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MEMORANDUM

TO: LCA Board of Directors
FROM: Liesel Gross, CEO
DATE: December 10, 2018
RE: Western Lehigh Interceptor High Flow – Emergency Declaration

On November 28, 2018, Lehigh County Authority staff activated its Emergency Response Plan to expedite investigation and correction of sanitary sewer overflow conditions in the Western Lehigh sewer service area. This memo is provided to the LCA Board of Directors to explain the situation, steps taken to address it, and to request formal authorization of the Emergency Declaration. Costs are expected to exceed the \$50,000 threshold established in LCA's financial policies.

Situation Background

Precipitation in 2018 has far exceeded normal, beginning in February 2018 when 5.5 inches of rain fell in our area, approximately 200% of normal for the month. In August, after a generally wet first half of the year, a series of severe rain events occurred throughout the month, taxing local stormwater and sanitary sewer systems, and creating severe flooding of local waterways.

During the month of August, LCA's Western Lehigh sewer service area experienced prolonged sanitary sewer overflows (SSOs) in locations in the area of Trexlertown where the system has a known bottleneck that will be addressed by planned conveyance capacity improvement projects that will kick off in 2019. These August prolonged overflows, along with other SSOs in the region including bypasses at the Kline's Island Wastewater Treatment Plant, were the subject of a Notice of Violation issued by the Pa. Department of Environmental Protection in October. The DEP notice and LCA's response were shared with the LCA Board at the November 12, 2018 meeting.

Wet-weather issues in the Kline's Island Sewer System (KISS) are well known and documented, and our planned approach to removing infiltration and inflow (I&I) into the system was documented and shared with federal and state regulators in early August. As outlined in the Regional Flow Management Strategy submitted to the USEPA and DEP, LCA and the municipalities served in the Western Lehigh service area have committed more than \$22 million on I&I source reduction programs through the year 2026, in addition to the conveyance capacity projects planned. To date, LCA and the other 14 municipalities that partnered in developing the RFMS have not received response from the USEPA or DEP indicating our planned approach is approved.

While LCA initially expected August's weather to be an anomaly that would not continue, this has not been the case. To date, the Allentown area has received 61.51 inches of rain in 2018, as compared to normal expected precipitation of 42.82 inches. November's rainfall of more than 9 inches (compared to 3.5 inches that is considered "normal") has challenged the system due to the very high groundwater conditions, swollen creeks and rivers, and overall elevated soil moisture. There is simply no place for additional rain to go when it falls, creating more stress on local waterways, stormwater systems and sanitary sewer systems.

Every drop matters. Every customer counts.

During the month of November, prolonged SSOs in the Trexlertown area have returned at manholes (such as U-58, U-63 and U-69) and a small number of residential customers in the area are experiencing intermittent sewer backups over the past four weeks.

Exacerbating the situation is an ongoing “backflow” condition at the Industrial Pretreatment Plant in Fogelsville, about 1 mile north of Trexlertown. This backflow condition is suspected to be due to surcharge conditions in the interceptor which pushes flow backwards into the plant.

The severity of the conditions has resulted in LCA activating its Emergency Response Plan (ERP) to expedite investigation and repair of any major structural conditions that may be contributing to the high-flow conditions. Such prolonged SSOs and “backflow” conditions have not been experienced previously, and weather patterns cannot be relied on to provide a future “dry period” to allow for this work to be conducted. Therefore, LCA staff believe activating the ERP was the prudent approach.

Actions Taken

Since activating the ERP, an internal team has been meeting daily to plan LCA’s investigation and repair approach. Critical to this work is the identification of a reliable method to dewater the Western Lehigh Interceptor to levels appropriate for inspection and repair activities. Several options were investigated including:

- Using the Flow Equalization Basin at the pretreatment plant to hold flow back from the system
- Discharging treated effluent at the pretreatment plant (that meets standard discharge permit requirements) to the Iron Run Creek
- Bypass pumping between manholes where investigation and repair work is happening
- Temporary pumping into the Spring Creek Pump Station to pull additional flow down the line faster

Weather conditions were favorable beginning on December 3, 2018 to begin trying these approaches.

