



TOWN OF BROOKFIELD

WPCA

BROOKFIELD, CT 06804

Data Analysis of 14 Brookfield Pump Station Sewersheds with Rainfall

The data displayed for each system spans from July 2021 to June 2022 taken from the Mission Communication data collection system. Online tools allow a year of data to be readily captured.

For each pump station model, a two-day weighted average was used for the number of inches of rainfall to account for the rainfall's delayed impact on the sewage system. The graphs below show the daily pump volume plotted against rain fall. On the graphs, the R-squared number (R^2) reflects the correlation of the data. An R^2 of 1.0 is a perfect correlation where all numbers fall on the line. The slope of the line is an indication of severity of the infiltration problem.

This brief report shows that there was a significant improvement with the application of manhole cover pans in the collection area of the North Station. Also, at the end of this paper, the analysis shows these stations have no discernable change in flow with rain fall:

- Eastview
- High School
- Silvermine
- Del Mar and
- Brooks Quarry

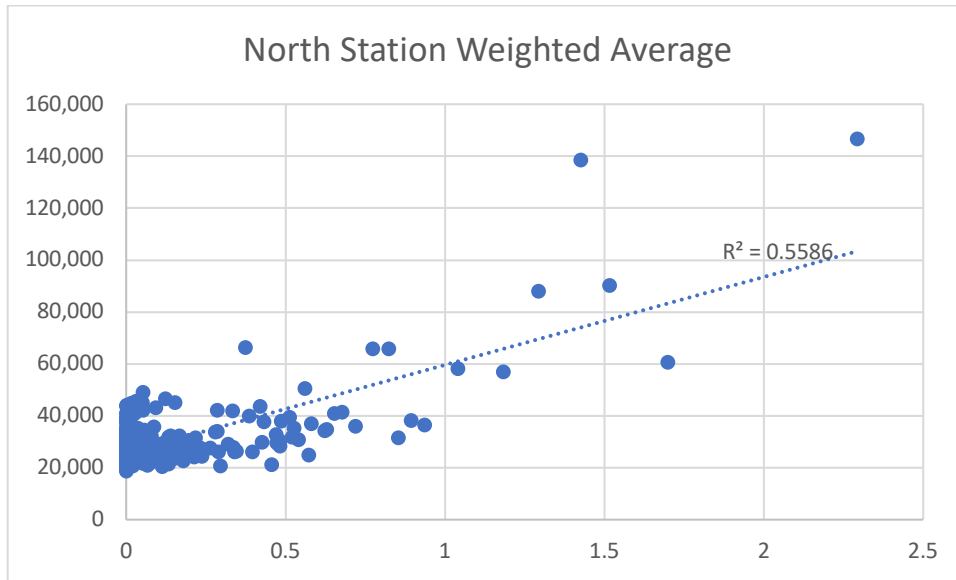
The pump stations that serve the Three Condo are show a mild correlation of flow vs rainfall:

- Cedarbrook
- Stony Hill and
- Sand Cut

The analysis shows that the manhole inspection program in Town Roads has proved effective, but more could be done. It also shows there is a challenge in the sewershed in Federal Road South area where careful study could be done. That study may include a more stringent focus on private pump stations as well. Overall, it seems the added flow due to rainfall is 60,000 – 70,000 gallons per day per inch of rain on days of rain.

