ANDERSON, ECKSTEIN & WESTRICK, INC.
CIVIL ENGINEERS - SURVEYORS - ARCHITECTS
51301 Schoenherr Road, Shelby Township, MI 48315
586.726.1234 | www.aewinc.com

April 21, 2023

Kip Walby, SEMSD Director of Operations
Southeast Macomb Sanitary District
20001 Pleasant Avenue
St. Clair Shores, Michigan 48080

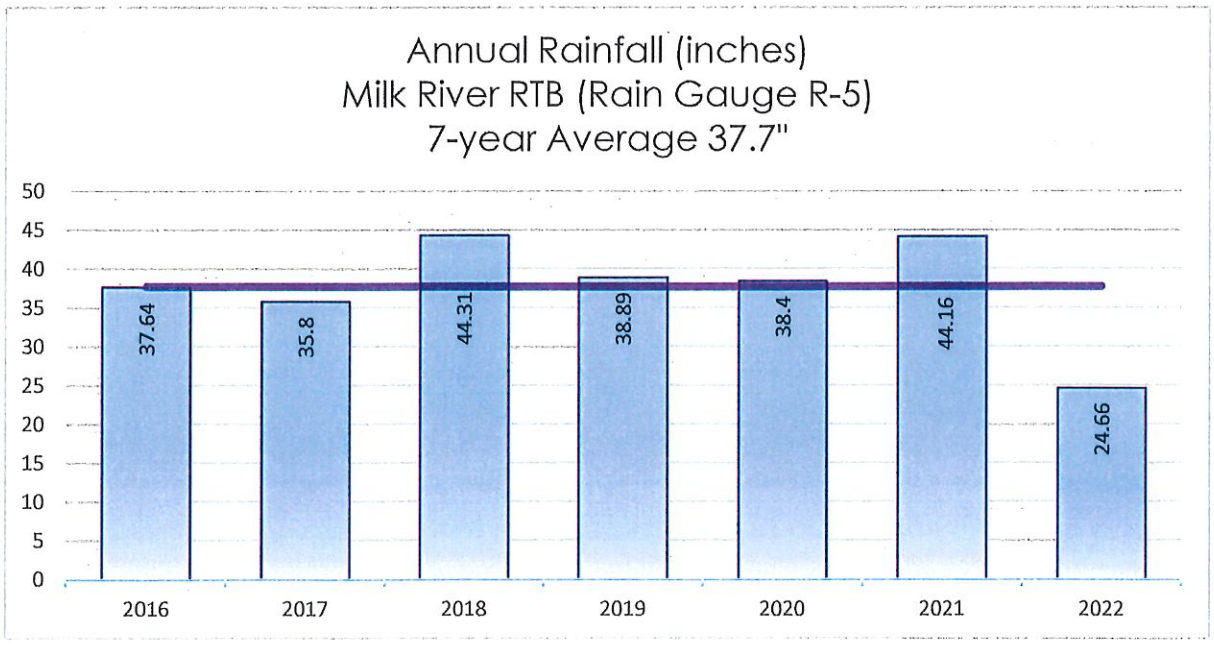
Reference: SEMSD/MRIDDD 2022 End of Year System Summary

Dear Mr. Walby:

The system data for 2022 has been reviewed and compared with previous years in effort to evaluate the facility's operational performance over the past year. The primary goals for managing the wastewater are to prevent basement backups and limit retention treatment basin (RTB) discharges to the waters of the State. This letter is intended to provide a summary of the findings and observations for calendar year 2022.

Rainfall Data

The rain gauge located at the Milk River RTB (R-5) was reviewed and compared with previous years. Overall, 2022 was the driest year over the last seven years. The total rainfall was 65% of the 7-year average of 37.7 inches and 75% of the long-term average of 34.5 inches. This is contrary to the large events experienced in 2021.



RTB Discharges

In 2022 there were two discharge events from the Milk River RTB to Lake St. Clair, with a total volume of 55.5 million gallons. This is a fraction of previous years discharges and is a result of reduction in rainfall for 2022. For comparison in 2018 the Milk River RTB discharged 603 MG over 16 rainfall events with similar yearly total rainfall. In 2022 the total volume captured at Milk River RTB and dewatered back to the system was about 116 MG.

The tables below summarize the CSO discharges by facility for 2022.

