9.42	0.17	5.31	4.11	-4.58	0
1/26/2024	10.29	0.11	6.12	4.17	-3.71	0
1/27/2024	9.04	0.08	4.18	4.86	-4.96	0
1/28/2024	13.59	0.79	8.53	5.06	-0.41	0
1/29/2024	9.59	0.01	5.58	4.01	-4.41	0
1/30/2024	7.98	0	4.41	3.57	-6.02	0
1/31/2024	8.18	0	3.86	4.32	-5.82	0
2/1/2024	8.5	0	3.6	4.9	-5.5	0
2/2/2024	8.13	0	3.33	4.8	-5.87	0
2/3/2024	6.64	0	3.2	3.44	-7.36	0
2/4/2024	6.06	0	3.14	2.92	-7.94	0
2/22/2024	6.32	0.56	2.94	3.38	-7.68	0
2/23/2024	7.24	0.01	2.84	4.4	-6.76	0
2/28/2024	6.3	0.23	2.77	3.53	-7.7	0
3/2/2024	6.56	0.04	3.44	3.12	-7.44	0
3/3/2024	6.23	0.21	3.27	2.96	-7.77	0
3/6/2024	7.23	0.34	3.99	3.24	-6.77	0
3/7/2024	7.37	0	3.95	3.42	-6.63	0
3/8/2024	6.84	0	3.59	3.25	-7.16	0
3/9/2024	8.23	0.59	4.85	3.38	-5.77	0
3/10/2024	8.62	0.05	4.6	4.02	-5.38	0
3/11/2024	6.79	0	4.18	2.61	-7.21	0
3/12/2024	7.63	0	3.82	3.81	-6.37	0
3/13/2024	7.07	0	3.49	3.58	-6.93	0
3/14/2024	6.61	0.69	3.85	2.76	-7.39	0
3/15/2024	10.13	0.04	7.04	3.09	-3.87	0
3/16/2024	9.04	0	4.61	4.43	-4.96	0
3/17/2024	7.93	0.15	4.47	3.46	-6.07	0
3/18/2024	7.11	0.1	4.09	3.02	-6.89	0
3/19/2024	7.66	0.05	4.04	3.62	-6.34	0
3/20/2024	7.44	0.01	3.78	3.66	-6.56	0
3/21/2024	7.21	0	3.51	3.7	-6.79	0
3/23/2024	8	0.17	4.51	3.49	-6	0
3/24/2024	6.31	0	3.89	2.42	-7.69	0
3/25/2024	6.22	0	3.69	2.53	-7.78	0
3/26/2024	9.44	1.06	6.57	2.87	-4.56	0
3/27/2024	9.41	0.01	6.56	2.85	-4.59	0
3/28/2024	8	0	5	3	-6	0
3/29/2024	7.72	0	4.51	3.21	-6.28	0
3/30/2024	8.86	0.14	4.3	4.56	-5.14	0
3/31/2024	7.68	0	3.94	3.74	-6.32	0
4/1/2024	7.6	0.55	4.98	2.62	-6.4	0
4/2/2024	12.88	2.13	10.55	2.33	-1.12	0
4/3/2024	15	0.37	11.02	3.98	1	1
4/4/2024	10.78	0.08	7.69	3.09	-3.22	0
4/5/2024	9.79	0.12	6.47	3.32	-4.21	0
4/6/2024	8.83	0	5.52	3.31	-5.17	0
4/7/2024	7.58	0	4.85	2.73	-6.42	0
4/8/2024	9.68	0.01	4.44	5.24	-4.32	0
4/9/2024	9.24	0.21	4.27	4.97	-4.76	0
4/10/2024	8.54	0.08	4.53	4.01	-5.46	0
4/11/2024	10.62	0.9	7.11	3.51	-3.38	0
4/12/2024	11.51	0.97	10.89	0.62	-2.49	0
4/13/2024	13.9	0	9.71	4.19	-0.1	0
4/14/2024	12.7	0.06	6.52	6.18	-1.3	0
4/15/2024	10.06	0.01	5.49	4.57	-3.94	0
4/16/2024	9.94	0	4.75	5.19	-4.06	0
4/17/2024	10.9335	0.6	4.93	6.0035	-3.0665	0
4/18/2024	8.45	0.01	5.27	3.18	-5.55	0
4/19/2024	9.25	0.01	4.63	4.62	-4.75	0
4/20/2024	8.72	0	4.18	4.54	-5.28	0
4/21/2024	8.22	0	3.87	4.35	-5.78	0
4/22/2024	6.16	0	3.64	2.52	-7.84	0
4/23/2024	6.3	0.02	3.56	2.74	-7.7	0
4/24/2024	6.1	0.06	3.47	2.63	-7.9	0