Metropolitan Water Reclamation District of Greater Chicago

Welcome to the July Edition of the 2022 M&R Seminar Series

NOTES FOR SEMINAR ATTENDEES

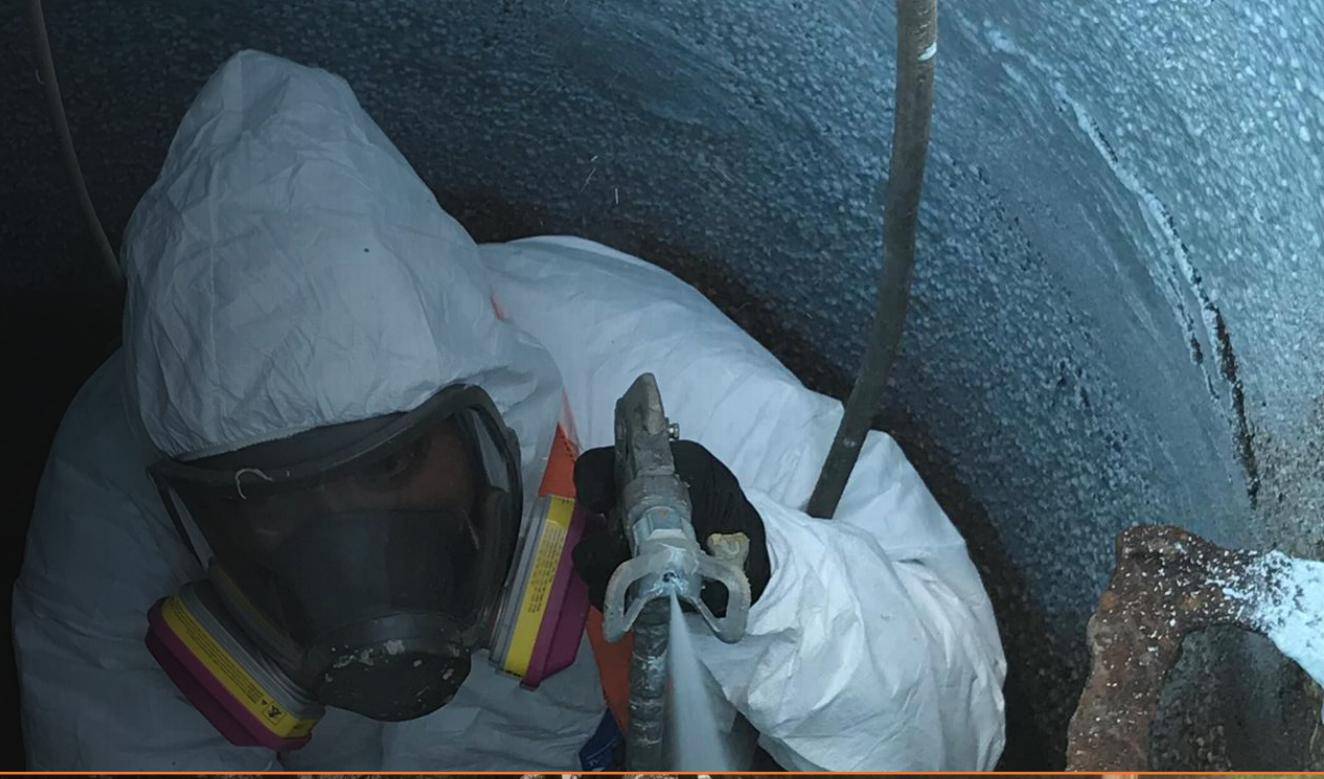
- All attendees' audio lines have been muted to minimize background noise.
- A question and answer session will follow the presentation.
- Please use the "Chat" feature to ask a question via text to "All Panelists."
- The presentation slides will be posted on the MWRD website after the seminar.
- This seminar is pending approval by the ISPE for one PDH and is pending approval by the IEPA for one TCH. Certificates will only be issued to participants who attend the entire presentation.

TONY CONN SR.
WATER DISTRIBUTION AND COLLECTION MANAGER
CITY OF NAPERVILLE

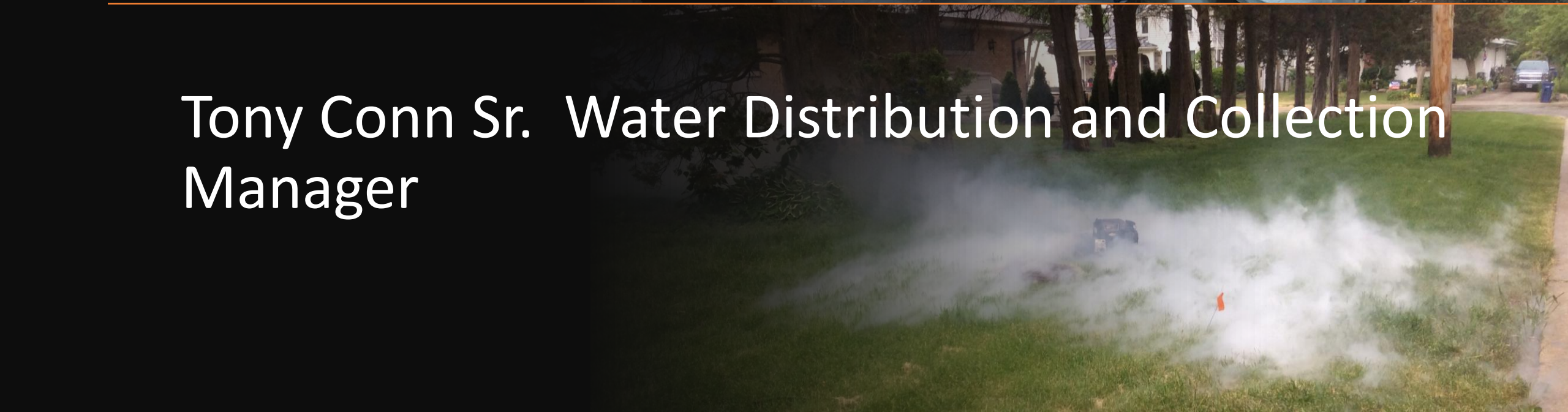
Tony Conn, Sr. has been with the City of Naperville for 30 years, serving as Water Distribution and Collection Manager since 2017. Leading a team of 47 employees, he manages the water distribution, water supply, wastewater collection & pumping, and storm water pumping sections. His educational background includes Industrial Maintenance and Electrical Automated Systems. He holds various certifications including IEPA Wastewater Collection Systems operator, IEPA Cross-Connection Control Device Inspector, IEPA Class "C" Water Operator, as well as several NASSCO certifications. He is a member of WEF, IWEA, CSWEA, NFPA, AWWA/ISAWWA, NASSCO and NASTT. He is also a member of the IWEA Golden Manhole Society and serves as an IWEA Collection System Committee Member.

Tony is an avid cyclist, including road, mountain, cyclocross and endurance. He is looking forward to soon meeting his eighth grandchild.

"Infiltration and Inflow Control at the City of Naperville"



Tony Conn Sr. Water Distribution and Collection Manager



Overview of the Naperville Collection System

WASTEWATER:	
Treatment Facility	Springbrook Water Reclamation Center
Capacity - Dry Weather Design (MGD)	26.25 million gallons/day
Capacity - Wet Weather Design (MGD)	55.13 million gallons/day
Average Daily Wastewater Flow (Calendar 2022)	17.278 million gallons/day
Average 3 Low-Flow Months (Calendar 2022)	13.929 million gallons/day
Wastewater Pump Stations (2022) Back Flow Prevention Stations (2022)	23 7
Sanitary Sewers (2022)	566 miles
Manholes (2022)	14,020
Customers - Total (2022)	43,781
Customers - Residential (2022)	40,449
Wastewater Utility Population Served: Naperville Warrenville Total	 150,126 13,158 163,284

WASTEWATER:	
Flow Monitors	46 Open Channel 13 Closed Pipe (Lift Station)
SSO Alarms	18
Ground Water Monitoring Wells	14
Rain Gauges	13
Sanitary Main Rehabilitation (CIPP)	637,000
Sanitary Lateral Rehabilitation (CIPP) Sanitary Laterals Grouted	4,636 507
Sanitary Manhole Rehabilitation (Entire) Sanitary Manhole Rehabilitation (Upper Only)	1,020 1,500 (CIPP Chimney Liners)
Manholes Replacement	75
Customer Calls: City responsibility 2021-2022	0
Customer Calls: City responsibility 2021-2022	0
Inverted Siphon Rehabilitation	5 of 8 Siphons

What is Naperville doing to combat I&I?

