

Inflow and Infiltration Evaluation for the Town of Wilton's Sanitary Sewer Collection System

September 2023

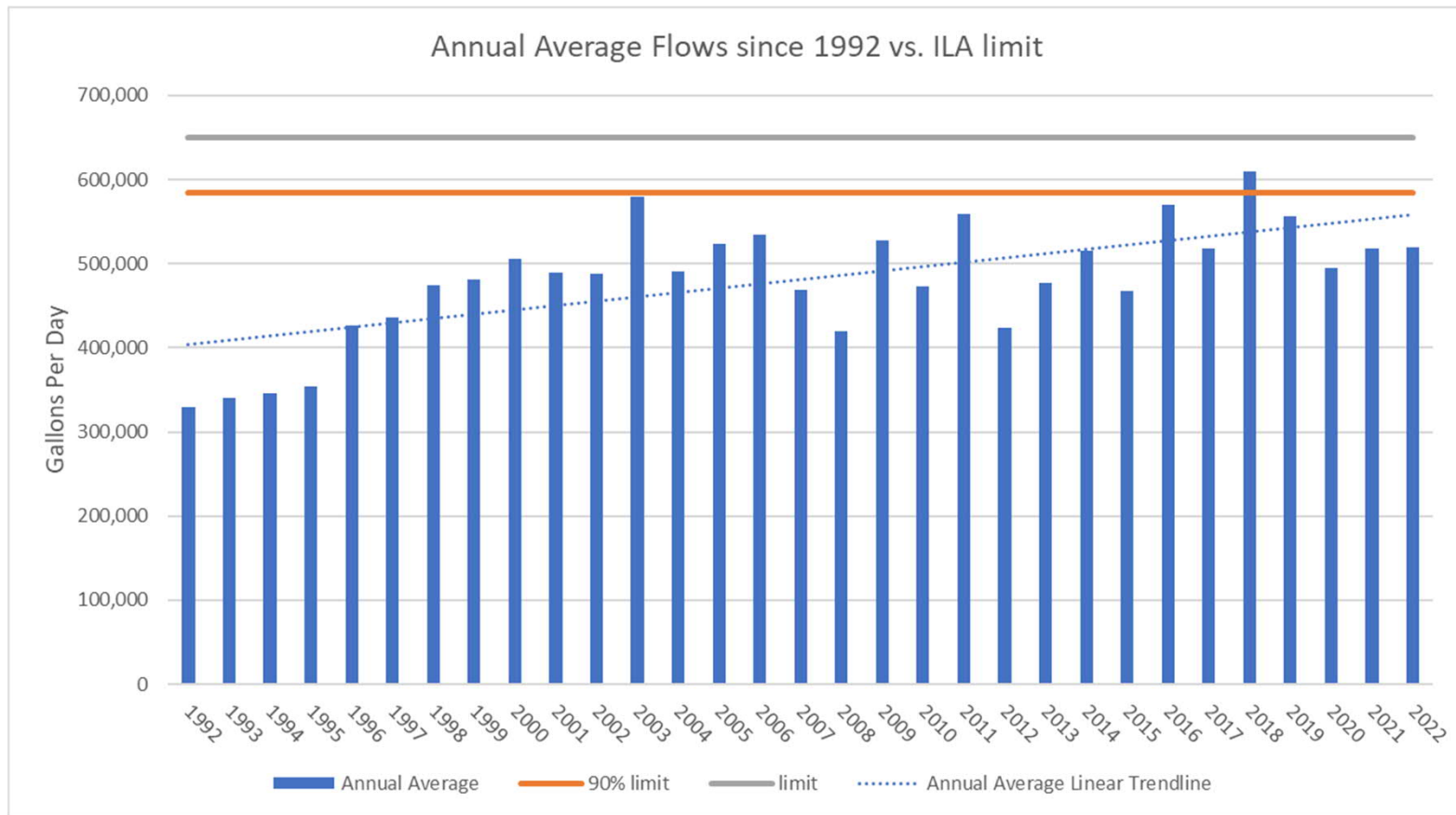
Christine Kurtz, PE
