

FACILITY LAYOUT

Extensive planning and design efforts were undertaken to integrate the expansion with the original facility, shown in red. The expansion consists of two chambers located on both sides of the original facility, between I-75 and John R, north of Twelve Mile Road in Madison Heights.

- | | |
|--------------------------------|----------------------------------|
| 1 Inlet Weir | 6 Dewatering Pumping Station |
| 2 Basin Storage/Retention | 7 Odor Control/Generator |
| 3 Basin Access Ramp | 8 Control Room/Office |
| 4 Screen Room | 9 Emergency Relief Gates/Screens |
| 5 Garage/Screening Access Ramp | 10 Intermediate Weirs |



THE CLINTON RIVER

The GWK Drainage District has historically averaged 10 treated discharges per year to the Red Run Drain, a tributary of the Clinton River. Efforts to protect the receiving waters began more than half a century ago with the construction of relief drains and the original facility. The expansion has reduced the volume and frequency of combined sewer overflows to an average of seven per year. All discharge is now screened, in addition to being settled and disinfected, to reduce pollutants prior to release. All discharges to the Red Run Drain are sampled and closely monitored to ensure compliance with Michigan Department of Natural Resources and Environment (DNRE) permitted standards.

To learn more about what you can do to improve the water quality of the Clinton River, visit www.crowc.org.



HIGHLIGHTS

The Retention Treatment Basin (RTB) expansion has reduced overflow volume by an average of 875 million gallons per year. It has also eliminated the release of untreated combined sewage by rerouting two combined sewers into the RTB which would have otherwise entered the basin downstream of the new screens and disinfection facilities.

Existing storm drains discharging into the basin were removed and rerouted, providing more volume to control combined sewer flows. System storage was increased by 30 million gallons to 124 million gallons.

Redundant fiber optics were used for flushing valve sequencing and control over the entire two-mile length of the project.

Operators can control any part of the RTB from any one of the eight Wonderware Intouch computer workstations.

The new basin structures were connected to the existing facility's tunnel with a hinge to accommodate initial and long-term settlement.

Excavation had to proceed equally on both sides of the existing reinforced concrete double box sewer to avoid damage from differential earth pressure. Special attention was also given to monitoring worker safety concerns during excavation. No accidents occurred during construction.

Construction required careful staging and coordination to continuously maintain flows through the facility and to lessen the impact on traffic in the I-75 corridor. Consideration was also needed to protect the existing foundation of the I-75 bridge and adjacent overhead power line towers.

The RTB expansion required 106,000 cubic yards of concrete, and 14,000 tons of reinforcing steel.

An abrasion and corrosion resistant polyurea lining is used to protect the concrete screening troughs. All screens are constructed of stainless steel for longevity and corrosion resistance.

The University of Michigan created a physical model to confirm the hydraulic characteristics of the new and modified weirs. A high-flow relief gate system was included to assist in reducing hydraulic losses during extreme flow conditions.

The George W. Kuhn Drainage District (formerly the Twelve Towns Drainage District) serves all or part of 14 communities, encompassing a drainage area of 24,500 acres upstream of the Red Run Drain, a tributary of the Clinton River. During dry weather, all flow is routed to the Detroit Wastewater Treatment Plant, but during heavy rainfall, high volumes of combined sewage (typically more than 93 percent storm water) exceed the outlet capacity to Detroit, causing excess flow to be diverted to the George W. Kuhn Retention Treatment Basin (GWK RTB) where it is stored, screened and disinfected prior to discharge to the Red Run Drain. The original facility was built in 1972, but unfortunately, by the early 1990s, the facility could no longer meet more stringent environmental regulations. Planning for an expansion began in the late 1990s, and construction was completed in 2006. Outfitted with the latest in engineering and controls technology, the GWK RTB will protect and improve the quality of the Clinton River for decades to come.



Jim Nash

George W. Kuhn Retention Treatment Basin

Facility Location

1400 Ajax Drive,
Madison Heights, MI
248-544-4694

Communities Served:

Cities of Berkley, Birmingham, Clawson, Ferndale, Hazel Park, Huntington Woods, Madison Heights, Oak Park, Pleasant Ridge, Royal Oak, Southfield, and Troy; Charter Township of Royal Oak and the Village of Beverly Hills





RETENTION TREATMENT BASIN (RTB) The expansion of the existing Twelve Towns Retention Treatment Basin was completed in 2006 to meet Michigan Department of Natural Resources and Environment (DNRE) permit requirements for the treatment of combined sewer overflows (CSOs). This was necessary to protect the Red Run Drain and the Clinton River. The original 1972 facility provided 62 million gallons (mg) of basin storage, and an additional 32 mg of in-system (upstream pipe) storage. The new RTB adds more than 30 mg of basin storage, for a total storage volume of 124 mg. In addition, any overflow from the RTB receives both fine screening and disinfection prior to release. When capacity becomes available, retained flows are returned to the collection system for processing at the Detroit Wastewater Treatment Plant.