Since the 1990's, Naperville has committed significant resources (more than $4-5 million annually) towards the goal of reducing I&I using the techniques mentioned above. City staff take a holistic approach when planning and completing rehab projects, taking care to match the proper technique with the existing field conditions and desired outcome. Planning for rehabilitation begins with flow monitoring from I&I studies. These studies help form a general 10-year guide for rehabilitation.

Generally mainline pipes are the first to be rehabilitated, followed by manholes, and finally individual service lines. The number of assets scheduled to be rehabbed per year are prioritized and can vary based on a number of factors including asset condition and budget. Assets in the same geographic area are all rehabbed before moving on to other areas. All assets in a geographic area can be completed in as little as two years or up to several years-time. Assets that are candidates for grouting typically receive grout prior to any lining in the area.

Inflow and Infiltration Investigation Tools

- **Flow Monitoring:**
  - **Permanent**
  - **Temporary**
  - **Micro Basin**
  - **RDII Studies**
- **SCADA Data**
- **MSI Inspections**

- **Smoke Testing**
- **Dye Flooding**
- **Manhole Inspections**
- **Manhole Scanning**
- **Building Inspections**
- **GIS**

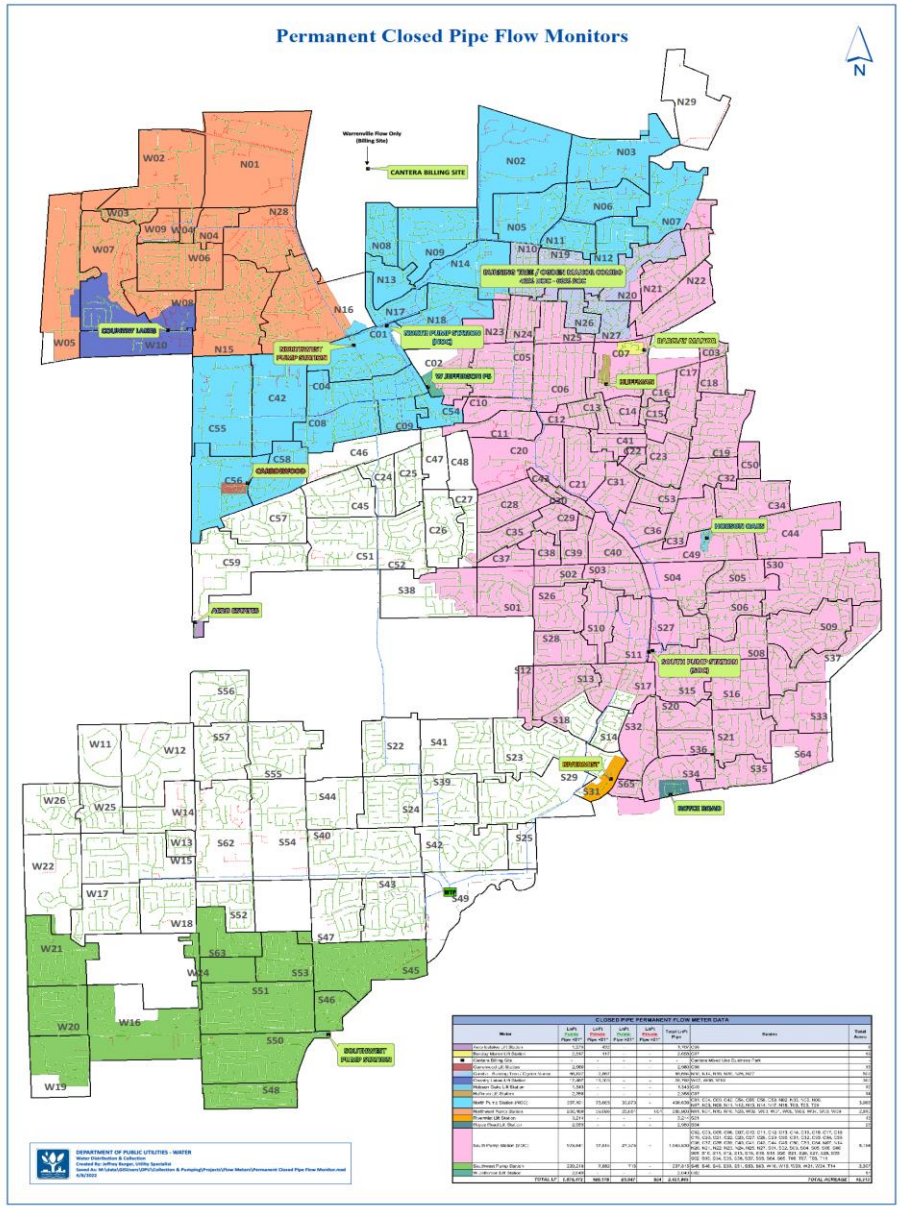
- **Saturated Ground Inspections:**
  - **Mainline CCTV**
  - **Manhole Inspections**
  - **Lateral CCTV**

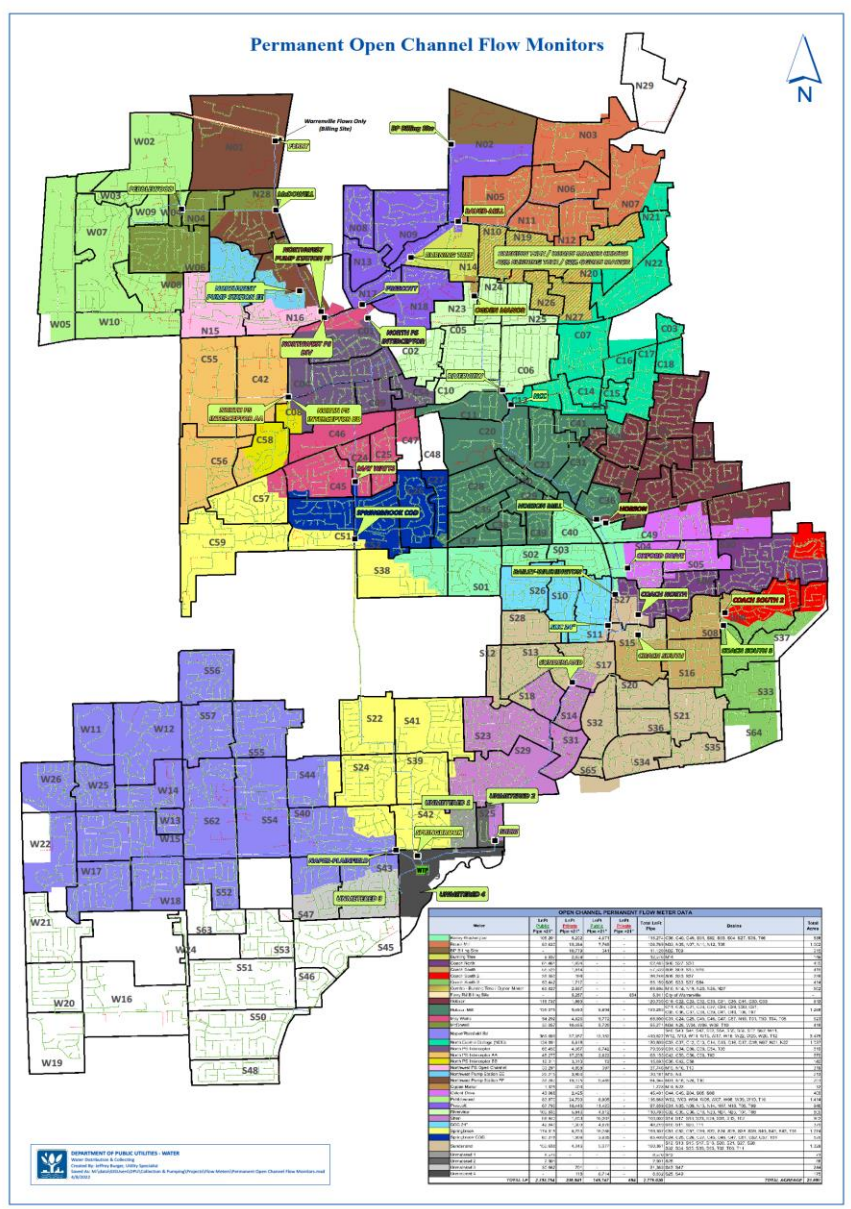
City Of Naperville Ten-Year I&I Reduction Plan