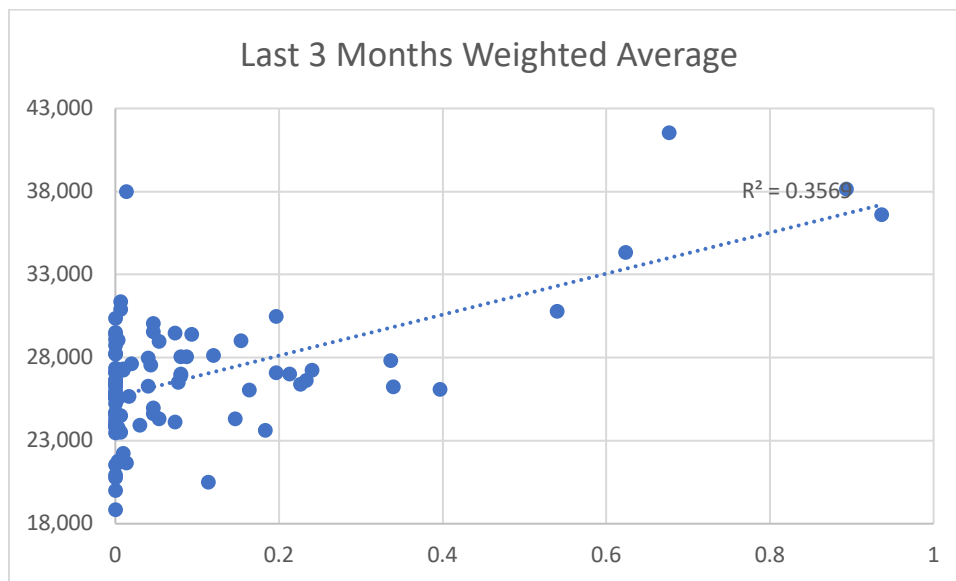
This translates to raising the wastewater flow by about 8,000 gallons per day for the year. So, if the total flow for the year is 330,000 GPD it would be 328,000 GPD if there we no rain all year.

So, there is opportunity for improvement with the ongoing manhole inspection program. A review of the graphs below tells the story and indicates where to focus in the future.



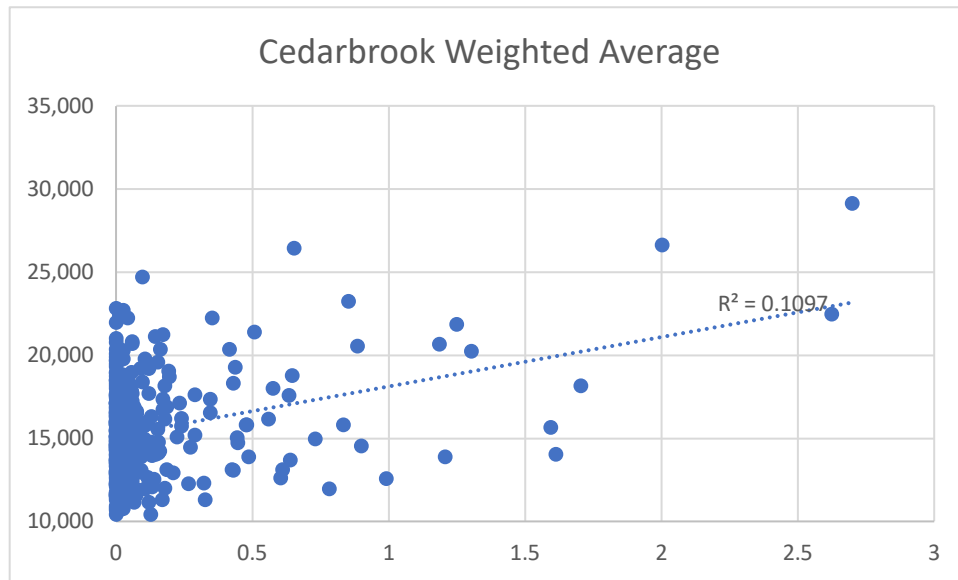
The North system displays a very significant correlation between rainfall and the gallons of sewage pumped. However, it was noted that this system had recently been improved with inspected and refurbished manhole structures. The vertical axis is Gallons per Day. The horizontal axis is inches of rain.