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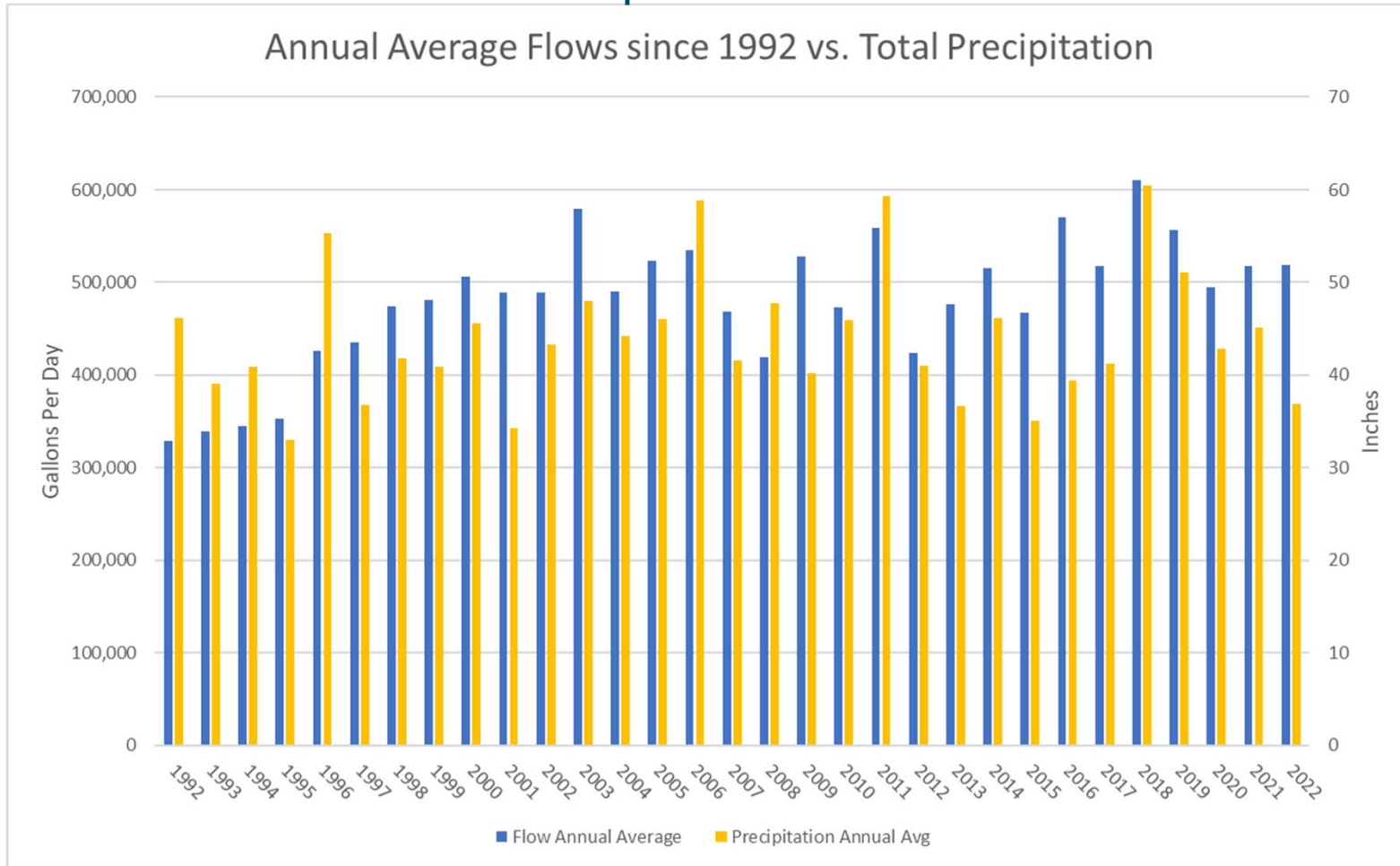
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Annual Wastewater Totals