UNDERGROUND STORAGE BASIN The underground concrete basin provides more than 30 mg of additional storage capacity to enhance removal of suspended solids and reduce the volume and frequency of overflows to the Red Run Drain. A new 2,000-foot-long intermediate weir (retaining wall) located downstream of the screen room handles smaller storms, and provides hydraulic control of larger storms. A network of flushing pipes and nozzles is provided along the ceiling of the basin addition to flush accumulated solids and debris after the basin has been drained. Troughs are provided in the floor to direct flushing water and debris toward the dewatering pump station. An access ramp is provided to allow vehicles and maintenance staff to enter the basin to complete the cleaning process. Staff members use fire hoses to thoroughly clean the basin after a storm and dump trucks haul out large debris.



SCREENING The number and size of screens at the RTB make it one of the largest screening facilities in North America. Sixteen fine screens (one-half-inch openings) are used under normal conditions; four emergency screens (two-inch openings) are used if upstream flow levels reach critical depths. All flow that enters the Red Run Drain receives screening. Debris that is collected on the screens is discharged to a sluicing trough that flushes to the Detroit collection system for treatment. Two auxiliary screens protect the pumps by removing large objects from the sluicing trough. These large objects are dried on-site and disposed of in a landfill. A 10-ton overhead crane is provided to lift the screens out for maintenance.



PUMPING STATION The pumping station contains six, vertical dry-pit solids-handling pumps, each with a capacity of 20 cubic feet per second (cfs) providing a firm capacity of 100 cfs, even when one of the pumps is out of service. The pumps are located 47 feet below the motors and are connected through extended drive shafts. The motors are equipped to allow variable flow rates to match available capacity in the Twelve Mile Interceptor. The pumps drain the stored water from the RTB when capacity is available. The pumps are controlled along with those at the Dequindre Road station to maintain the contracted outlet capacity with Detroit.

DISINFECTION All flow that enters the Red Run Drain is disinfected with sodium hypochlorite, which is similar to swimming pool chlorine or household bleach. The chemical feed pumps are designed to provide the proper dose of sodium hypochlorite at wastewater flow rates ranging from near zero to 6,700 cfs. There are eight chemical feed pumps ranging in capacity from 43 to 430 gallons per minute. These pumps are also equipped with variable frequency drives to automatically provide the proper dose rate to widely varying flows. Eight fiberglass reinforced plastic storage tanks provide a total volume of 150,000 gallons of sodium hypochlorite. There are 16 induction mixers suspended in the flow at the downstream end of the RTB to feed the disinfectant into the flow and ensure proper mixing.



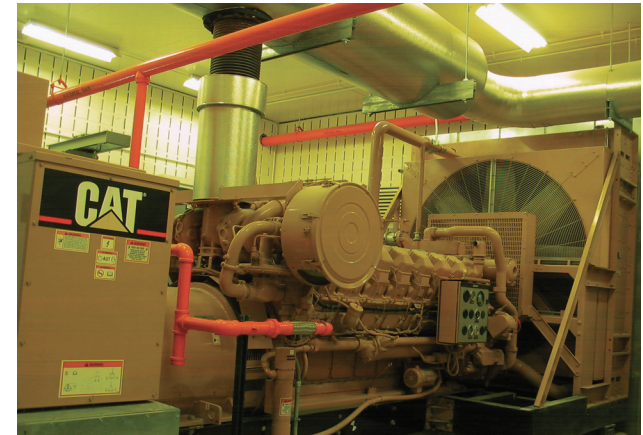
CHEMICAL STORAGE (Right) Sodium hypochlorite is used for both disinfection and odor control.

EMERGENCY GENERATOR (Second from Bottom) Two emergency generators are able to run all critical applications in the event of a power outage. The 1,000 kilowatt generators can power all screens, the emergency bypass gates, the chemical feed (disinfection) system and the control system.

ODOR CONTROL (Below) To be a good neighbor in the populous I-75 corridor, the RTB is equipped with an odor control system that neutralizes air via a sodium hypochlorite mist. Over time, RTB staff have found that rigorous cleansing of the basin after each storm has eliminated the need and cost of utilizing the odor control system.