Tables 2-4: 2022 System RTB Discharges

Milk River RTB		
2022 CSO Discharges		
Date	Volume (MG)	Rain (in)
02/17/22	25.90	0.93
06/07/22	29.60	1.61
2022 Total	**55.50**	-

Chapaton RTB		
2022 CSO Discharges		
Date	Volume (MG)	Rain (in)
06/07/22	25.00	1.87
2022 Total	**25.00**	-

Martin RTB		
2022 CSO Discharges		
Date	Volume (MG)	Rain (in)
02/17/22	19.30	2.10
05/16/22	08.10	1.83
06/07/22	17.90	1.81
2022 Total	**45.30**	-

Table 5

Milk River Retention Treatment Basin			
Year	Annual Rainfall (in)	Number of Discharges	Volume of Discharge
2017	35.80	15	327.2
2018	44.31	16	603.7
2019	38.89	5	210.8
2020	38.40	9	425.6
2021	44.16	12	799.1
2022	24.66	2	55.5

Based on 2022 Milk River discharge data, we have remained at similar levels for the threshold for the expected amount of rainfall that would cause an RTB discharge. Data was updated this year by adding the two storms to the trend from October 2018 to present.

Events from 2022 are shown in orange on figure 2. The February event is suspected to be above the trend line due to the snow-melt that is unaccounted for in the rainfall depth.

When evaluating the time period between January 2016 to October 2018, this threshold was about 0.20 inches, and from October 2018 to January 2022, this threshold averaged 0.76 inches. October 2018 was a period of operational procedure changes and therefore was selected as a logical period break for analyzing the data. The chart below displays the Milk River RTB discharges versus reported rainfall totals for the two time periods.

Table 6: Summary of Rainfall Causing Milk River RTB Overflow

Timeline	Approximate Rainfall Total Causing an RTB Overflow at Milk River (inches)
January 2016 - October 2018	0.20
October 2018 – December 2021	0.78
October 2018 – December 2022	0.76

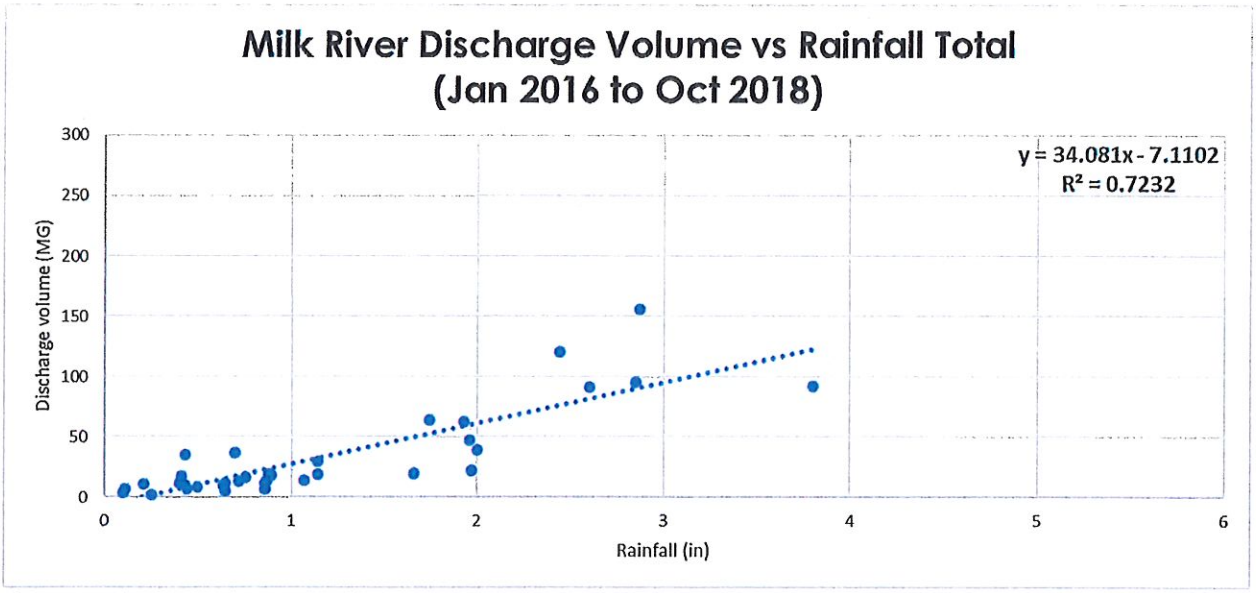


Figure 1: Threshold determination of Rainfall Total causing RTB Discharge at Milk River (Jan 2016-Oct 2018)