The last three months of this system (following the system updates) were also analyzed:

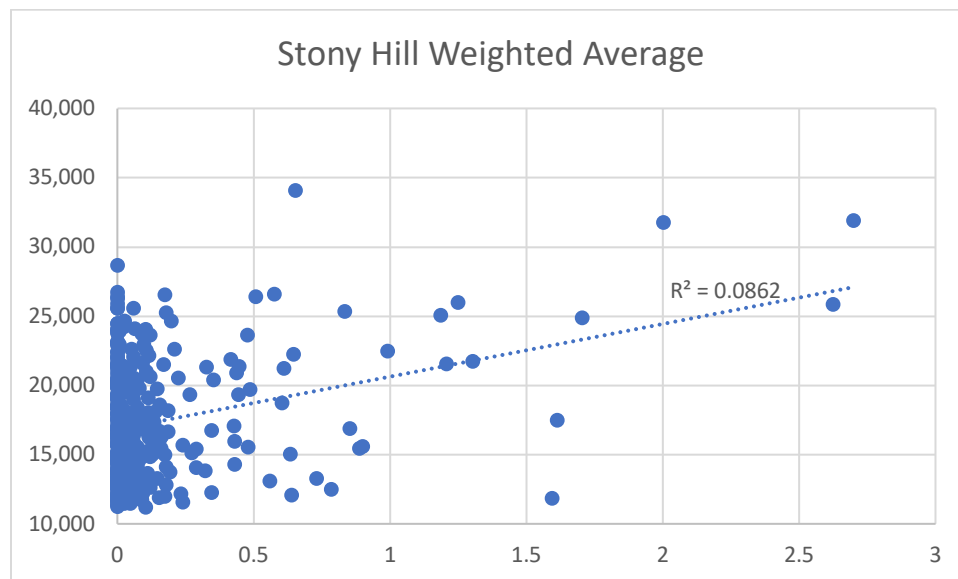


This more recent analysis displays a much less significant correlation, which implies that the system updates were very effective. But more investigation is merited as there is still influence of rain water on pump station output as this study indicates the infiltration is about 12,000 per day per inch of rain.

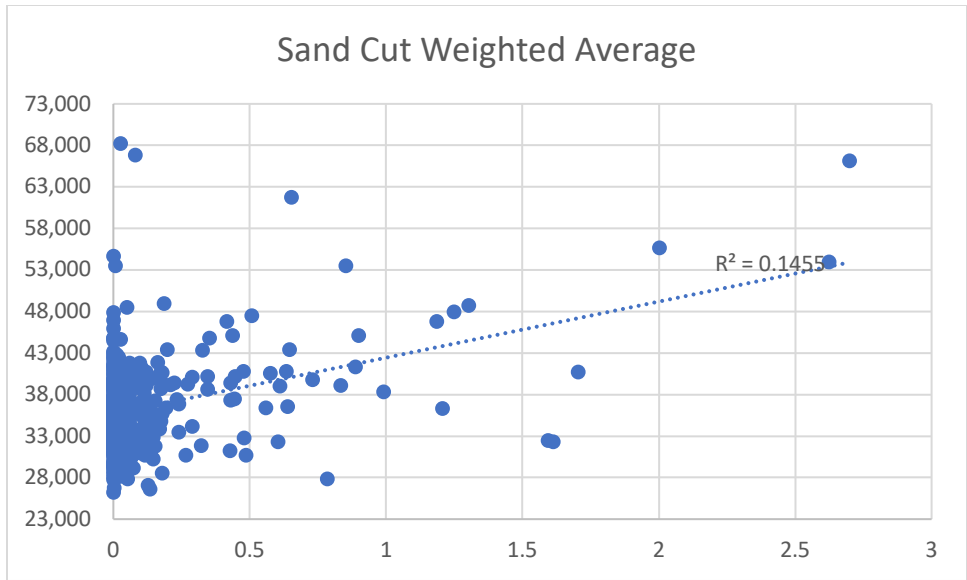
The stations serving the private communities in the Three Condo District show a slight influence of flow with rainfall. These areas are worth investigating in the boundaries of the private manhole inspection program to determine if installing manhole covers will have a positive impact in I&I.