The GWK RTB is one of the largest screening facilities in North America



CONTROL ROOM Operators can monitor and control all equipment in the facility from a variety of locations courtesy of a two-mile-long fiber optic communication system. This system monitors regional rainfall, depth of flow in upstream sewers, rate and depth of flow within the RTB, and rate of flow to the Detroit collection system. Data uploaded during monitoring drive the fully automated disinfection and flushing processes. There are a total of six dedicated computers, one at the Stephenson Highway Inlet Weir, two at the Dequindre Pump Station, and three at the RTB. In addition, operators can access the system remotely via a secure virtual private network provided by a Web server at the RTB. The central control room at the RTB also houses a database server with automated reporting capabilities. To simplify countywide operations, three existing CSO basins have been integrated into the RTB's monitoring and control system.



Improving and Protecting the Quality of the Clinton River

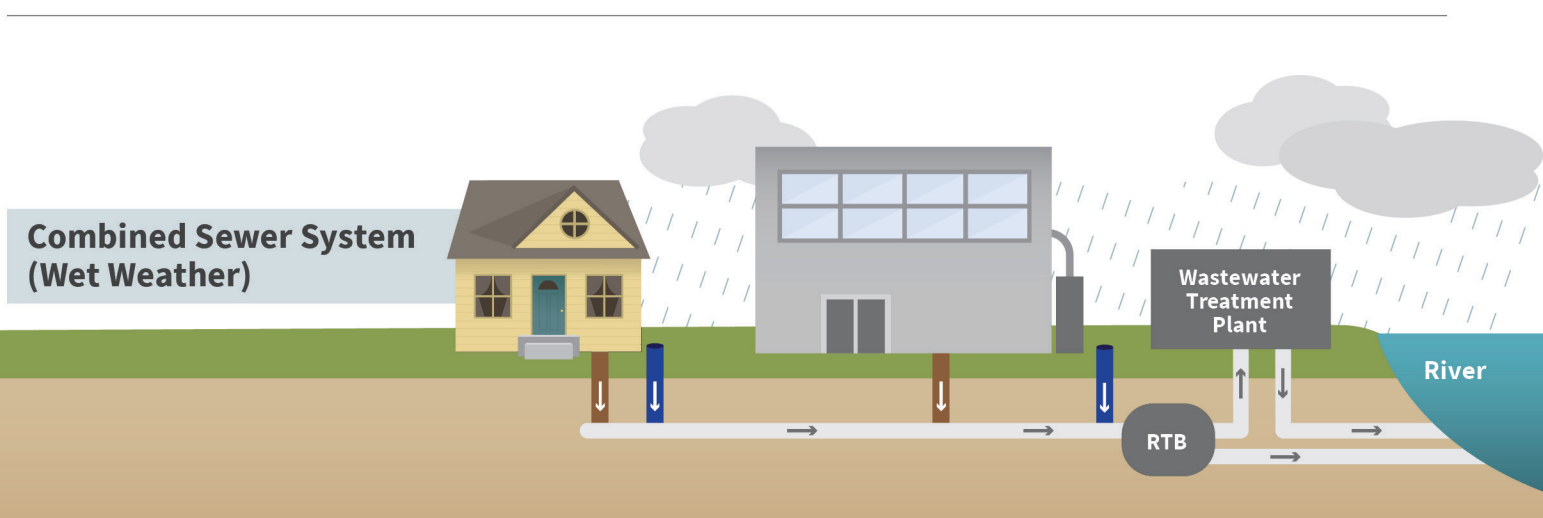
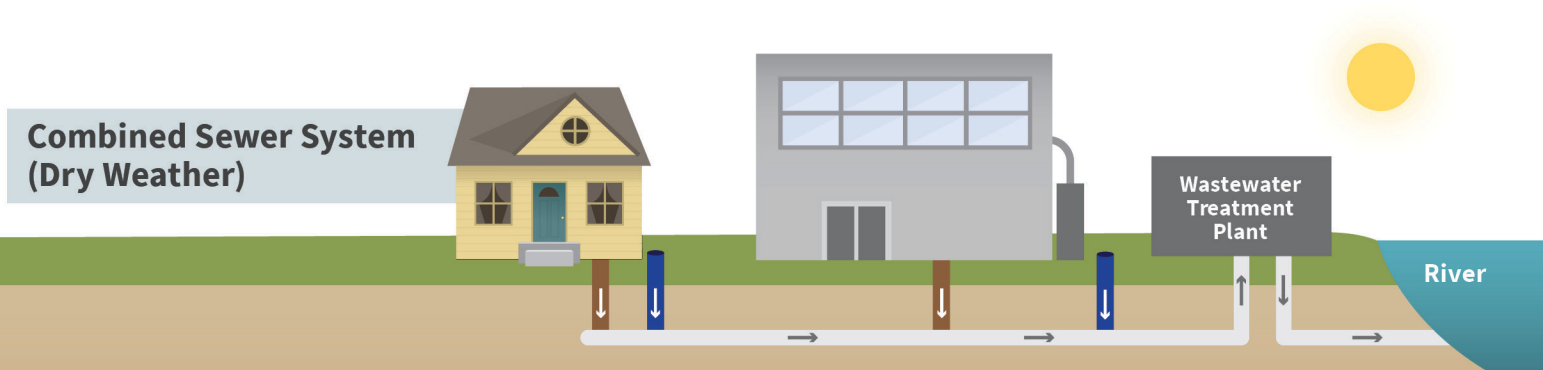
What You Need to Know about Combined Sewer Overflows and Retention Treatment Basins