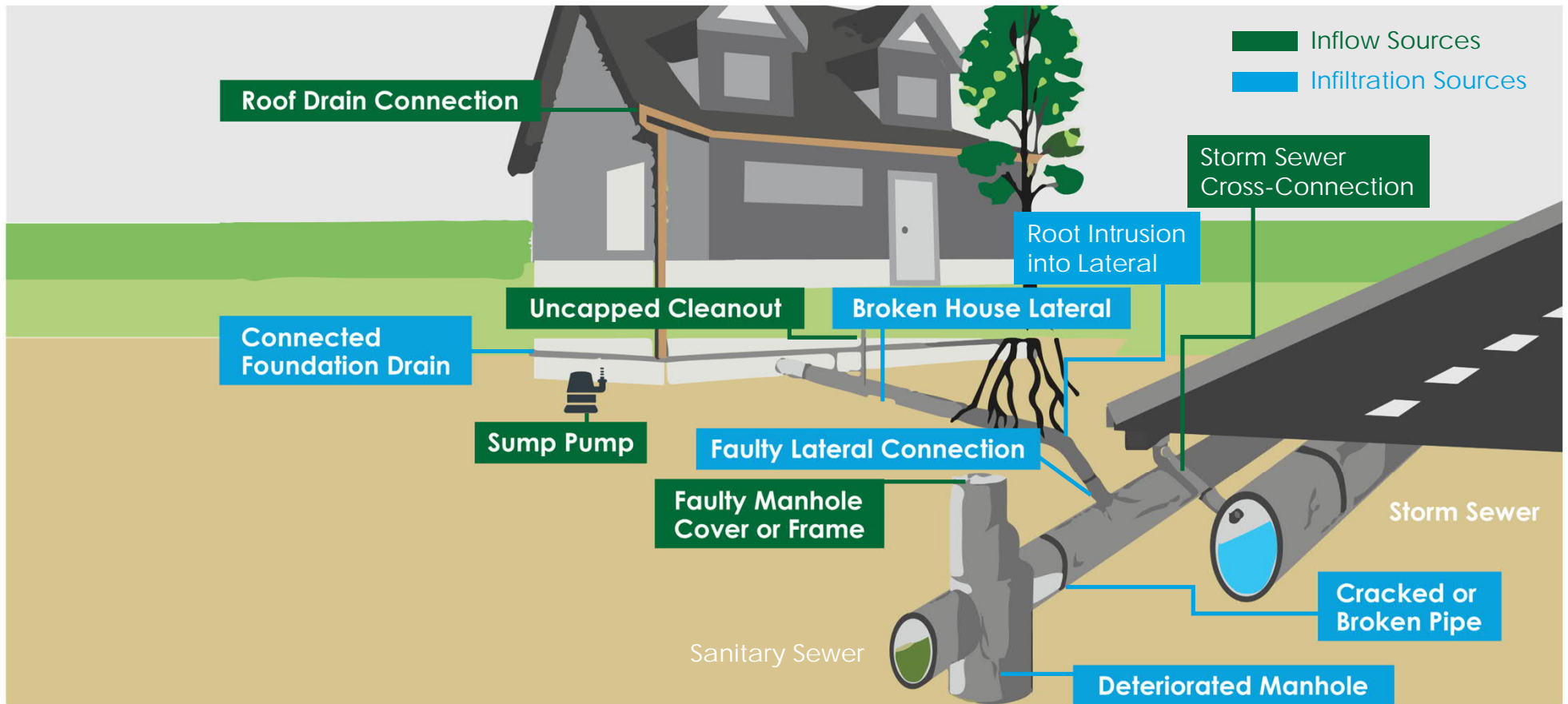
Annual Wastewater and Precipitation Totals