The Cedarbrook system displays a very mild correlation between rainfall and the gallons of sewage pumped. The infiltration is roughly 5,000 gallons per day per inch of rain.

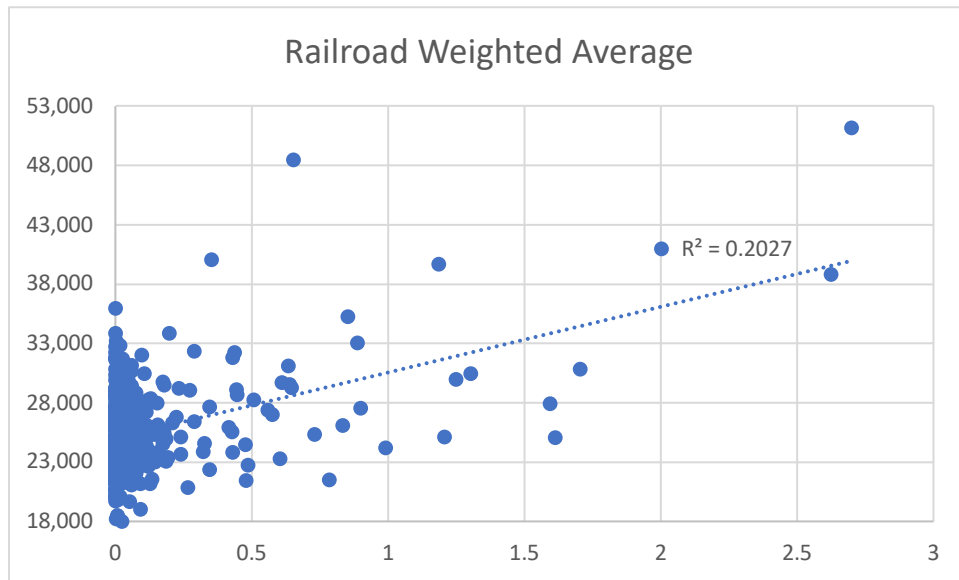


The Stony Hill system displays a slight correlation between rainfall and the gallons of sewage pumped. The precipitation infiltration is about 3,000 gallons per day per inch of rain. Both the Cedarbrook and Stony Hill stations feed to the Sand Cut station reported below.

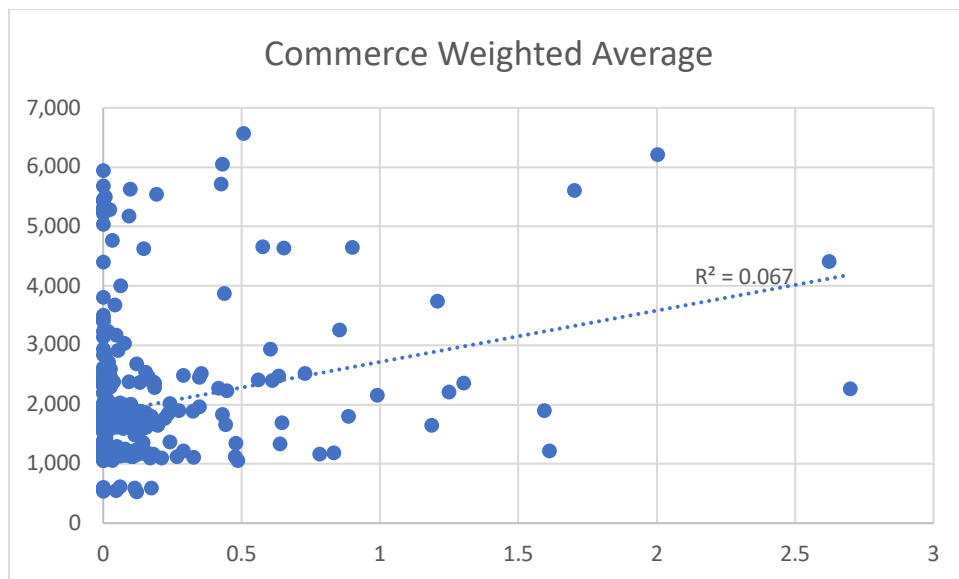


The Sand Cut system displays slight correlation between rainfall and the gallons of sewage pumped. The I&I rate is about 9,000 GPD per inch of rainfall. The Sand Cut station flows to the final Caldor station.