A common misconception is that water discharged during an overflow from a retention treatment basin is untreated. In a combined sewer system, snowmelt, rainwater runoff, and wastewater (sewage) from inside houses and buildings are all combined in one pipe. When the pipes become full, excess combined sewage can be released at points throughout the system. These are termed combined sewer overflows (CSO), which are untreated. Since CSO releases are a threat to public health, many systems have added Retention Treatment Basins (RTBs), which collect and treat this wastewater to avoid untreated overflows. Overall most releases in the State of Michigan from combined sewers are treated via screening, skimming, settling and disinfection in Retention Treatment Basins (RTBs) prior to release into a water body. During smaller storms where there is no discharge, combined sewage is stored and sent to the Wastewater Treatment plant. When an overflow of the RTB occurs during a large rain event, the pollutants in the water discharged to a water body have already been largely reduced, resulting in protection of public health and allowing the water to be used for fishing, swimming, and other recreational activities.

SEPARATED SEWER SYSTEMS

Separated sewer systems collect the rainwater separately from the wastewater, letting the rainwater go directly to the nearest river, lake or stream via storm sewers while the wastewater (sewage) is sent to the treatment plant by a sanitary sewer. There is no RTB in a separated sewer.

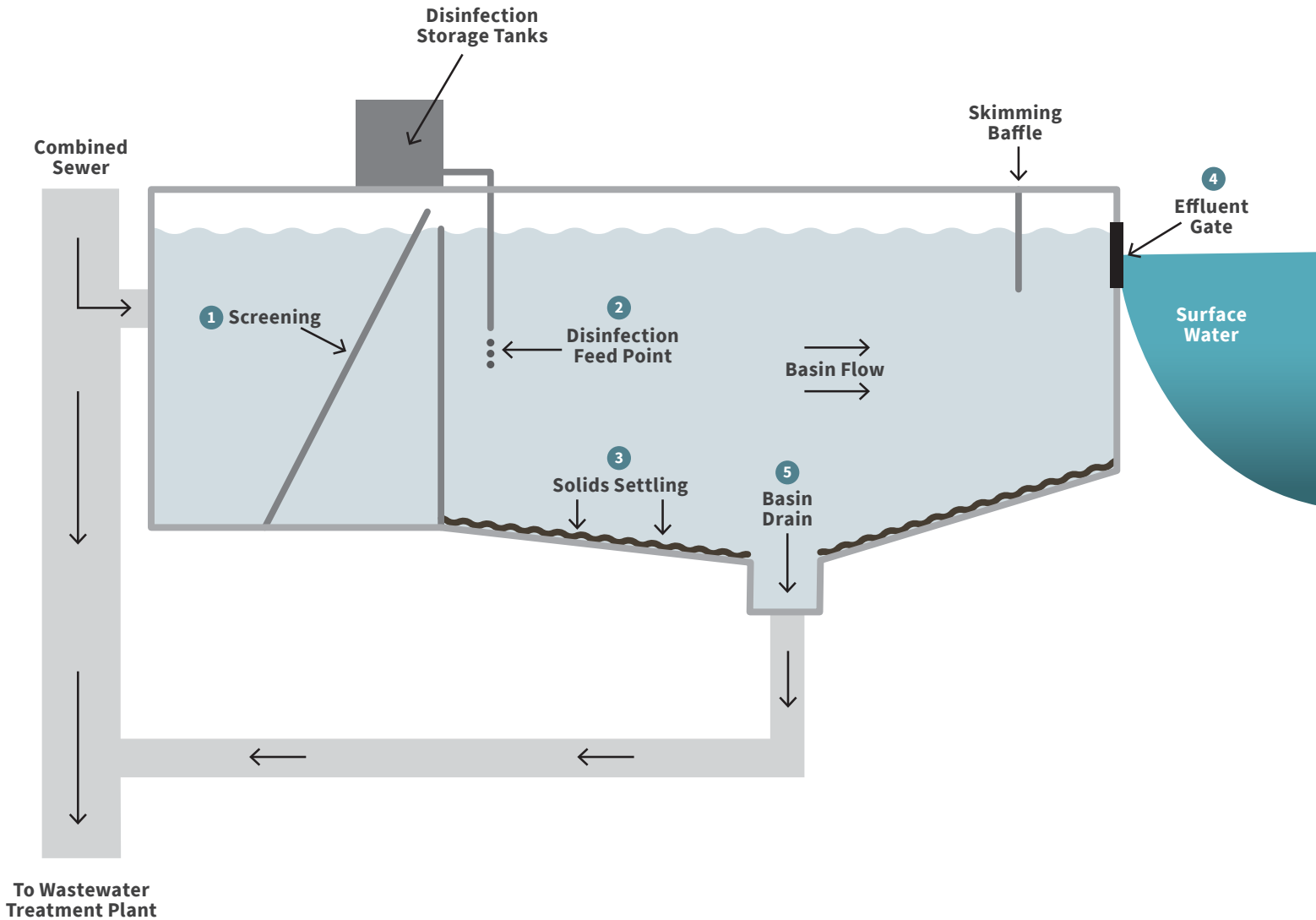
The following illustrations show where rainwater and sewage go in a combined sewer system before it is received and further treated by the wastewater treatment plant.