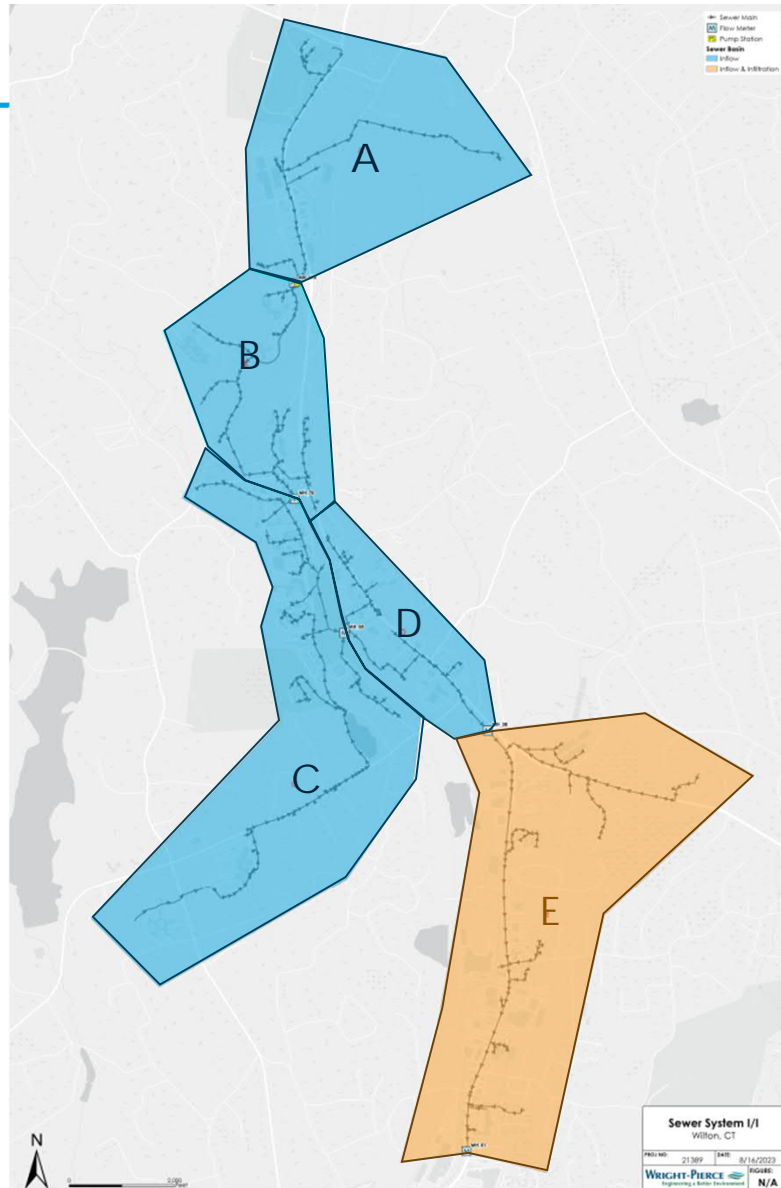
Presentation Overview

Flow Monitoring Overview
Dry Weather Analysis
Wet Weather Analysis
Results
Recommendations

I/I Sources



Sewer Sub-Areas



Flow Monitoring Locations

12-Week Period (Spring 2023)

Sewer Sub-Area	Flow Meter Site/Manhole ID	Basin Size (LF)	Pipe Diameter (IN)
A	MH_615	13,693	18
B	MH_70	15,557	18
C	MH_58	22,380	24
D	MH_38	11,861	24
E	MH_01	21,820	24

Rain Events (Greater than 0.50 Inches)

Start Date	Duration (HRS)	Peak Rain (IN)	Total Rain (IN)
3/13/2023	29	0.19	1.37
4/22/2023	14	0.47	1.68
4/28/2023	29	0.20	1.64
4/30/2023	15	0.41	1.39
5/20/2023	16	0.53	1.96