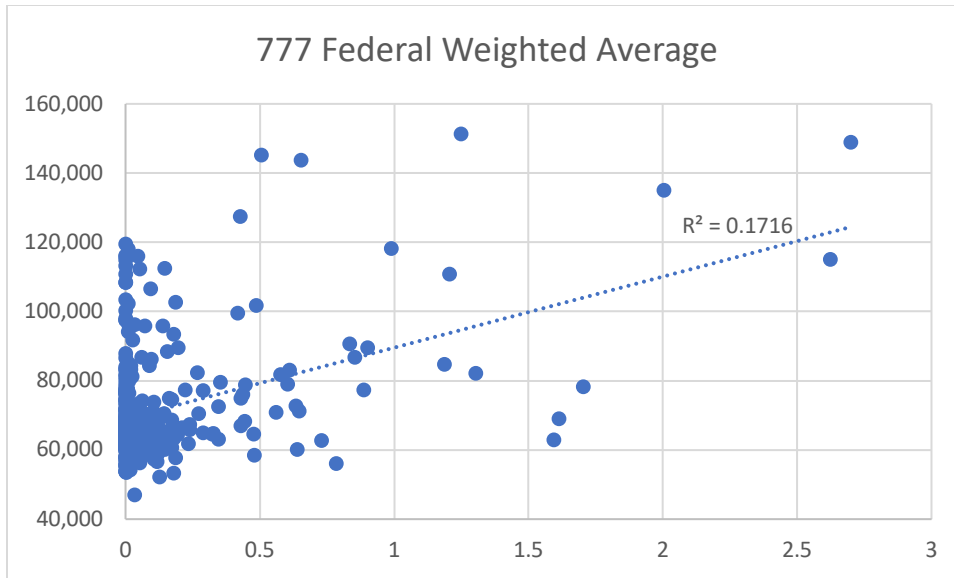
The Railroad station is fed by the High School and Eastview stations. Both those station seem tight, so it seems there is an opportunity for I&I reduction in the area of Center School immediately north & south of Route 25.



The Railroad system displays a mild correlation between rainfall and the gallons of sewage pumped. The I&I rate is modest at about 6,000 GPD per inch of rain. This station feeds to the Route 133 station.