RETENTION TREATMENT BASINS (RTBS)

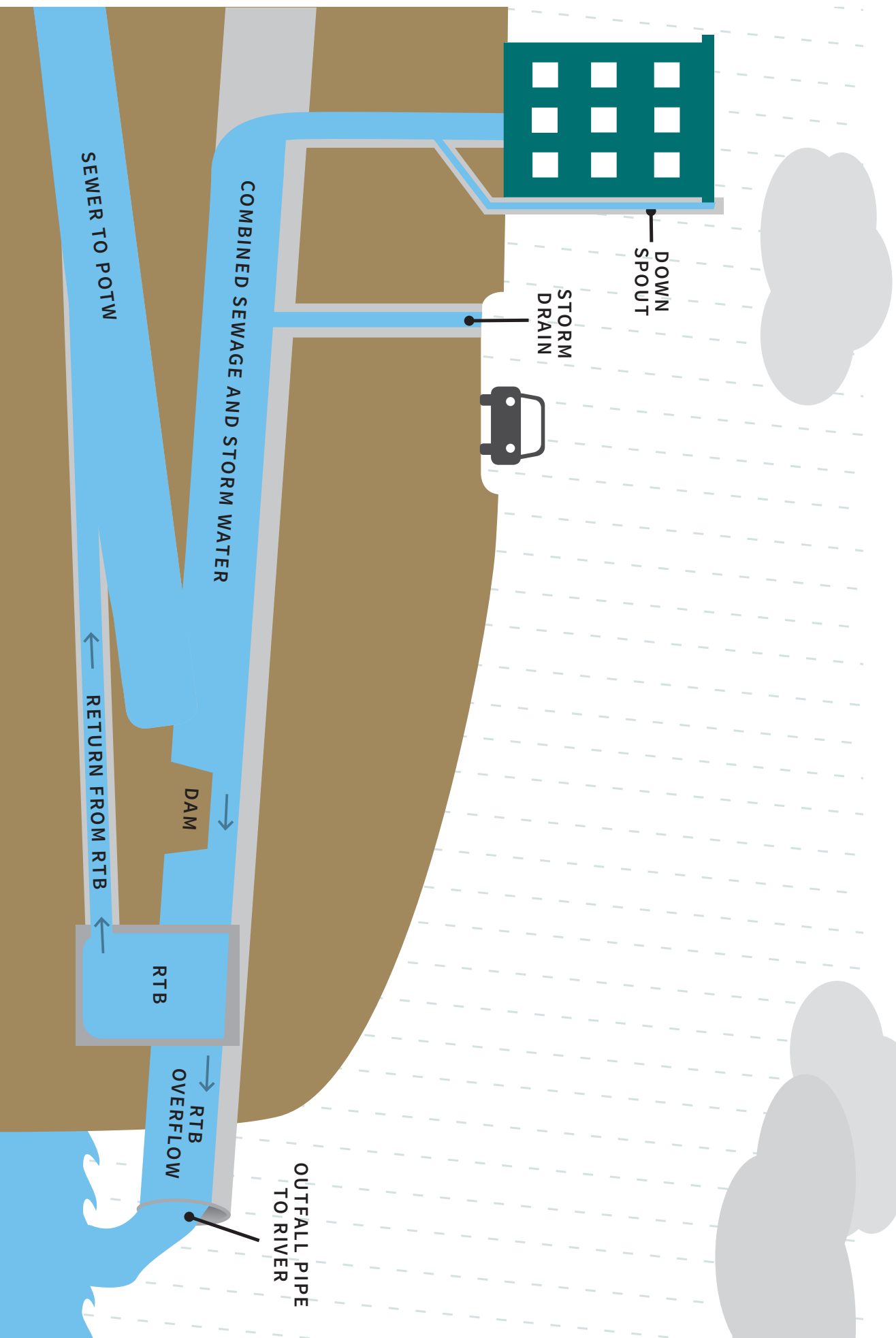
During a large rain event, excess combined sewage gets sent to the RTB once the sewers become full. The combined sewage flows through screens that filter out debris such as sanitary trash (1). A disinfectant is then applied to allow adequate time to kill disease causing organisms (2). In the basin, solids settle out and the skimming baffle prevents the discharge of floatable material and oils (3). Once the capacity of the RTB is exceeded, the treated overflow is sent to surface water resulting in a discharge that is protective of public health and the environment (4).