Day 1 – December 4, 2018 – Using the FEB to hold back flow, six emergency operations crews were deployed on the Iron Run Trunk Line to conduct manhole inspections, pipeline televising operations, and installation of temporary flow meters at key locations in the system. Upper Macungie Township was also deployed on this day to flush key lines in the area that were suspected to be partially blocked.

Day 1 Results – This day was considered a highly successful “test” to determine if the FEB usage would adequately draw flows down to allow this work to be conducted. Crews visited approximately 135 manholes and televised 6,000 feet of the interceptor. Five of the six planned flow meters were also installed. Several areas of leakage were identified along with significant debris in the pipe at locations that were documented through this process.

Day 2 – December 6, 2018 – On this day, LCA repeated the FEB “holdback” procedure, and also used pipeline plugs to further reduce flows in targeted areas where work was being conducted. Five emergency operations crews were deployed to complete the televising of the Iron Run Trunk Line and to remove debris that was discovered during the Day 1 operation.

Day 2 Results – Adding the use of line plugs in key locations was effective in providing short-term flow relief in areas the crews were working with no upstream problems. LCA crews completed the TV work and identified some additional leaks that would help to reduce flows once repaired. Debris pulled from the line is also expected to provide some immediate relief.

DEP Meeting – December 7, 2018 – During a meeting with DEP officials, LCA reviewed conditions and plans to address the SSOs in this critical area. We discussed flow management options to allow the work to continue on an expedited schedule, including the possible temporary discharge of treated effluent from the pretreatment plant to the Iron Run Creek. During the visit, we toured key sites with the DEP officials to illustrate LCA’s sense of urgency to address the problem and to explain the challenges we are facing in conducting this work. We expect to receive feedback from DEP early this week to indicate their recommended approach to continuing this operation.

Next Steps

Efforts to date have focused on investigating the interceptor in the areas directly impacted by SSOs and residential backups. However, the system is in a surcharge condition (but not actively overflowing) downstream of the Trexlertown area almost all the way to the Spring Creek Pump Station. This would indicate further downstream leakage or blockages could be contributing to the problem, in addition to the findings in the Iron Run Trunk Line. Evaluating this section of the interceptor will be highly problematic due to the flooding conditions that persist in this area.

Week 2 – December 11-14, 2018 – A modified operation is planned for the upcoming week to utilize a combination of methods to dewater the line in between Trexlertown and the Spring Creek Pump Station. The FEB will continue to be utilized, along with an additional pump to be installed at the Pump Station downstream to pull additional flows out of the line. LCA will contract with Video Pipe Services to televise the interceptor using their specialized equipment that is designed for such conditions. If DEP provides additional support or recommendations to modify this approach further, they will be put in place as well.

The goal of the Week 2 operation is to have full characterization of the interceptor from the Pretreatment Plant down through Trexlertown and east to the Spring Creek Pump Station. This will serve as the basis for an expedited emergency repair operation.

Notes on Results to Date:

1. Unless the Week 2 operation provides different results than what we have generated so far, we expect to find that the interceptor in all locations is in very good condition and is structurally sound. This is the case in the Iron Run Trunk Line, despite the existence of some joint leaks and debris in the line. Such repairs can be made through a cost-effective cleaning and grouting method that will eliminate the identified leaks vs. more expensive slip-lining or line replacement work that doesn’t appear to be required due to the otherwise good condition of the interceptor.
2. While operating in these high-flow conditions is not ideal, it has provided LCA with the opportunity to view our system in a stressed condition. That is, the high groundwater levels, soil moisture and pressure from high flows in our local waterways are often not present when pipeline inspection activity is occurring. The work conducted so far, and expected to be

conducted during the Week 2 operation, has been effective in identifying sources of I&I that would not have been identified if conducted during more “normal” dry-day conditions. The overall impact of rehab work can therefore be more easily quantified and relied upon to address the problem we need to solve.