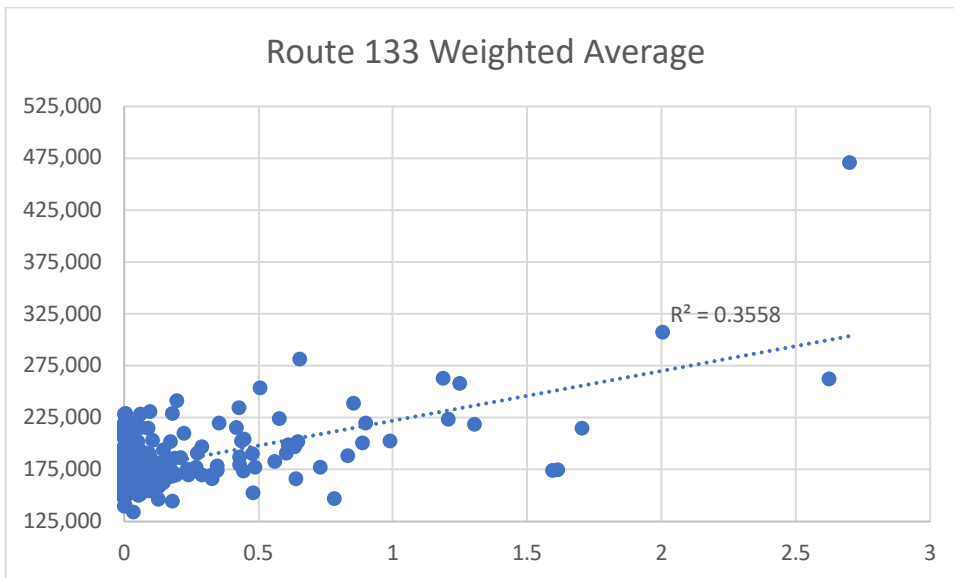


The Commerce system displays very mild correlation between rainfall and the gallons of sewage pumped. The infiltration for this small system is about 1,200 GPD per inch of rain. This station also feeds to the Route 133 station. Investigations in this area can receive a lower priority.



The 777 Federal system displays a mild correlation between rainfall and the gallons of sewage pumped. The infiltration of water at this station is about 20,000 GPD per inch of rain.

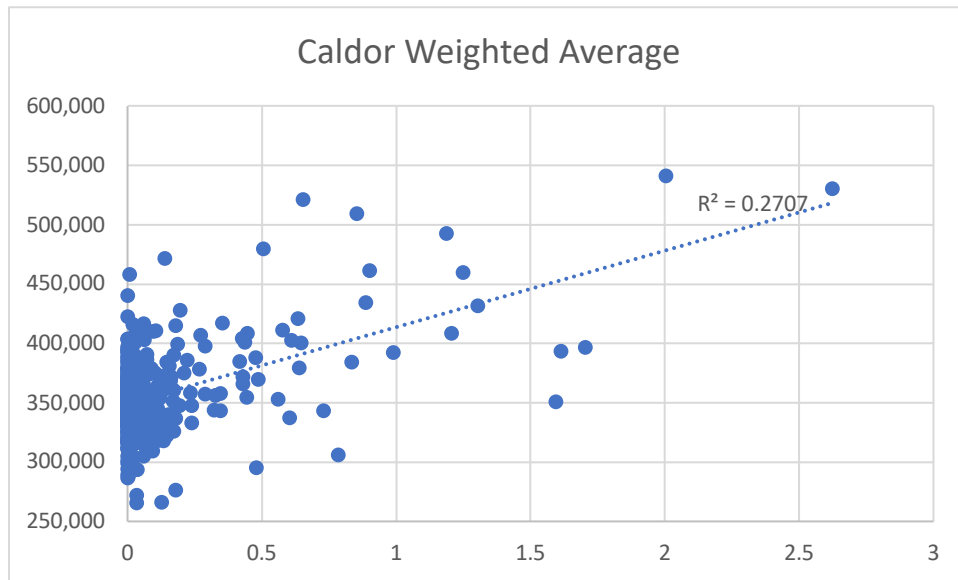
This station also feeds to the Route 133 station. This station receives flow from the North Station which may account for the station performance shown above.



The Route 133 system displays a very somewhat mild correlation between rainfall and the gallons of sewage pumped. But the total increase of wastewater flow is about 50,000 GPD per inch of rain.