Revised 12/30/21 TC

Additional Flow Monitors	Years	Number of Meters	Status	Completion Date	Manholes	
NWPS and North PS Flow Area	2020	4	Complete	April, 2020	T04-009, T03-029, T03-028, N16-091	
Coach Dr South Flow Basin	2021	3	Complete	April, 2021	S03-001, S09-002, S09-001	
Sheri and Sunderland Flow Basins	2022	3			S17- 007, T02-035A, S29-047	
Sheri and Sunderland Flow Basins	2023	2			S29-102, C51-110	
Springbrook Interceptor	2024	2			T01-010, S24-092	
Springbrook Interceptor	2025	2			C45-025B, T01-041	
Hobson, Hobson Mill Flow Basins	2026	2			C21-001, C30-003B	
Hobson, Hobson Mill Flow Basins	2027	1			C33-001	
TBD	2028	0				
TBD	2029	0				
Micro-Flow Basin Studies	**Years**	**Number of Meters**			**Subdivisions**	
None	2020	0			None	
None	2021	0			None	
South Pump Station Phase 1	2022	7			University Heights, Misc.	
South Pump Station Phase 2	2023	7			Farmington, Misc.	
Downtown Area Re- Monitoring	2024	10			Downtown, College Area.	
South Interceptor Phase 1	2025	7			Old Farm, Misc.	
South Interceptor Phase 2	2026	7			Knoch Knolls, Misc.	
NWPS Area Re-Monitoring	2027	10			NWPS Tributary.	
Springbrook Interceptor Phase 1	2028	7			Buttonwood, Misc.	
Springbrook Interceptor Phase 2	2029	7			Springbrook Crossing, Misc.	
Dye Water Flooding	**Years**	**Footage**			**Subdivisions**	
Basin N25	2020	10,330	Started	All work moved to 2022	Old Naperville	
Basin N26	2021	9,228	In Planning	All work moved to 2022	Old Naperville	
Basin C05	2022	26,492			Downtown, College Area.	
Basin C06	2023	28,456			Downtown, College Area.	
Basin N24	2024	11,888			Old Naperville	
TBD	2025	TBD			TBD	
TBD	2026	TBD			TBD	
TBD	2027	TBD			TBD	
TBD	2028	TBD			TBD	
TBD	2029	TBD			TBD	
Smoke Testing	**Years**	**Footage**			**Subdivisions**	
None	2020	None			None	
Basins N19, N10, N11, N12	2021	147,000	Complete	August,2021	SayBrook, Naperville Heights	
Basins C28, C35 ,C37, C40, C29, c43, c30	2022	75,252			West Highlands	Added to I
Basins S08, S09, S15, S16	2023	89,637			Naper Carriage Hill, Hunters Woods	
None	2024	None			None	
None	2025	None			None	
None	2026	None			None	
Basins S04, S05, S06, S27	2027	50,252			Signal Point, Misc.	
Basins S12, S13, S14, S17, S18, S23	2028	102,406			Old Farm	
SOC area	2029	100,000			SOC area	
Manhole Inspections	**Years**	**Number of Manholes**			**Area**	
Basins C28, C43, C35	2020	138	152	November, 2020	West Highlands	
Basins C37, C38, C29, C30	2021	100	N/A	Moved to 2022	West Highlands	Added to
Basins, N01, W02 W03, W04, W05	2022	265			McDowell Tributary	
Basins, W06, W07, W08, N28	2023	388			McDowell Tributary	
Basins N15, N16	2024	376			Brookdale	
Basins C01, C04	2025	217			Brush Hill, Will-O-Way	
Basins C08, c09, C54	2026	170			Brush Hill, Will-O-Way	
Basin S04, S05, S06, S27	2027	293			Coach Drive Flow Basins	
Basins S15, S16, S37	2028	328			Coach Drive Flow Basins	
S14, S18, S23, S31	2029	290			Old Farm	
CCTV Saturated Grounds	**Years**	**Footage**				
Basins C28, C43, C35	2020	33,612	15,000	December, 2020	West Highlands	
Basins C37, C38, C29, C30	2021	22,672	N/A	Moved to 2022	West Highlands	
Basins, N01, W02 W03, W04, W05	2022	59,021			McDowell Tributary	
Basins, W06, W07, W08, N28	2023	40,000*			McDowell Tributary	