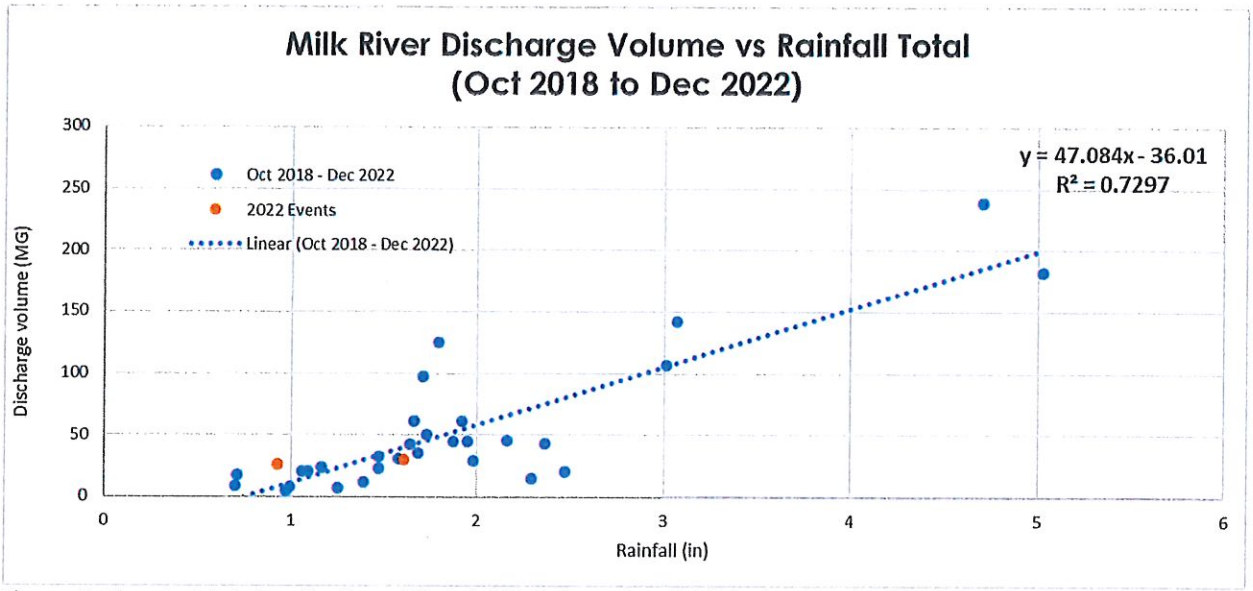


Figure 2: Threshold determination of Rainfall Total causing RTB Discharge at Milk River (Oct 2018-Dec 2022)

Overall analysis indicates that the SEMSD is continuing to operate in an efficient manner, improving on containing smaller sized storms, containing more volume with in-line storage and in some cases preventing RTB discharges.

The driving factor for the significant declines in CSO discharge in 2022 was caused by the absence of overall rainfall volume for the region. We will continue to monitor the system data and look for ways to improve the operations.

NPDES Permit

E. Coli

Both of the 2022 discharge events from the Milk River RTB met their National Pollution Discharge Elimination System (NPDES) permit requirements for Escherichia coli (E. coli). The permit allows a maximum limit for E. coli of 300 cts/100ml between May to October and 1,000 cts/100ml between November and April. The following table summarizes the maximum E. coli limits discharged to the Milk River from the RTB during the 2022 discharge events.

Table 6 E coli.

	Max Limit E. coli (cts/100ml)	
Date	**NPDES Permit**	**Actual Measured**
02/17/22	1,000	32
6/7/22	300	15

Total Residual Chlorine (TRC)

Both of the 2022 discharge events from the Milk River RTB met their National Pollution Discharge Elimination System (NPDES) permit goal for TRC. The permit goal is to below an event average of 1.50 mg/L for TRC. The following table summarizes the event average TRC discharged to the Milk River from the RTB during the 2022 discharge events.

Table 7 TRC

	TRC Event Average (mg/L)	
Date	**NPDES Permit Maximum**	**Actual Measured**
02/17/22	1.50	1.26
6/7/22	1.50	1.36

Total Suspended Solids

The Milk River RTB Total Suspended Solids (TSS) was reviewed. Table 5 summarizes the event average Influent, Effluent and reduction in TSS by year. The anomaly in 2020 of the increased discharge of total suspended solids may have been a result of solids in the basin re-suspending due to turbulence in the basin and construction measures necessary to remove the solids.

Table 8: Total Suspended Solids Yearly Average

Milk River RTB			
Year	**Event Average Influent TSS (mg/L)**	**Event Average Effluent TSS (mg/L)**	**TSS Removal**
2018	192.5	88.4	54%
2019	69.2	85.2	-23%
2020	68.3	66.4	3%
2021	89.1	51.7	42%
2022	147.2	80.8	45%

Since the final removal of the sludge build up from the retention treatment basin around 2020 we have seen the total suspended solids removal rate of around 44%. This is likely attributed to the cleaning activities and flushing improvements made to the RTB in the Priority 1b Project and the active flushing completed by the SEMSD after each RTB Event.

Sincerely,

Taylor Sting, PE
Project Engineer

Kyle Seidel, PE
Senior Project Engineer

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