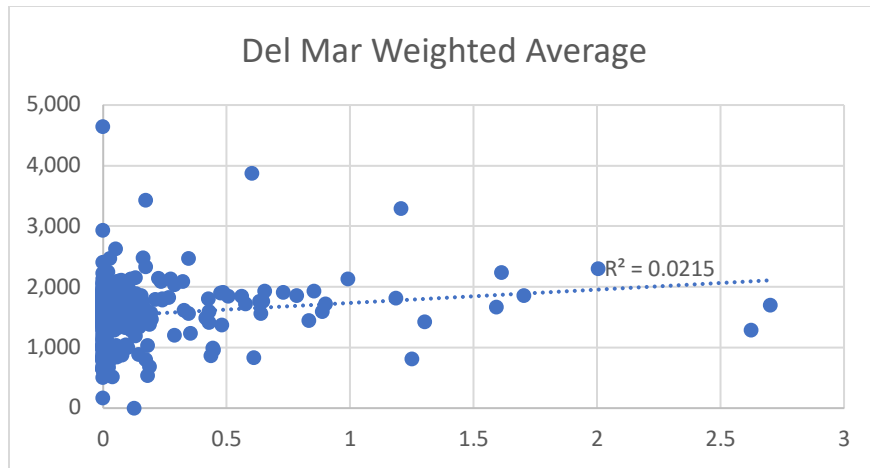
This station receives flow from stations 777 Federal Road, Silvermine, Railroad and Commerce Road. The Route 133 station sends flow directly to the Caldor station.

This Caldor Station is the final station before all flow is sent to Danbury. It receives flow from the Route 133 and Sand Cut stations. It also receives flow directly from all of the activity on Federal Road south of the Linden and the new Candlewood Elementary School.

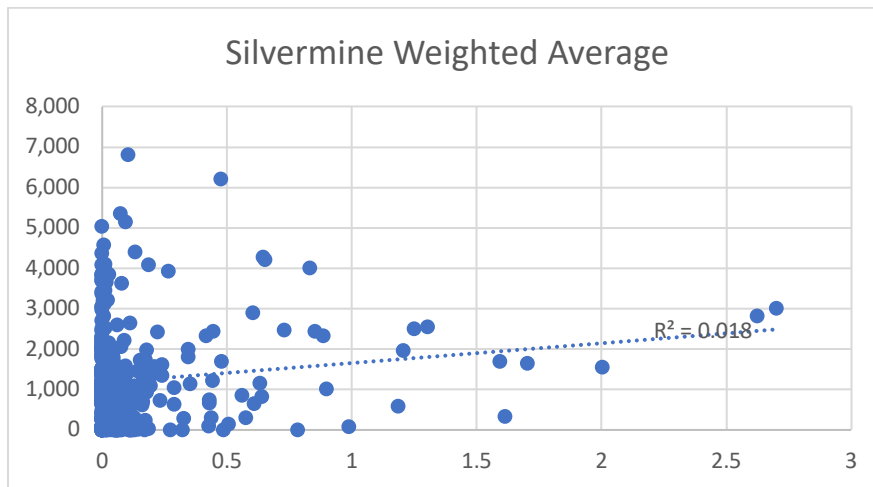


Recall that these graphs show Gallons per Day on the vertical axis and inches of rain in a day on the horizontal axis. The Caldor system displays a moderately significant correlation between rainfall and the gallons of sewage pumped. The added flow due to rainfall is about 65,000 GPD per inch. Manhole investigations and refurbishment in this sewershed should prove to be beneficial.

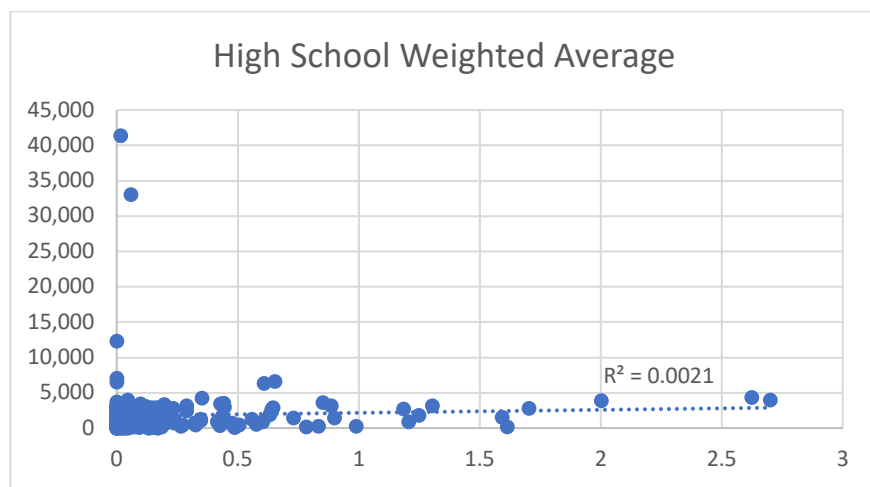
The following five sewershed areas show no important impact of rainfall with station duty.