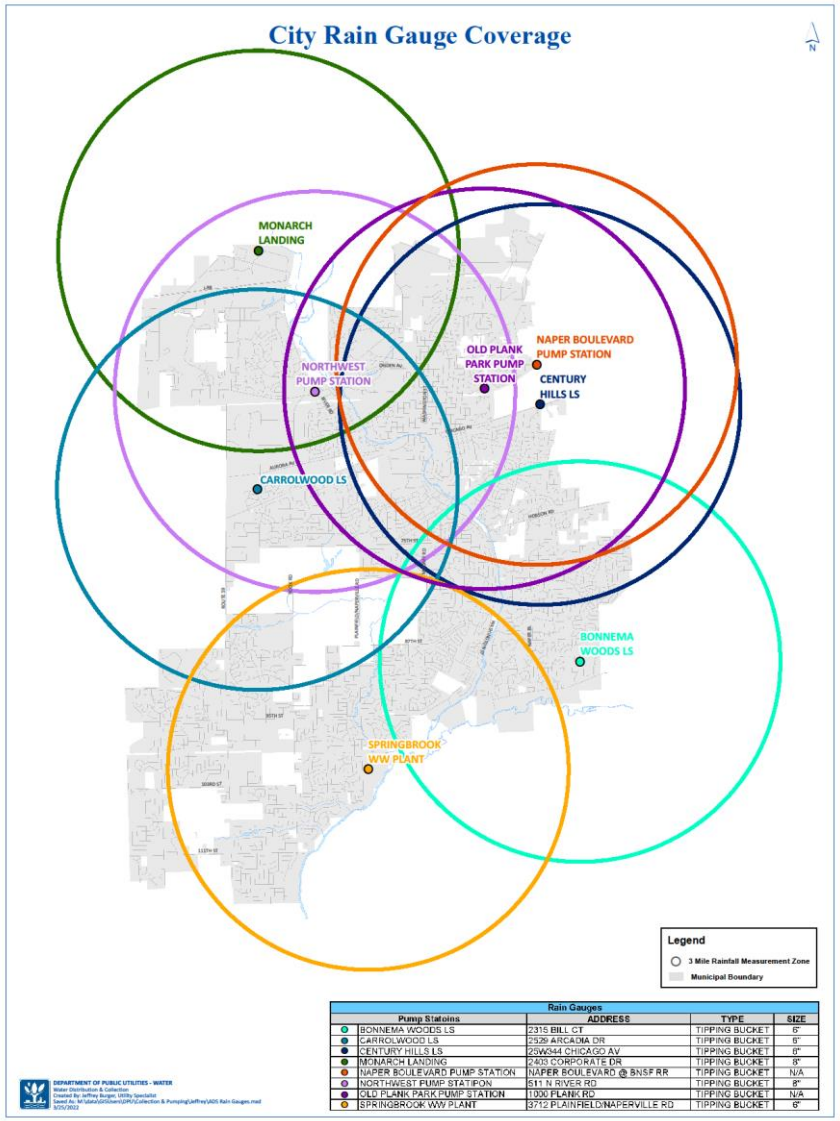
FLOW MONITORING



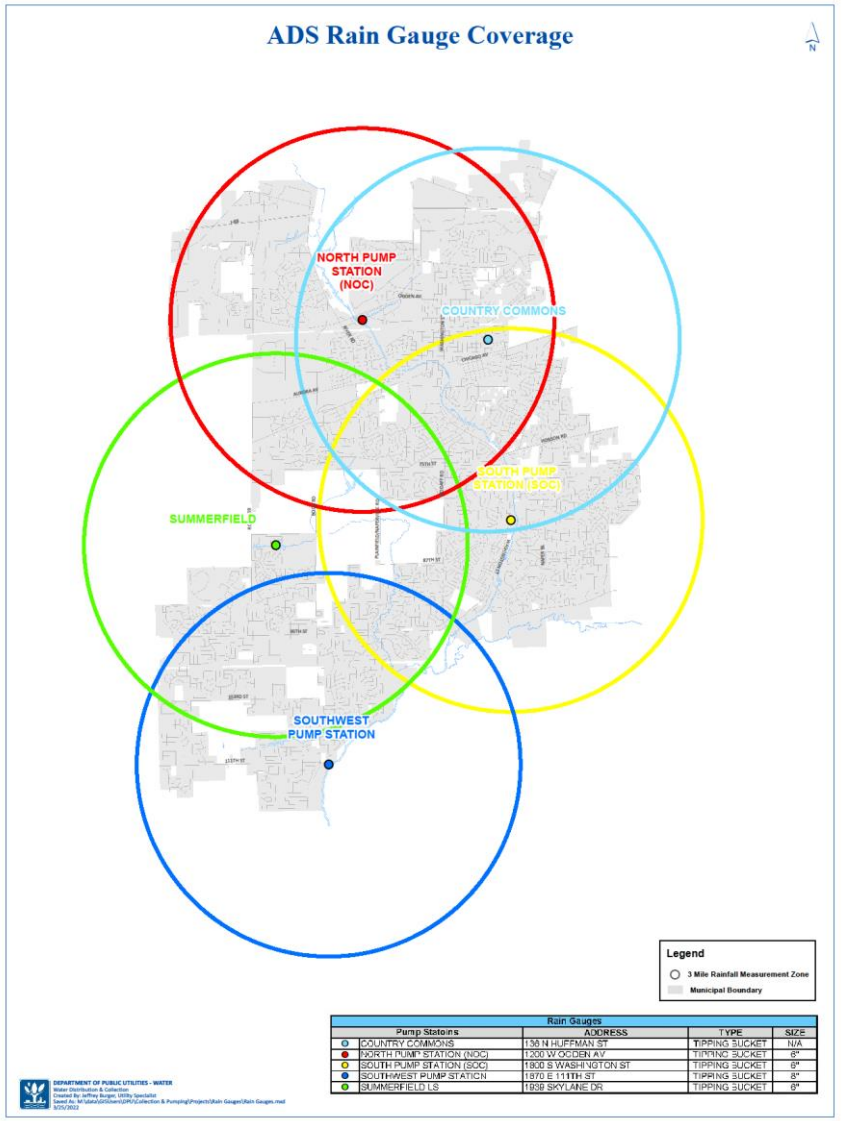


SSO ALARMING

RAIN GAUGES


City Rain Gauge Coverage
MONARCH LANDING
NORTHWEST PUMP STATION
OLD PLANK PARK PUMP STATION
NAPER BOULEVARD PUMP STATION
CENTURY HILLS LS
CARROLWOOD LS
BONNEMA WOODS LS
SPRINGBROOK WW PLANT
Legend
3 Mile Rainfall Measurement Zone
Municipal Boundary
Rain Gauges
Pump Statoins | ADDRESS | TYPE | SIZE
BONNEMA WOODS LS | 2315 BILL CT | TIPPING BUCKET | 6"
CARROLWOOD LS | 2529 ARCADIA DR | TIPPING BUCKET | 6"
CENTURY HILLS LS | 25W344 CHICAGO AV | TIPPING BUCKET | 6"
MONARCH LANDING | 2400 CORPORATE DR | TIPPING BUCKET | 8"
NAPER BOULEVARD PUMP STATION | NAPER BOULEVARD @ BNSF RR | TIPPING BUCKET | N/A
NORTHWEST PUMP STATIPON | 511 N RIVER RD | TIPPING BUCKET | 8"
OLD PLANK PARK PUMP STATION | 1000 PLANK RD | TIPPING BUCKET | N/A
SPRINGBROOK WW PLANT | 3712 PLAINFIELD/NAPERVILLE RD | TIPPING BUCKET | 6"


RAINALERT II


ADS Rain Gauge Coverage
NORTH PUMP STATION (NOC)
COUNTRY COMMONS
SOUTH PUMP STATION (SOC)
SUMMERFIELD
SOUTHWEST PUMP STATION
Legend
3 Mile Rainfall Measurement Zone
Municipal Boundary
Rain Gauges
Pump Statoins | ADDRESS | TYPE | SIZE
COUNTRY COMMONS | 136 N HUFFMAN ST | TIPPING BUCKET | N/A
NORTH PUMP STATION (NOC) | 1200 W ODDEN AV | TIPPING BUCKET | 8"
SOUTH PUMP STATION (SOC) | 1800 S WASHINGTON ST | TIPPING BUCKET | 8"
SOUTHWEST PUMP STATION | 1870 E 111TH ST | TIPPING BUCKET | 8"
SUMMERFIELD LS | 1939 SKYLANE DR | TIPPING BUCKET | 8"

Rain Data from SCADA

Rain Data is Collected in:

- 5-Minute
- Hourly
- Daily

Naperville Pump Stations Daily Rain

Region:

Serial #:

Territory: Naperville

Date	Springbrook Rain (In.)	SW Pump Rain (In.)	NW Pump Rain (In.)	Monarch Landing Rain (In.)	Century Hills Rain (In.)	Carrolwood Rain (In.)	Bonnema Woods Rain (In.)	Old Plank Road Rain (In.)	Naper Boulevard Rain (In.)
1	0.035	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
2	0.004	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.799	4.610	0.370	0.240	0.230	0.530	0.400	0.140	0.170
5	0.063	0.170	0.080	0.110	0.070	0.020	0.210	0.060	0.200
6	0.469	0.070	0.390	0.360	0.330	0.390	0.510	0.160	0.350
7	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000
8	0.189	0.000	0.050	0.040	0.010	0.060	0.310	0.020	0.020
9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11	0.004	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	1.185	0.480	0.870	0.920	1.030	0.940	0.970	0.340	0.680
16	0.047	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.050
17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030
19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23	2.512	0.280	1.230	1.270	1.010	1.660	1.700	0.140	0.550
24	0.673	0.190	0.820	0.980	0.910	0.670	0.760	0.020	0.070
25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030
26									
27									
28									
29									
30									
31									
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Average	0.239	0.236	0.152	0.158	0.144	0.171	0.195	0.035	0.088
Maximum	2.512	4.610	1.230	1.270	1.030	1.660	1.700	0.340	0.680
Total	5.980	5.900	3.810	3.950	3.590	4.280	4.880	0.880	2.190

SCADA DATA

Lift Station Amperage Report

July 2022

Territory: Naperville

Huffman Lift Station

DateTime	Pump 1 T1 Avg.	Pump 1 T1 Max.	Pump 1 Runtime	Pump 1 Starts	Pump 2 T1 Avg.	Pump 2 T1 Max.	Pump 2 Runtime	Pump 2 Starts	Wetwell Level Min.	Wetwell Level Avg.	Wetwell Level Max.
1	3.703	7.400	0.7	46	7.435	7.500	0.5	45	1.990	2.692	3.500
2	3.725	7.400	0.6	46	7.440	7.500	0.5	46	2.030	2.730	3.470
3	3.734	7.600	0.6	46	7.424	7.800	0.5	47	1.940	2.738	3.520
4	3.726	7.300	0.6	49	7.428	7.600	0.5	48	1.990	2.750	3.500
5	3.749	7.500	0.7	48	7.403	7.500	0.5	48	2.050	2.761	3.470
6	3.659	7.300	0.6	49	7.410	7.600	0.6	50	1.950	2.757	3.520
7	3.707	7.300	0.6	45	7.396	7.500	0.5	44	1.930	2.739	3.500
8	3.702	7.400	0.6	44	7.415	7.700	0.4	44	1.970	2.685	3.490
9	3.685	7.300	0.6	42	7.401	7.500	0.5	43	1.980	2.673	3.430
10	3.691	7.300	0.5	43	7.427	7.700	0.5	42	1.950	2.706	3.470
11	3.691	7.300	0.6	41	7.407	7.600	0.4	42	1.990	2.742	3.530
12	3.715	7.300	0.5	39	7.438	8.100	0.4	36	2.020	2.747	3.500
13	3.618	7.300	0.4	32	7.620	7.900	0.3	30	2.040	2.824	3.500
14	3.697	7.200	0.1	33	7.894	8.600	0.0	32	2.000	2.684	3.470
15	3.712	7.300	0.5	36	7.788	8.200	0.4	37	2.040	2.755	3.520
16	3.688	7.300	0.5	37	7.398	7.500	0.4	37	1.950	2.726	3.460
17	3.665	7.300	0.5	34	7.401	7.600	0.4	34	2.000	2.660	3.400
18	3.719	7.300	0.5	44	7.427	7.900	0.4	43	2.010	2.680	3.380
19	3.693	7.200	0.5	31	7.408	7.600	0.4	32	1.930	2.741	3.510
20	3.477	7.200	0.3	31	7.415	7.800	0.2	24	2.090	2.830	3.500
21	3.670	7.200	0.4	26	7.402	7.900	0.3	27	2.120	2.785	3.480
22	3.676	7.100	0.3	26	7.428	7.800	0.3	25	1.940	2.704	3.490
23	3.767	7.300	1.1	75	7.392	7.700	0.9	75	1.960	2.737	3.470
24	3.953	7.300	2.4	151	7.394	7.500	2.2	151	2.030	2.862	3.670
25	3.834	7.300	1.3	96	7.382	7.500	1.2	96	2.110	2.758	3.500
26											
27											
28											
29											
30											
31											
32											