Dry Weather Analysis

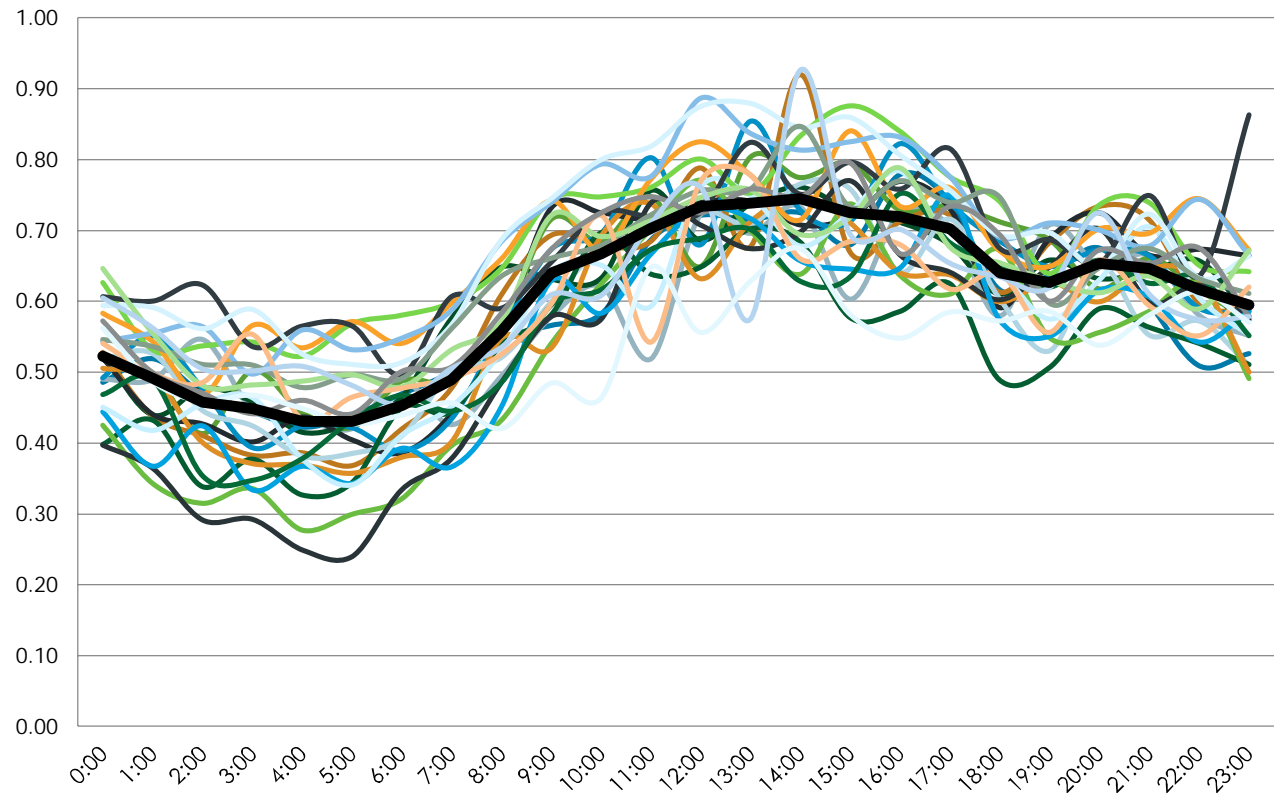
Base Infiltration (BI) Calculation

- Dry day selection
- Stevens-Schutzbach method

$$BI = \frac{0.4 * AMNF}{1 - \left(0.6 * \frac{AMNF}{ADDF} \right)^{0.7}}$$

- Where:
 - AMNF is average minimum night flow
 - ADDF is average dry day flow
- Inch-diameter-mile (IDM)
- 4,000 GPD/IDM threshold

Average Dry Day Flow (MGD)
Sewer Sub-Area E



Dry Weather Results

Net Base Infiltration (BI)