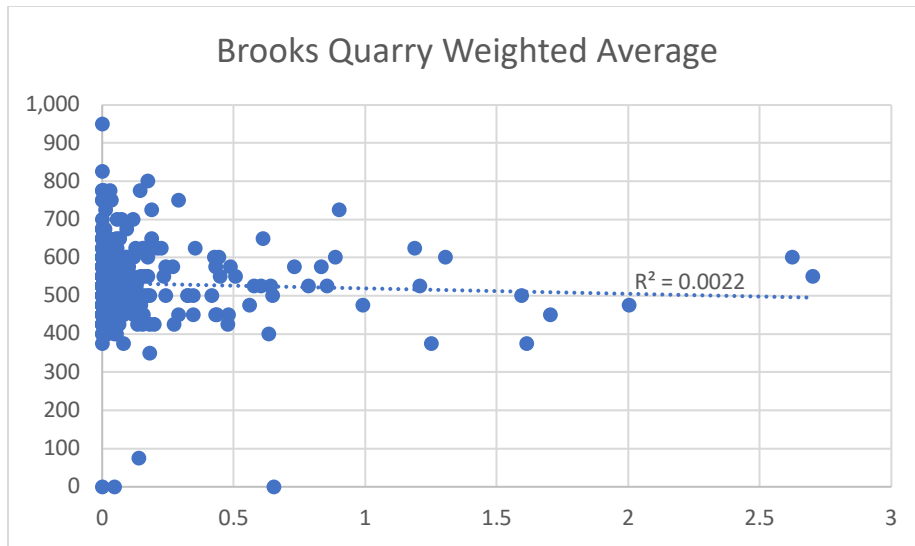
The Del Mar system displays no correlation between rainfall and the gallons of sewage pumped.



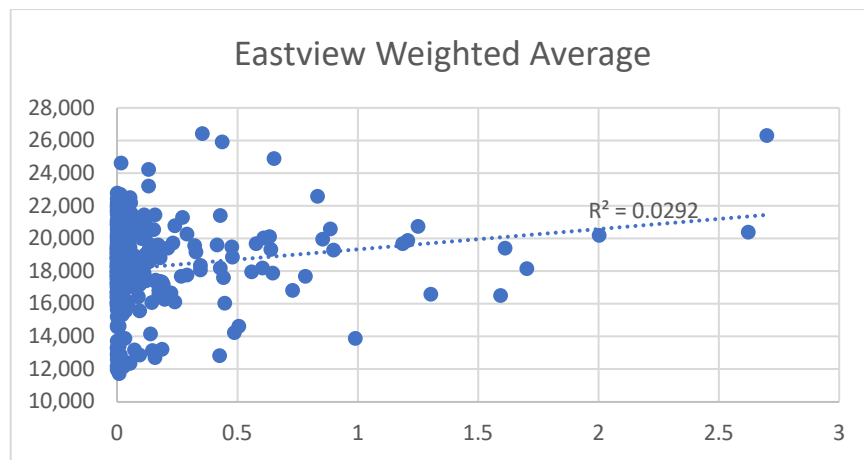
The Silvermine system displays no correlation between rainfall and the gallons of sewage pumped.



The High School system displays no correlation between rainfall and the gallons of sewage pumped.



The Brooks Quarry system displays no correlation between rainfall and the gallons of sewage pumped.



The Eastview system displays very little correlation between rainfall and the gallons of sewage pumped.