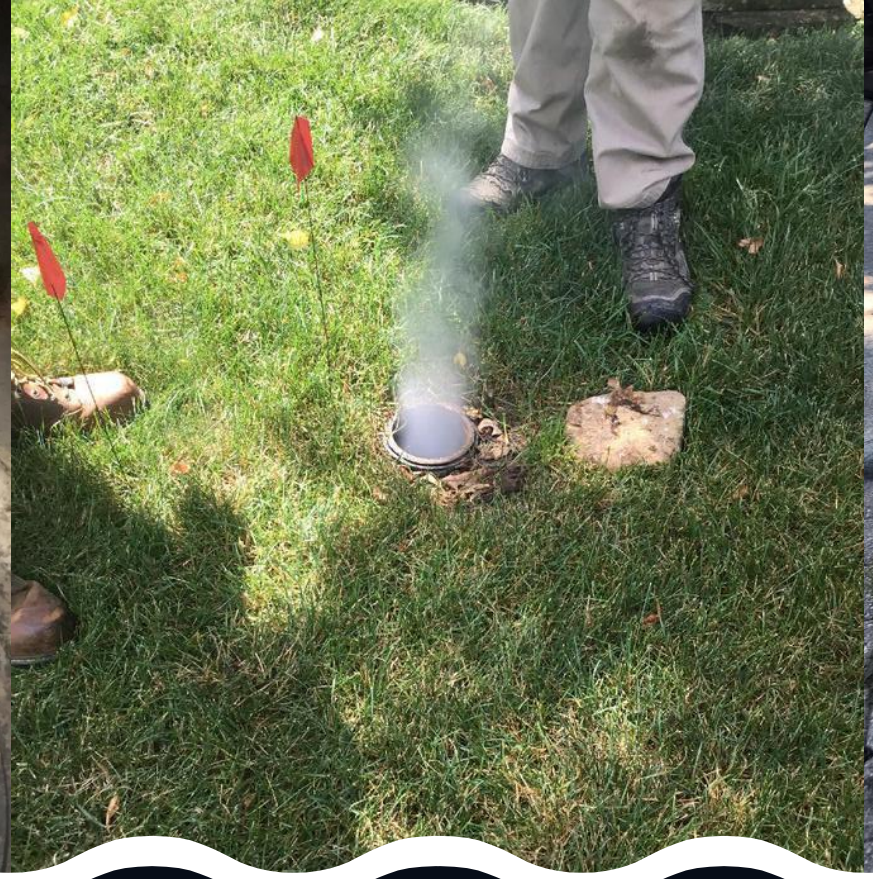
Pump Station Flow, Ground Water & Rain

Site: Huffman Pump Station

970 F.M. Version 1.19 Region:

Serial #: Site ID: Territory: Naperville

Date	Discharge Flow (MG)	Rainfall (In.)	Wetwell Level Min.	Wetwell Level Avg.	Wetwell Level Max.
1	0.219	0.000	2.0	2.7	3.5
2	0.219	0.000	2.0	2.7	3.5
3	0.224	0.000	1.9	2.7	3.5
4	0.235	0.530	2.0	2.7	3.5
5	0.232	0.020	2.0	2.8	3.5
6	0.234	0.390	2.0	2.8	3.5
7	0.212	0.000	1.9	2.7	3.5
8	0.211	0.060	2.0	2.7	3.5
9	0.207	0.000	2.0	2.7	3.4
10	0.206	0.000	2.0	2.7	3.5
11	0.201	0.000	2.0	2.7	3.5
12	0.179	0.000	2.0	2.7	3.5
13	0.141	0.000	2.0	2.8	3.5
14	0.169	0.000	2.0	2.7	3.5
15	0.179	0.940	2.0	2.8	3.5
16	0.178	0.010	2.0	2.7	3.5
17	0.162	0.000	2.0	2.7	3.4
18	0.212	0.000	2.0	2.7	3.4
19	0.149	0.000	1.9	2.7	3.5
20	0.121	0.000	2.1	2.8	3.5
21	0.123	0.000	2.1	2.8	3.5
22	0.119	0.000	1.9	2.7	3.5
23	0.387	1.660	2.0	2.7	3.5
24	0.962	0.670	2.0	2.9	3.7
25	0.508	0.000	2.1	2.8	3.5
26					
27					
28					
29					
30					
31					
Minimum	0.119	0.000	1.9		
Average	0.240	0.171	2.7		
Maximum	0.962	1.660	3.7		
Total	5.989	4.280			


Smoke Testing

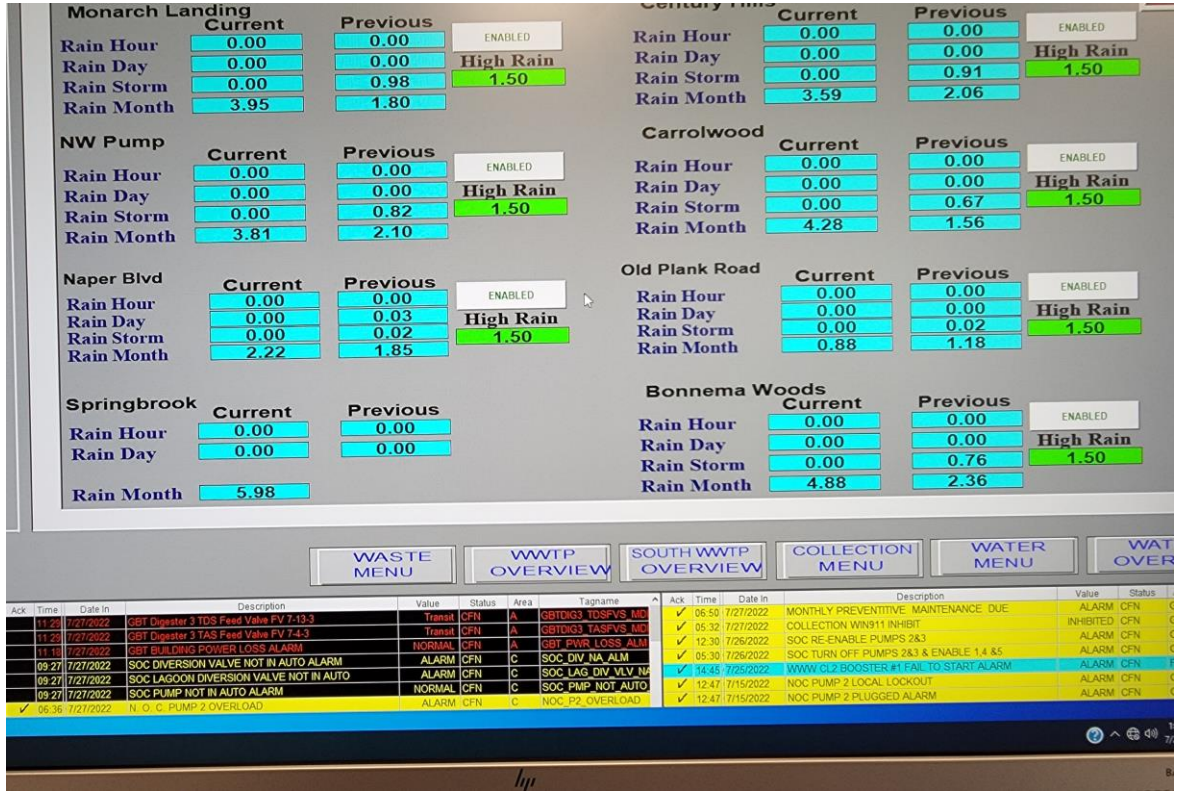
- Smoke testing in three-year intervals
- Defects repaired over three-years
- 2021 Smoke Testing Project: 146,657 LF with 586 defects.
- 2022 Smoke Testing Project: 85,000 LF of 153,821 LF scheduled.