When the rain event ends and there is capacity available in the sewer, the contents of the RTB are drained back to the sewer to be sent to the wastewater treatment plant (5). RTB's are also equipped with flushing systems, which flush any remaining solids left in the RTB to the wastewater treatment plant, so the RTB is ready for the next rain event.

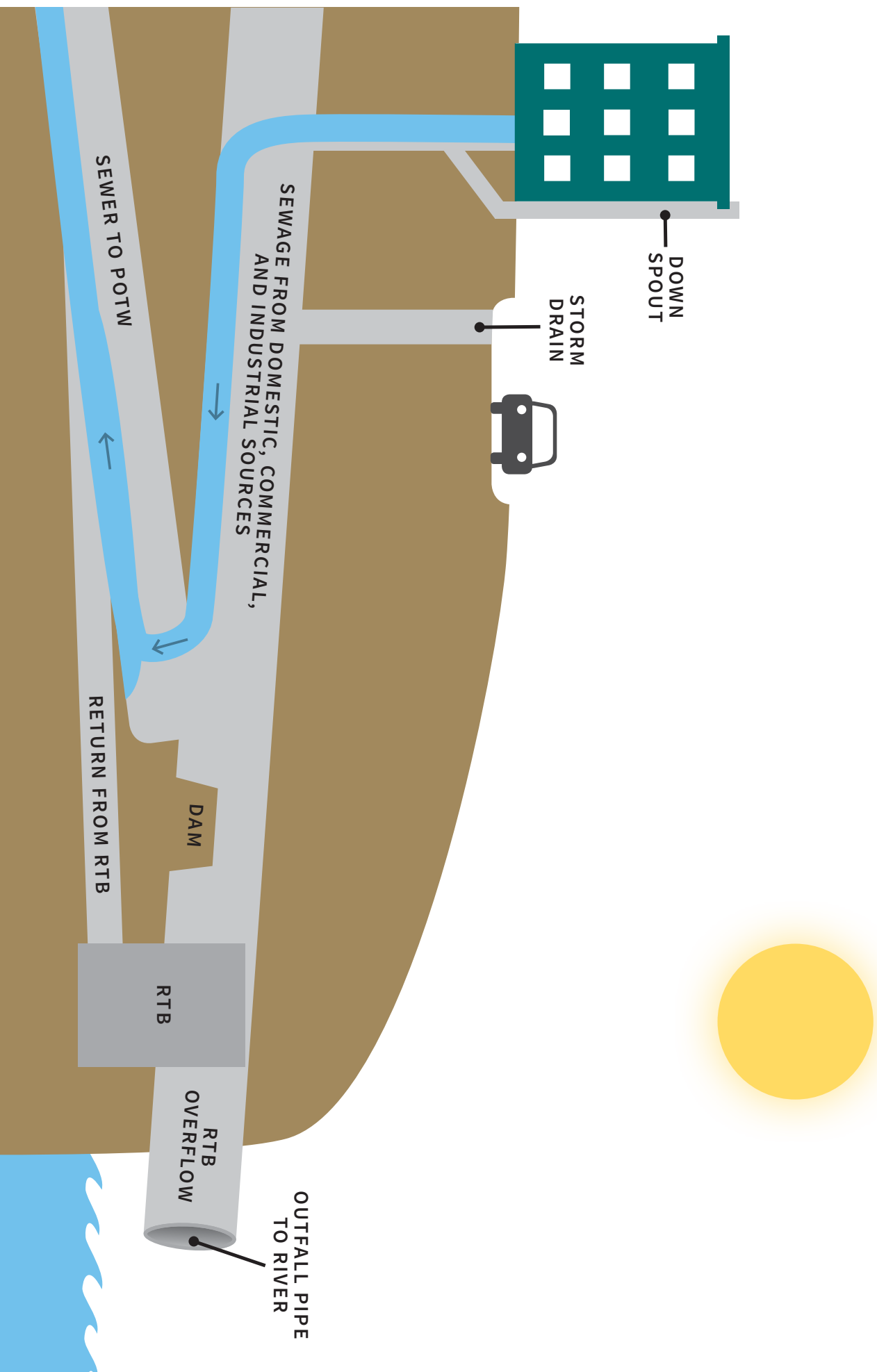


To learn more about Combined Sewer Overflows, see the annual report published by the Michigan Department of Environment, Great Lakes, and Energy, at [Michigan.gov/SewageDischarge](https://www.michigan.gov/SewageDischarge), or call the Environmental Assistance Center at 800-662-9278 and ask for a wastewater engineer in an office near you.

