

Sump Pumps – Lagoon System Killers

Wastewater lagoon systems are designed to carry a set amount of flow of wastewater each day that the system can biologically break down over time. This design flow is roughly based on each person using 100 gallons of water per day. When the flow exceeds that amount, usually due to Inflow and Infiltration (I and I), damage to infrastructure, longer pump run times, and sewer backups can ensue. Exceeding a lagoon wastewater design flow can also result in wastewater being discharged into the environment untreated, threatening the health of surrounding communities.

It seems every other article I write for *The Lifeline* is about Inflow and Infiltration. In the previous articles, I have touched on what I and I is and how it affects the wastewater treatment process. I continue to get many calls about issues caused by I and I and the proposed method to fix the problems. It seems that lining the wastewater collections system with Cured-In-Place Pipe (CIPP) is the “go-to fix” for I and I.

And generally, I would agree that it is most likely the best cure for Infiltration. However, Inflow occurs when stormwater enters the sewer system through roof drains, basement sump pumps, leaky manhole covers, or foundation drains illegally connected to the sewer. All of the listed inflows of water should be able to be eliminated or minimized without an engineered project.

By eliminating or minimizing these sources of Inflow, the city may be able to reduce the I and I enough that the wastewater treatment system could handle the influx of



This 1/3-HP Master Plumber Sump Pump is rated at 3,600 gallons per hour (GPH).

Infiltration and not need the major project that will undoubtedly range well into the millions of dollars.

I believe one of the most significant contributors to Inflow into many systems is sump pumps. This is not a new claim by me or shocking news never before heard. But I continue to see towns and cities sign up with an engineering firm to eliminate the I and I, and no one can explain if sump pumps are even tied into the wastewater collection system. I have worked with many towns that have utilized CIPP to correct the I and I, and the result is usually....” Yeah, I think it helped.” More than one study has shown that CIPP lining alone may only cure

ten to thirty percent of the I and I issue.

In no way am I suggesting that CIPP lining is bad or not helpful. As I stated before, I believe it is a very good tool to eliminate Infiltration but the inflow portion of the acronym I and I is most likely curable without a significant project.

The issue with sump pumps is often knowing where they are in use and convincing a homeowner or business to disconnect from the wastewater collection system and direct the flow outside onto the ground.

While cruising the isles of a local hardware store, I took photos of a 1/3 horsepower sump pump rated to pump 3,600 gallons of water per hour. To put this into perspective, let’s

If you want to effectively mitigate inflow and infiltration, you need to have a plan for the private side of your system. Engineering firm CDM Smith has found across several I&I mitigation programs that private properties contribute an estimated 50 to 70 percent of total I&I for any given municipality. Their findings were confirmed during a comparison study in Revere, Massachusetts.¹

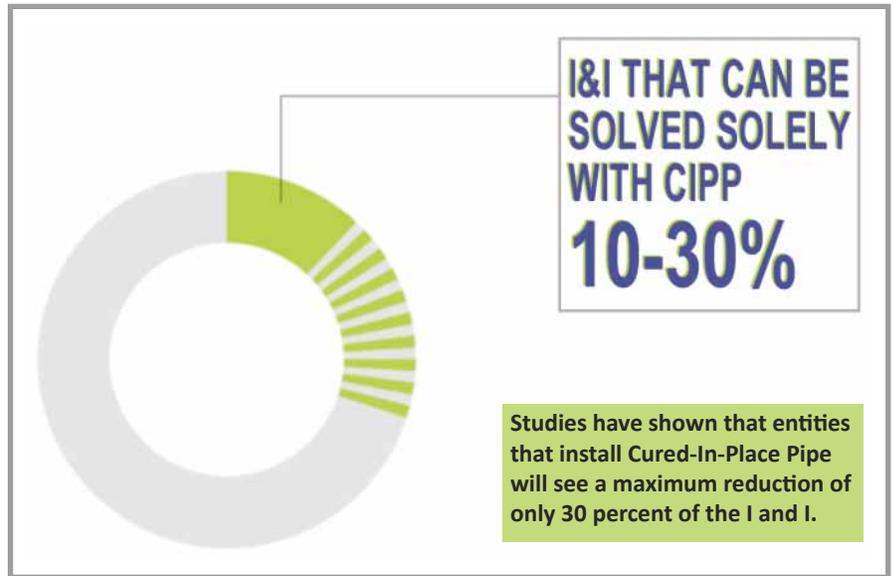
¹ Raney, Jared. The Private Side Fight Against Inflow, *I & I Magazine*, Spring 2019, www.landmag.com.

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recall the 100 gallons per person per day allotment of wastewater the lagoon facility can treat according to the engineered design.

Hypothetically speaking, let's say a town with a population of 850 and has a lagoon wastewater treatment system designed daily flow of 85,000 gallons per day. And hypothetically speaking, this town only has one sump pump in all the homes and businesses in town that is tied into the wastewater collection system. And this one single sump pump happens to run for 24 hours (not unrealistic on the eastern side of the state) at 3,600 gallons per hour multiplied by 24 hours per day equals 86,400 gallons. This town has just exceeded the design flow of the entire town's wastewater treatment system of 85,000 gallons per day by 1,400 gallons. One sump pump has now just more than doubled the design flow, with the city still contributing the 85,000 gallons of normal flow.

I don't generally live in La La Land and think that any system in Kansas has a single sump pump that is the culprit to the town's total I and I issues. The example shows that many towns could reduce the amount of Inflow and possibly divert a multi-million-dollar project by simply resolving the illegal connections to the wastewater collection system, especially if effluent compliance is not an issue.



I am all for proactive maintenance rather than reactive but the city's due diligence to reduce inflow may be enough to eliminate the need for a significant project. At a minimum, by reducing the inflow, the size of pumps and piping may be reduced, lowering the engineering and hardware price due to lower max flows used in the design phase. This may save the city money even if a major project is still warranted.

I discussed state regulations prohibiting illegal connections to the city sewer collection system in previous articles. And I wrote about city ordinances and the probability that every city has an ordinance that says sump pumps connected to the sewer system are an illegal connection. The resolution lies on the city council to enforce the city's ordinances.

The feel-good answer is for the city to say that each house sold in town will be inspected and before sale, it must be documented that no illegal connections like sump pumps are connected to the sewer collection system. My question to the council would be, "How many houses were sold in the city last year?" A single sump pump can potentially pump 86,400 gallons per day every time a rainfall event occurs.

Each town and city have unique issues and certainly unique local politics that will most likely drive the actual outcome of the city council's decision on what to do about illegal Inflow connections.

Please get in touch with KRWA for assistance with developing a plan to root out the illegal connections and potentially save the city millions in costs on repairs that may not address the real problem.

Question: How many manholes in the city become submerged during high precipitation events?

One municipality performed its own Inflow testing on manhole lids using actual field conditions. The test was conducted using from one to ten inches of water over the manhole cover while developing three different sets of circumstances.

For Test No. 1, the bearing surface was sealed to simulate dirt and grit deposits between the frame and cover, and the pick holes were left open. Test No. 2 had a clean frame and cover, but the pick holes were plugged. Test No. 3 had the ring and cover clean. Results with one inch of water over the cover ranged from 12 GPM for Test No. 1 to 15 GPM for No. 2 and 27 GPM for Test No. 3. Moving to five inches of water produced rates of 20, 24 and 42 GPM, respectively. At the 10-inch mark, inflow increased to 25, 29 and 47 GPM.

Potentially 17,280 gallons per day enter the wastewater collection system from the pick hole in one manhole lid with one inch of water over the lid. This is another source of Inflow the city could reduce Inflow with minimal cost.

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