Approach to Repairs

LCA recommends the emergency declaration be extended to cover rehabilitation of the defects that will be discovered through the end of the Week 2 operation described above. The approach looks like this:

- Defects to be addressed on the Iron Run Trunk Line have already been identified and will be issued to multiple contractors this week to begin work as soon as possible.
- Defects to be addressed in the area between Trexlertown and Spring Creek Pump Station will be identified through the Week 2 operation and can be issued to multiple contractors to begin work shortly thereafter.
- By eliminating the formal bid process and having multiple contractors working simultaneously to complete the repairs on an emergency basis, the following benefits will be achieved:
 - Repairs to eliminate leakage will be completed 2-3 times faster, eliminating prolonged SSOs that much faster (expected repair timeline is 1-3 months)
 - Using the FEB holdback method to control flows will allow multiple crews / contractors to be working in different locations at the same time
 - Costs expected to be 50% less than a longer project with a single contractor

Cost Projections

Costs for the work completed to date is not fully available but are being tracked through the payroll system as well as additional authorizations for work by Arcadis, TFE and Jacobs. Costs for Video Pipe Services for the Week 2 operation have also been authorized administratively by the LCA staff.

The investigative stage of this work is expected to cost approximately \$75,000.

The rehabilitation stage of this work is unknown, pending results of the Week 2 operation, but is estimated at \$750,000. *

- * While these costs are significant, and operating reactively in an emergency response protocol is not ideal, it is noteworthy that conducting this work under adverse high-flow conditions has resulted in a highly reliable dataset regarding the location of pipe defects, so the rehab work will be targeted and highly cost effective. The alternative project approach of conducting “test & seal” work in dry-flow conditions is estimated to cost 2-3 times more because the leaks are more difficult to identify in dry conditions.

All costs are reimbursed via the municipal service agreements for the Western Lehigh Interceptor service area.

Concluding Remarks

This emergency work is expected to have a long-term, positive impact on the sewer system by quickly repairing leaks and other defects in the Western Lehigh Interceptor. The goal of this emergency work is to relieve the immediate problem of ongoing SSOs in the system. However, it is important to note that the high flows will not be eliminated by this work. The municipal signatories have committed to completing more than \$22 million of work to eliminate I&I in their systems over the next several years, and that work is absolutely necessary to address the conditions we are experiencing today.

Despite the wet-weather conditions in our sewer system, we should also not confuse this problem with a treatment capacity problem that does not exist. The data below illustrate that under normal conditions, LCA has more than enough treatment capacity available.

	Annual Precipitation (inches)	Suburban Water Sales (MGD)	Western Lehigh Sewer Flow (MGD)	Total KISS Sewer Flow (MGD)
2016	36.82	9.27	7.98	29.67
2017	50.18	9.28	8.78	30.78
2018 (est)	63.50	9.58	11.06	35.44

LCA has purchased 10.78 million gallons per day of treatment capacity from the Kline’s Island Treatment Plant and typically produces sewer flows well below our normal water sales, and well below our treatment capacity. The plant itself sees flows well below its permitted capacity of 40 million gallons per day. Addressing this issue as a treatment capacity problem does not resolve the root cause of the problem LCA is experience, which is wet-weather I&I.

LCA has two major challenges: Wet-weather I&I must be reduced, and conveyance capacity bottlenecks (especially in the Trexlertown area) must be addressed. Addressing both of these will require our continued full commitment and ongoing partnership with the municipalities we serve.

In the meantime, addressing the immediate high-flow conditions in our service area can be addressed through the emergency operation that was initiated in November. LCA staff hereby request Board support for continuing this operation through official authorization of this Emergency Declaration, retroactive to November 28, 2018, and covering rehabilitation of pipe defects discovered through the process described in this memo.