Combined Sewer Overflow: Wet Weather



Combined Sewer Overflow: Dry Weather





Candice S. Miller

Public Works Commissioner
Macomb County

November 17, 2022

Dear Commissioner Nash,

I write to address two separate issues: combined sewer overflows and rapid discharges that exceed storm water standards, both caused by operations of the George W. Kuhn Retention Treatment Basin (GWK).

As you are well aware because of our many conversations, I have objected to the CSO discharges at GWK which occur when combined sanitary and storm sewage from 17 Oakland County communities exceed the storage volume of the facility. As a result of heavy rainfall events, these overflows are directly discharged into Macomb County at our border. They flow into the Red Run Drain, which drains into the Clinton River and then into Lake St Clair. Recently, the Macomb County Board of Commissioners unanimously passed a resolution also objecting and asking Oakland County to address this issue. Macomb County has and is continuing to spend millions of dollars to stop our own CSOs into the Red Run Drain, Clinton River and especially Lake St. Clair. We believe CSOs are contributing factor to degrading water quality, to beach closures as well as some of the invasive algal blooms and Lyngbya along the shoreline.

You have suggested that the Red Run Drain Board take this issue up so that you can explain Oakland County's position and why you believe GWK CSOs are not harmful to water quality. I appreciate you suggesting this meeting. I agree that we should extend an invitation to the Macomb County Board of Commissioners and the Oakland County Board of Commissioners as well as EGLE, perhaps GLWA and SEMCOG. Let me know if there is anything we can assist with as you put together this meeting.

The other issue regarding GWK overflows to the Red Run Drain relates to the peak rate of discharge. Both Macomb and Oakland County have adopted storm water management standards that have been mandated by EGLE. These storm water standards manage discharge based on criteria such as acreage and peak rate of flow. Because of climate change and the increasing volume and intensity of rainfall, we share a mutual concern about this issue.

Based on available information, GWK has the ability to discharge into the Red Run Drain at rates between 7,000 to 11,000 cubic feet per second. That amount of discharge is two to three times more than the peak rate allowed by either of our Counties' adopted storm water management standards. We believe that in some extraordinary rain events, like August 2014 or June 2021, Oakland County is discharging so much CSOs into the Red Run Drain that it backs up into downstream storm systems like the Bear Creek Drain, using up capacity that Macomb County should have to manage our own flooding. Instead we are managing Oakland's CSOs to the

detriment of our own residents since we then lack drain capacity causing flooding in the cities of Warren, Center Line and Sterling Heights. In 2014 communities such as Warren sustained millions of dollars in flood damage. As the climate changes we cannot allow that to continue.

Macomb and Oakland are such great counties, great friends, and great neighbors. Yet the discharges from GWK from Oakland directly into Macomb County are a constant thorn. We don't like sewage overflows and we can't continue to allow our drain capacity and flood capacity to be used to handle much of Oakland County's storm water management. Obviously we are exploring any and all ways we can protect our environment and protect our residents. We are sincere in our hope of working together. I look forward to discussing both issues with you and all affected stakeholders as we look for solutions together to leave cleaner water and a better environment to future generations.

Sincerely,



Candice S. Miller

Macomb County Public Works Commissioner



November 28, 2022

The Honorable Candice S. Miller
Macomb County Public Works Commissioner
21777 Dunham Road
Clinton Township, MI 48036

Dear Commissioner Miller,

Please consider this letter my formal response to your correspondence of November 17, 2022.

Yes, you have told me of your pollution concerns regarding the George W. Kuhn Retention Treatment Basin (GWK). At our first personal meeting in early 2017 you directly told me you didn't believe anything I said about the GWK, and you were going to continue to pursue this as long as it took. From that time to now you have never shown any evidence, data or studies to support your claims, nor have you done so in your annual press assaults after Lake St. Clair turns over with dying invasive algae every year. You have also never raised this issue in the logical forum to do so, the Red Run Drain Board.

I would rather take the time and effort developing a regional approach and shared scope of work to study this problem, than make public statements back and forth in this venue or in the local news media. I have never instigated our public disputes but when asked to comment after your press conferences, I have honestly corrected your claims with facts. I do not consider this practice conducive to solving problems.