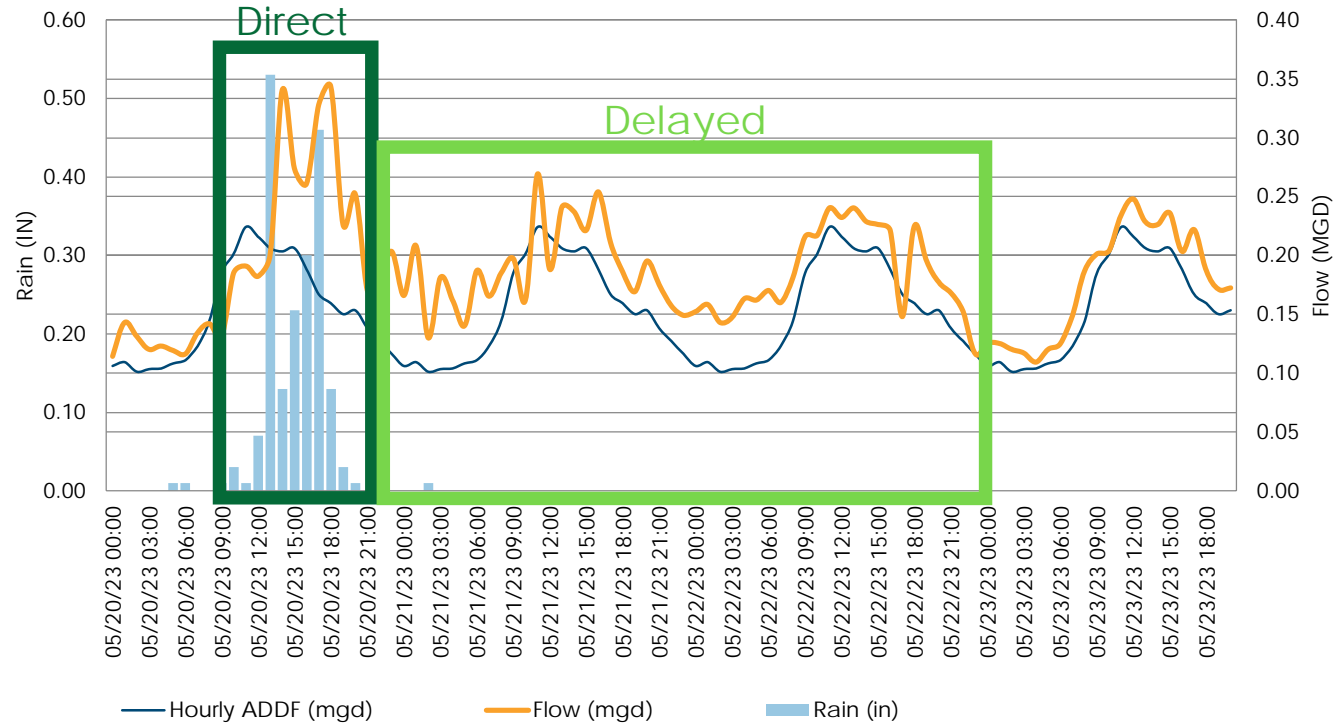
Sewer Sub-Area	Net Average Dry Day Flow (MGD)	Net Average Minimum Night Flow (MGD)	Net Base Infiltration (MGD)	Inch-diameter-mile (IDM)	Net BI Unit Rate (GPD/IDM)
A+B	0.152	0.101	0.090	54.91	1,639
C+D	0.203	0.140	0.123	75.70	1,625
E	0.602	0.431	0.344	58.32	5,898

Wet Weather Analysis

Inflow Calculation

- Individual storm hydrographs
- Peak inflow rate
- Inflow volume
 - Direct
 - Delayed