Storm Water Dye Flooding

Manhole Inspections

- Visual Inspection During Sewer Cleaning
- 3D Manhole Scanning
- Basin Manhole Inspections
- Saturated Ground Inspection

- Total of 1854 Manhole inspected in 2021



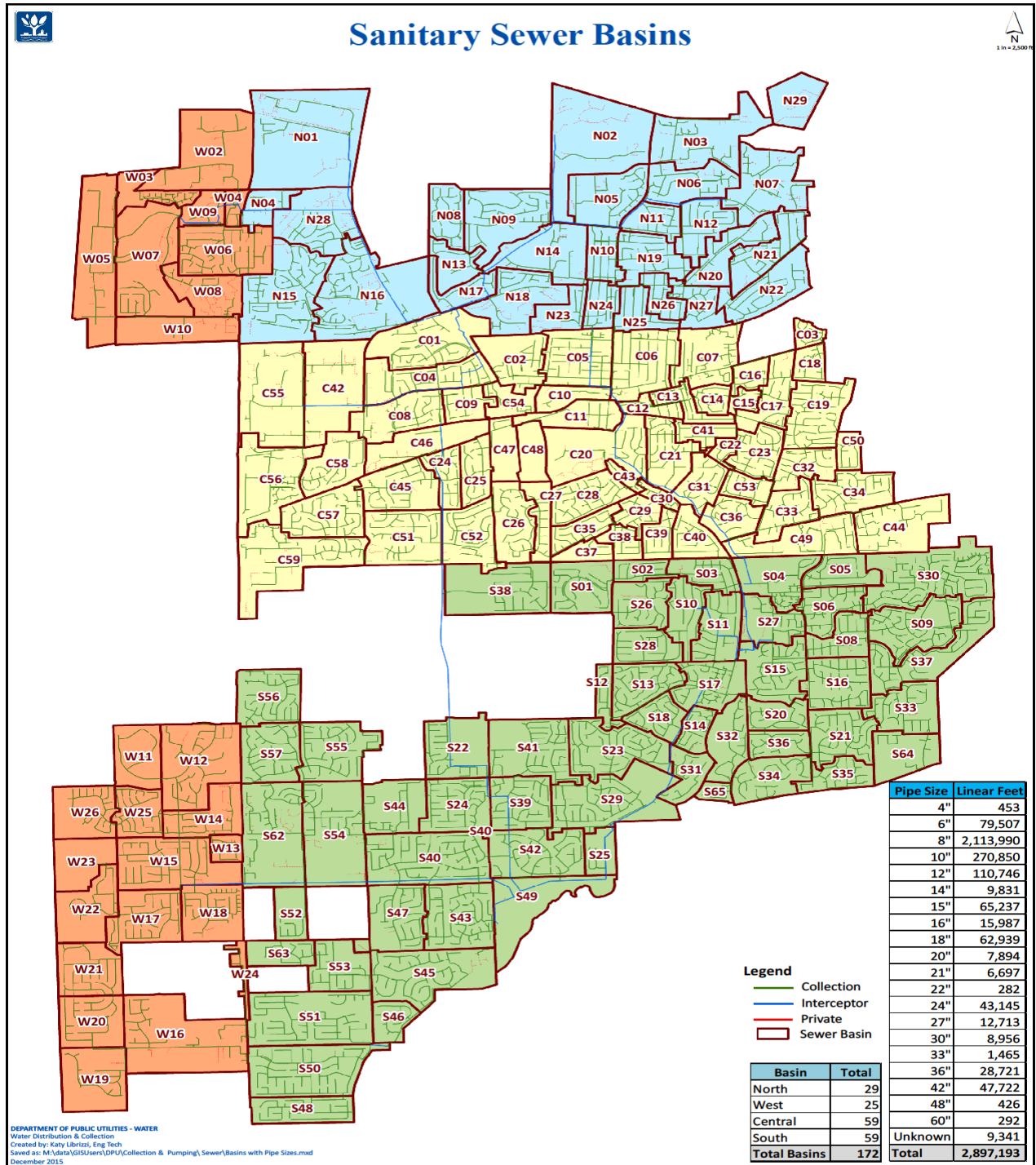
Saturated Ground Inspections:

- **Rain Gauge Data**
- **Mainline CCTV Inspections**
- **Manhole Inspections**

What's Working in Naperville and Why it Continues

Entire Flow Basin

- Mainline Lining
- Lateral Lining
- Manhole Rehabilitation
- Mainline Grouting
- Lateral Grouting



Basin	Total
North	29
West	25
Central	59
South	59
Total Basins	172

Pipe Size	Linear Feet
4"	453
6"	79,507
8"	2,113,990
10"	270,850
12"	110,746
14"	9,831
15"	65,237
16"	15,987
18"	62,939
20"	7,894
21"	6,697
22"	282
24"	43,145
27"	12,713
30"	8,956
33"	1,465
36"	28,721
42"	47,722
48"	426
60"	292
Unknown	9,341
Total	2,897,193

Water Migration

Using just one method of Sanitary Sewer Rehabilitation doesn’t eliminate Infiltration and Inflow.

Water moves to the next defective area.

Manhole Rehabilitation

Before

After

What's Working?

- Any new manhole rehabilitation product must go through two freeze/thaw cycles with no defects to be considered for a Naperville “Manhole Rehabilitation Project”.
- Currently only three products are approved for the “Manhole Rehabilitation Program”.
- 3-Year Warranty for all rehabbed manholes.

Raven 405
250 Mils

SpecrtaShield

Manhole Rehabilitation

Existing Brick Manhole

Cementitious Products
(¾”-1” Thick)

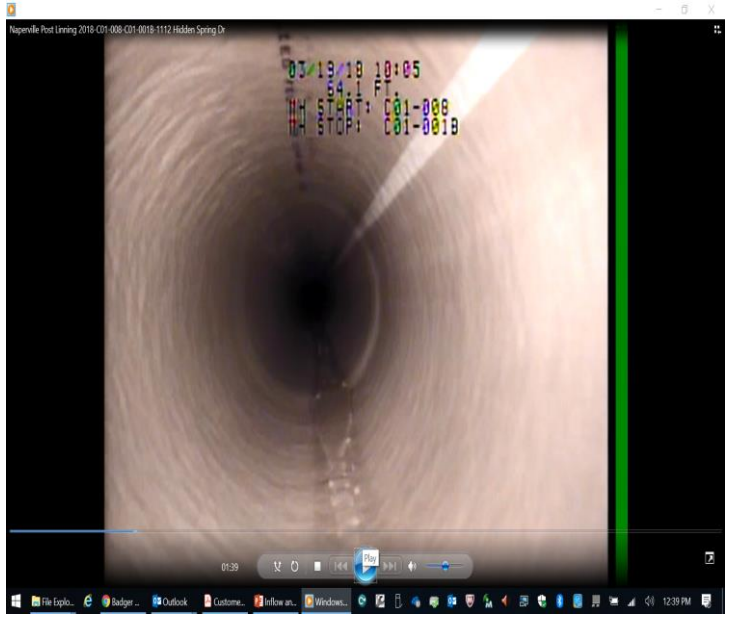
Wastewater Epoxies
(250 Mil)

Main Line Lining

Before CIPP Lining

CIPP Lining

After CIPP Lining



- *Cured-In-Place-Pipe* (CIPP) lining is primarily performed on sanitary sewer pipe constructed of Clay, ACP or Truss.
- The minimum allowable thickness for the finished product shall be 6 mm (Small diameter CIPP 6”-23”).