I suggested to the Red Run Drain Board, and to Macomb County resolution author Commissioner Barbara Zinner directly, that we develop a collaborative regional study to be done with an agreed-upon scope of work and schedule. We need to look at the issues affecting Lake St. Clair from all sources, including the GWK and Red Run, but all the other impacts on the lake's watershed as well.

Studies from the Water Resources Division of the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the State Toxicologist, the Southeast Michigan Council of Governments (SEMCOG), the Great Lakes Water Authority (GLWA), the US Geological Survey and the US Fish and Wildlife Service have stated that the GWK's treated releases have no correlation to the algae or beach-closing conditions on Lake St. Clair. I would be very interested in seeing the "several studies" that you cited were the basis of the Macomb County resolution. I would like to look at them and the above-referenced studies together with our regional partners.

You mentioned the GWK treated discharges as a threat, but neglected to mention they are screened, skimmed, settled and disinfected before they are released. This is done under the same

EGLE rules and supervision that you follow for the three Macomb County CSOs (combined sewer overflow) facilities you operate near Lake St. Clair.

Even in the largest storms of 2014, which was responsible for 2 billion gallons of discharge, and in 2020, which saw 750 million gallons, we have kept our discharges within our permit requirements for water quality. A recent study by Environmental Consulting and Technology, a firm used by both our counties, reports that when the GWK discharges, the water in the Red Run is cleaner because disinfectant kills the bacteria before release.

Our communities have continuously demonstrated their commitment to clean water, as evidenced by starting new projects from 1997 to finishing the GWK in 2007. Those projects included spending \$144 million on the GWK, building the largest screening facility in the world, an additional 40% increase in storage capacity totaling 124 million gallons, state of the art computer operations, chlorination distribution systems and massive chlorine storage. The cost of building, operating and maintaining that system designed to protect our residents and our neighbors in Macomb County, is well over \$200 million and growing.

Many GWK communities have become Water Towns, pledging to improve water quality and stormwater volume management through the use of green infrastructure (GI). The GWK district communities meet 2-3 times a year to discuss future GI initiatives and my office is currently proposing assistance to develop programs to help homeowners use GI on their properties. We are working with the Michigan Department of Transportation (MDOT) to build a storage tunnel under I-75 capable of keeping more than 25-million-gallons of runoff out of the GWK. Even the Detroit Zoo is planning a GI project to retain all stormwater on its 118-acre site.

You state, without evidence, that Oakland is violating the stormwater standards adopted by both counties with too much flow from the GWK. My office worked regionally for more than two years with Macomb, Wayne and Livingston Counties, in collaboration with EGLE, to develop regional stormwater standards that all our communities can follow. But these are requirements of the Municipal Separated Sanitary Sewer Systems, (MS4) specifically for separated stormwater drainage systems. This has nothing to do with the National Pollution Discharge Elimination System (NPDES) treatment permits the GWK, and the three Macomb-operated CSOs, have for their operations. There are no violations. Specifically, a recent study by Hubbell Roth and Clark, a respected regional engineering resource, demonstrated that the Red Run Drain cross-section is meeting its designed capacity.

Finally, you suggest that the GWK treatment basin was responsible for flooding in Warren and other Macomb communities during the massive 2014 storm that flooded thousands of basements in both our counties and beyond. Considering the conditions, it would seem unlikely that our flow caused floods there. But again, I am willing to look at any evidence or data you may have that might confirm your claim.

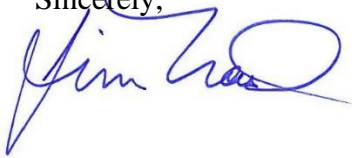
I propose we start with meetings between my office, your office, the Macomb and Oakland County Health Departments and members of both Boards of Commissioners. I suggest we start with a small group, or several groups, to tour the GWK treatment basin. My staff will show everyone how the systems work. You can see for yourself the scale of our operations and visit

the outlet of the GWK and the other separated storm drains entering there. I also propose a tour the three CSOs you operate directly on Lake St. Clair, so we can be familiar with all of the systems in Oakland and Macomb affecting the lake.

We would then widen our circle of partners to SEMCOG, GLWA, EGLE and other interested groups. Anyone on this email could play a role if they would like or we could organize regular communications. I would like to see a final report in the coming months or years, that can thoroughly analyze the issues, build engineering consensus and models for future actions, and develop local, regional, state, federal and international partners to work on any long-term plans that may develop.

If you truly seek regional collaboration, I hope to hear back from you regarding these proposals.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jim Nash", with a large, stylized flourish at the end.

Jim Nash