5/20/2023 Rain Event
Sewer Sub-Area B

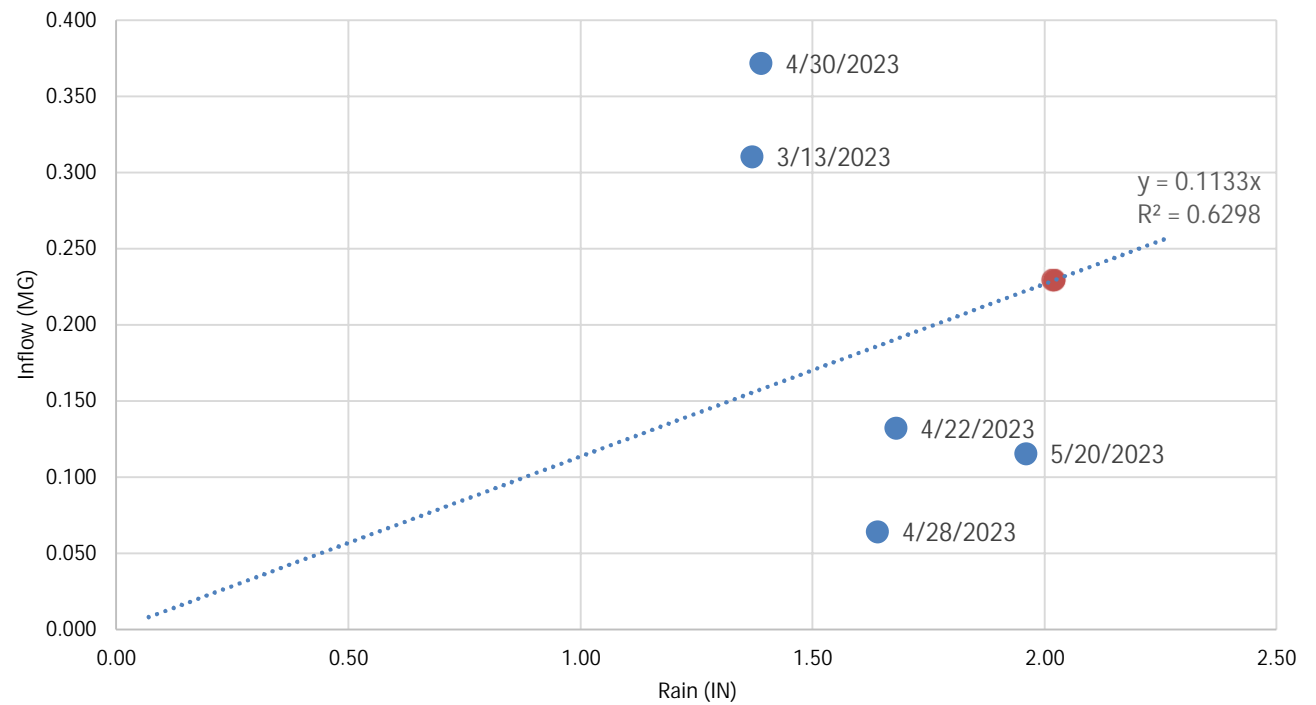


Wet Weather Analysis

Inflow Calculation

- Total inflow vs. rainfall
- 1-year, 6-hour design storm (2.02") projection
- Volume-based threshold

Inflow Volume vs. Rainfall
Sewer Sub-Area B



Wet Weather Results

Inflow for 1-Year, 6-Hour Design Storm (2.02")

Sewer Sub-Area	Net Total Inflow Volume (MG)	Net Direct Inflow Volume (MG)	Net Delayed Inflow Volume (MG)	Percent Total Inflow
A+B	0.229	0.054	0.175	26%
C+D	0.211	0.064	0.147	24%
E	0.457	0.123	0.334	51%
Total	0.897	0.241	0.656	100%

Recommendations

Infiltration

- Excessive if infiltration unit rate $\geq 4,000$ GPD/IDM

Sanitary Sewer Evaluation Survey (SSES)

- Manhole inspections
- Night flow isolations and/or micro-metering
- Closed-circuit television (CCTV) inspection