Lateral Lining

Locate Service Lateral

Install Cleanout/Vac-A-Tee

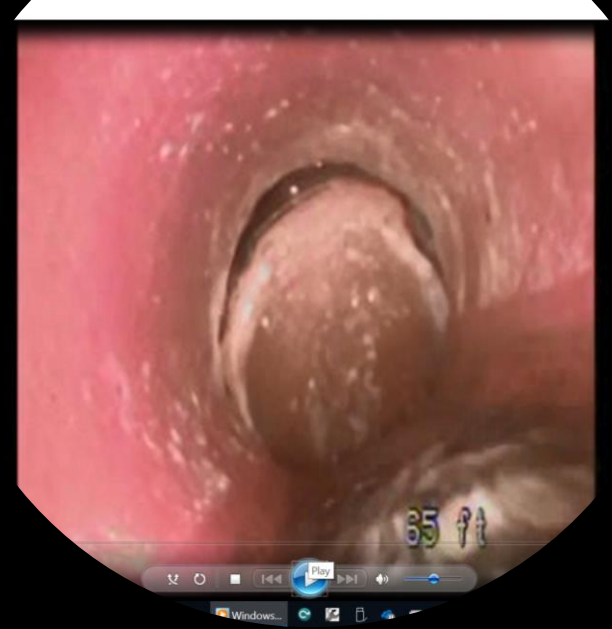
Clean Service Lateral

Install LMK Tee Liner

Shorty

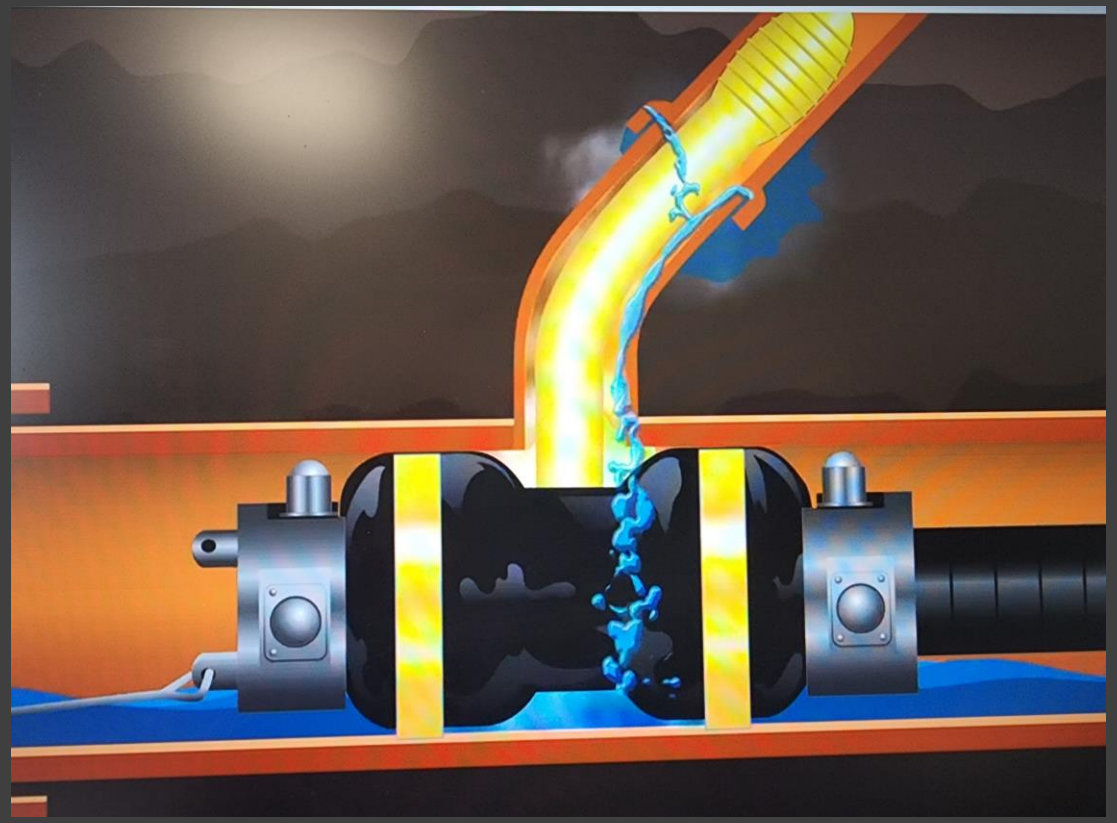
Stubby

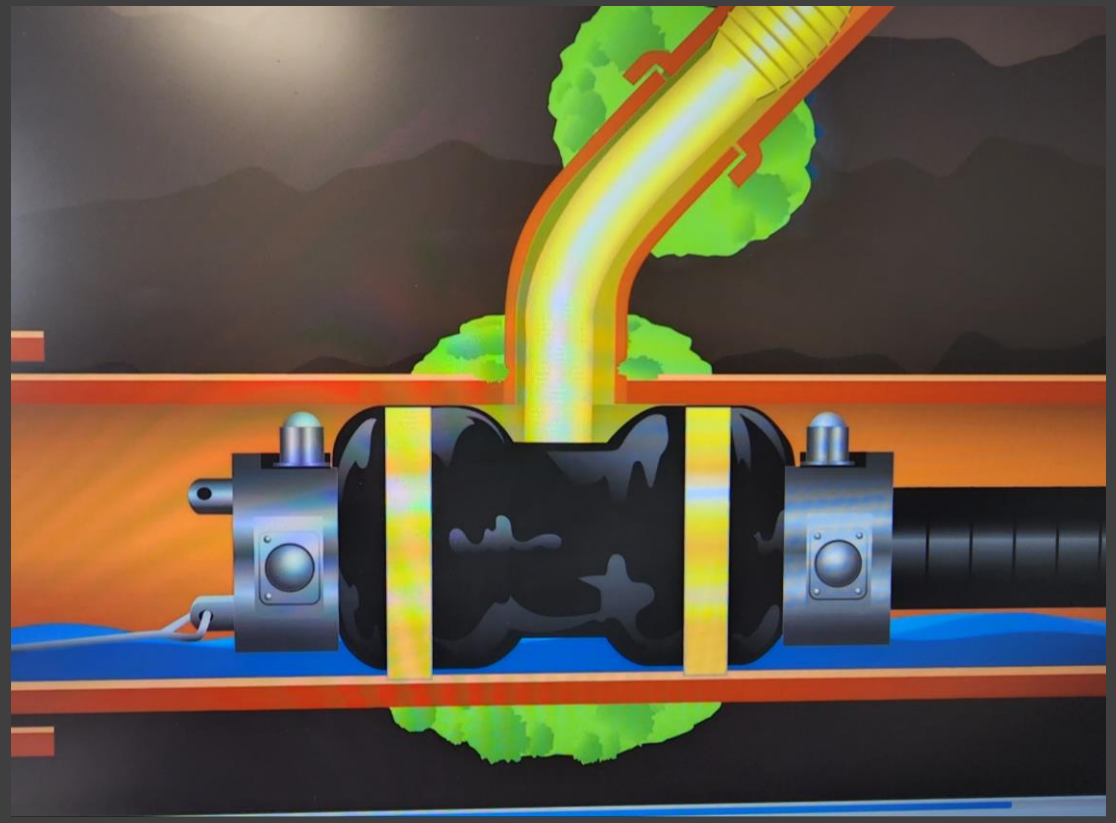
Full length liner



Lateral Lining CIPP

Lateral Lining CIPP



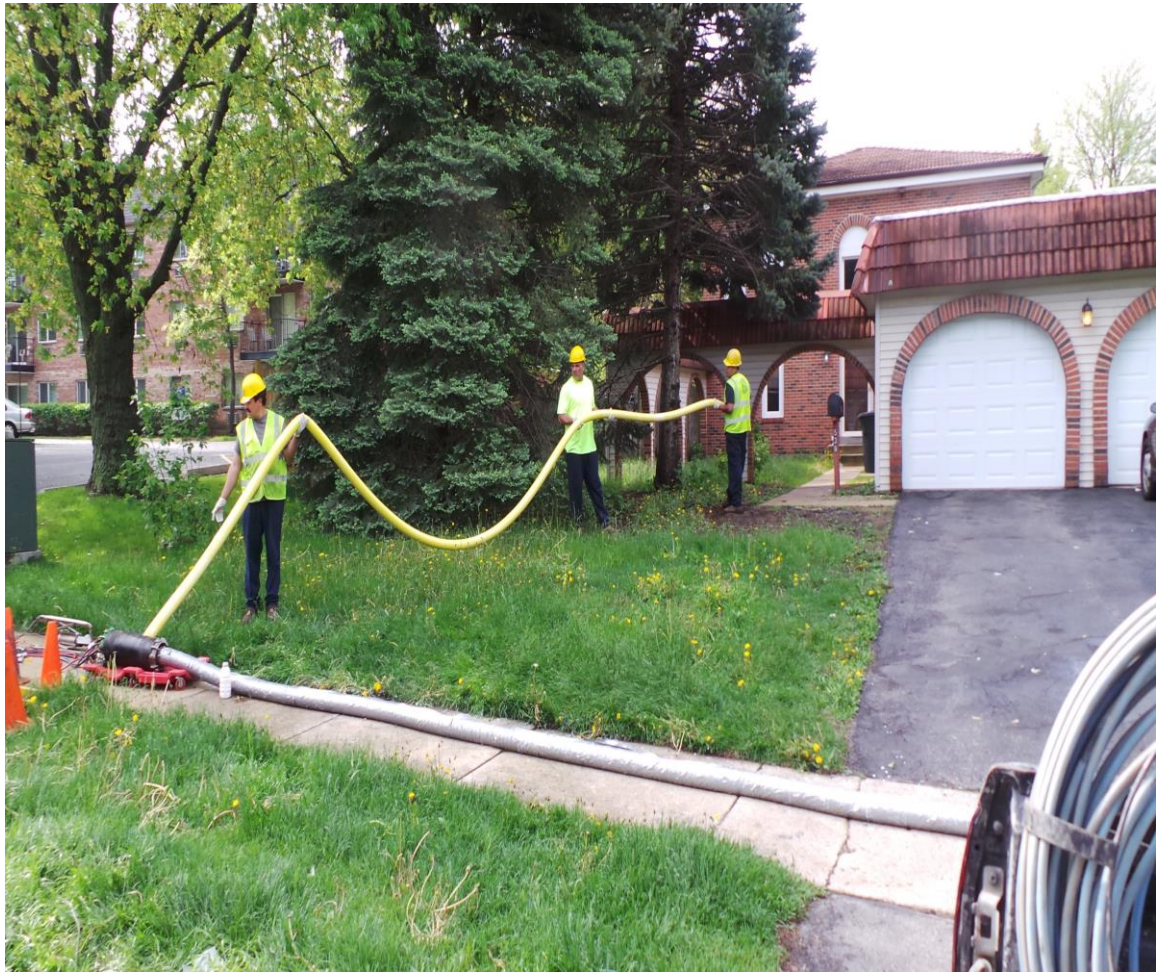


Mainline Lateral Grouting

Lateral Grouting

<u>Lateral Grouting Process</u>

- Locate Service Lateral
- Install Outside Cleanout
- Clean Lateral
- Grout Mainline Connection with Mainline Lateral Packer
- Grout Lateral from Cleanout to *Foundation* with a Push Packer
- Grout Lateral from Cleanout to *Main* with a Push Packer
- Warranty Testing



Manhole Rehabilitation Inspections

- Manhole Cleaning and Preparation Inspection
- Equipment Inspection
- Grouting
- Wet Film Thickness Inspections
- Visual Inspection
- Spark Testing
- Adhesion Testing

NAPERVILLE – DPU-WATER

Date:
WO #

Manhole Rehabilitation Inspection Form

Bid # 22-010 | Contract # 2180 | Location _____

Address _____ | Contractor SpectraTech | Applicator _____

Weather _____ | Temp _____

Manhole #_____ | Manhole Diameter _____ | Manhole Depth _____

Substrate Block, Brick, Concrete, Renew	Preparations Pass	Preparations Fail	Flow Control YES	Flow Control NO	Thickness Measurement 250 MILS	Thickness Measurement 500MILS	Visual Pass	Visual Fail	Adhesions Pass	Adhesions Fail	Spark Pass	Spark Fail

Adhesion tester manufacture _____

Adhesion tester Recommended PSI _____

Adhesion test Date of Correction _____

Spark test manufacture ____ABQ Industrial_____

Spark test recommended voltage ___9 – 10 vK_____

Number of spark test defects _____

Spark test defects date of correction _____

Reviewed Performance work statement (PWS) YES NO

IF NO WHY? _____

_____

COMMENTS: _____

_____

Manhole Rehabilitation Inspections.

Wet File Thickness Test

a. The minimum installed thickness of manhole coatings shall be:
   i. 250 mils (1/4”) for Raven 405
   ii. 250 mils (1/4”) for Spraywall

a. For Raven and Spraywall, City of Naperville staff shall test coating thickness during the “wet” phase of installation to verify compliance with minimum thickness requirements. The Contractor shall schedule all work so as to enable timely testing by City staff.

SPARK TEST (HOLIDAY DETECTION)

- Every manhole in this bid specifications is to be Spark tested.
- Every Spark Test is to be witnessed by a City Representative.
- Spark testing refer to ATSM D-4787 and NACE SP0188-2006
- Testing Procedures and Voltage Requirements shall be done as per Manufacturer recommendations.
- All defects are to be clearly marked and the count of defects per manhole shall be given to the City Representative.
- All defects are to be repaired per Manufacturer recommendations.
- 10% of repaired manholes are to be Re-Spark tested at no additional charge to the City of Naperville.
- City Representative will select the 10% of the manholes to be retested.