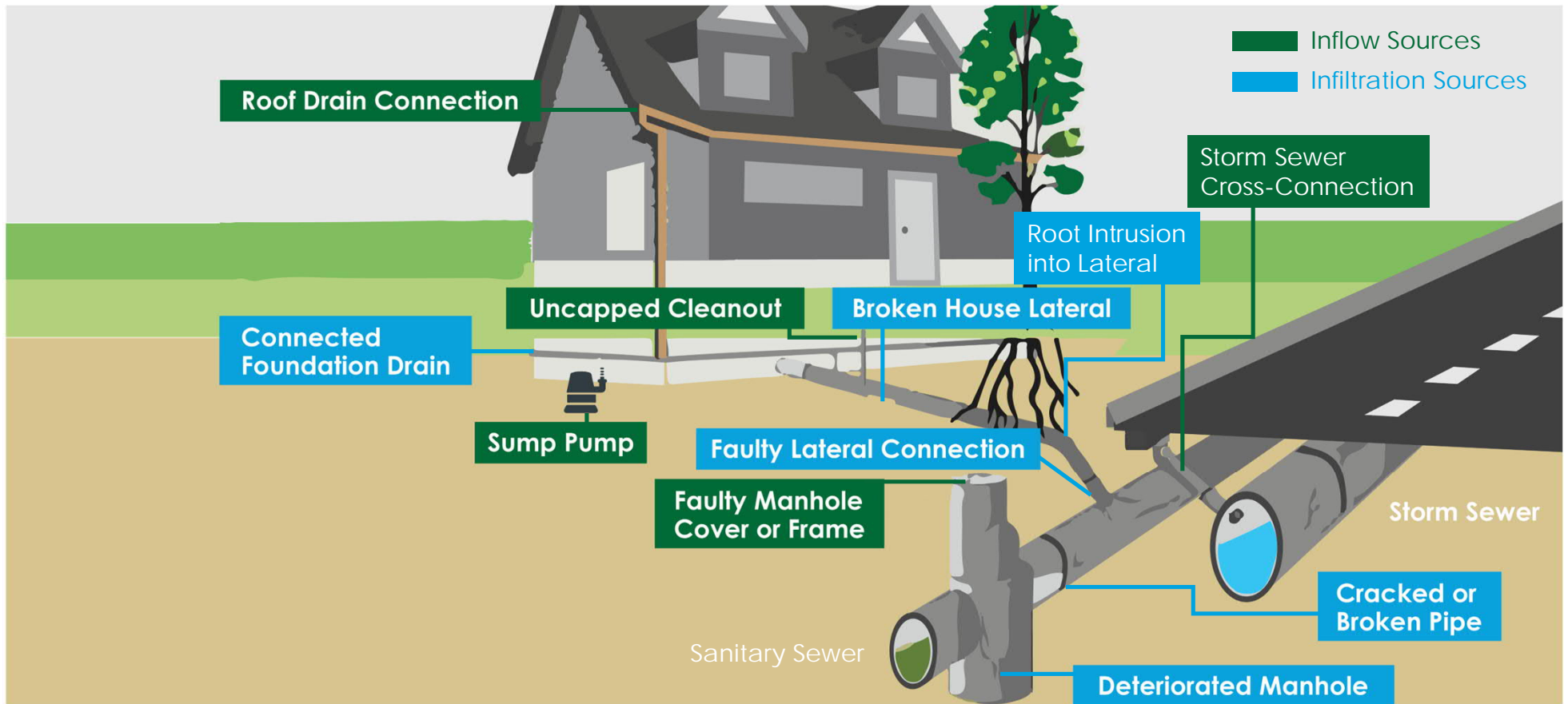
Inflow

- Excessive if sub-area contributes to large percent of total inflow volume (for 1-year, 6-hour design storm)
- All inflow should be eliminated

Sanitary Sewer Evaluation Survey (SSES)

- Manhole inspections (top portion only; focus on cover, frame, and chimney)
- Smoke testing
- Dye testing

I/I Sources Revisited



Next Steps – SSES Work

Phase	Basin	Field Work	Estimated Costs	Earliest Start
1	E	- Manhole Inspections - Smoke Testing* - Dye Testing - Hydraulic Model	\$100,000	Mid October 2023 (~10 weeks**)
2	E	- CCTV	\$115,000	November 2023 (~12 weeks**)
3	C&D and A&B	- Manhole Inspections - Smoke Testing*	\$135,000	November 2023 (~13 weeks**)
4	TBD	Design & Construction of Rehabilitation Contract		Spring 2024 (if Phase 1 & 2 completed)

* Preferred time of year for smoke testing field work is summertime (low ground water)

** If individually phased; overall timeline can be condensed if when done concurrently

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