ADHESION (PULL-OFF) TEST

- An Adhesion test shall be done to 10% of the manholes in this bid specification.
- City Representative will select the 10% of the manholes to be retested.
- Three Adhesion Tests will be done on each manhole. Bench, Cone, Barrel sections or areas selected by the City Representative.
- Testing Procedures shall be done as per Manufacturer recommendations.
- All areas tested are to be repaired per Manufacturer recommendations. This cost shall be considered incidental and not charged to the City of Naperville.
- If 50% of the 10% tested fail, an additional 20% of the manholes in this bid specification shall be tested. This cost shall be considered incidental and not charged to the City of Naperville.

Main Line CIPP Inspections

- Wet-Out Facility Visit
- Traffic Control
- Site Inspection
- By-Pass Pumping
- Visual Liner Inspection
- Curing Reports
- Curing Temperatures
- Samples
- Video Inspections of Cured Liner Before Service Reinstatement
- Service Lateral Reinstatement

Main Line CIPP Inspections

Main Line

Lateral☐

City of Naperville Water Utilities
CIPP Inspection Form

Type of CIPP Installation Water Cure CIPP☐ Stream Cure CIPP ☐ UV GR CIPP☐

Date	Main Line Set	Contractor	Work Order #	
1.	Site condition (Before work)	Pass☐	Fail☐	
2.	Traffic Control	Pass☐	Fail☐	N/A☐
3.	By-Pass Pumping	Pass☐	Fail☐	N/A☐
4.	Property Owner Notification	Yes☐	No☐	N/A☐

CIPP Inspection		Address	
1.	Preinstallation Inspection	Pass☐	Fail☐
2.	Visual Liner Inspection (Before Install)	Pass☐	Fail☐
3.	Received a copy of Wet-Out Report	Yes☐	No☐
4.	Reviewed Wet-Out Report	Pass☐	Fail☐
5.	Witness End Seal Installation	Yes☐	No☐
6.	Termination Points Sealed	Yes☐	No☐
7.	Leaking Between Host Pipe and Liner	Yes☐	No☐

CIPP Installation Inspection — **Foreman** — **Operator**

MH to MH #	Pipe Size (in)	Pipe Length (ft)	Weather	Temp	Curing Log	# of SC	Sample Taken
Water Heater/Stream Pressure (psi)	Tube Pressure (psi)	Tube Temp (F)	Thermo #1 Temp (F)	Thermo #2 Temp (F)			

Sample

1.	Sample Taken by Contractor	Yes☐	No☐
2.	Sample Witnessed and Approved	Yes☐	No☐

UV GR CIPP Inspection — **Foreman** — **Operator**

MH to MH #	Pipe Size (in)	Pipe Length (ft)	Weather	Temp	Curing Log	# of SC	Sample Taken
Curing speed	Light source working & wattage	Inner air pressure	Curing temperatures				

Chemical Grouting — **Main** — **Host Pipe/Liner**

Manhole #	Grout Type	Manufacturer	# of tubes	Sealed		

Main Liner

Lateral☐

City of Naperville Water Utilities
CIPP Inspection Form

MH to MH #	Grout Type	Manufacturer	# Joints failed	# of Gallons Pumped	Sealed		

Comments:-

Grouting Inspections

- Equipment Inspection
- Cup Test
- Barrell Test
- Air Testing
- Grouting Process
- Finished Product
- 11-Month Warranty test

Grouting Inspections

- Pre-Cleaning
- Set-Up
- Service Lateral Connection
- Cleanout to Main
- Cleanout to Foundation

City of Naperville Department of Public Utilities - Water

Grouting of Sanitary Sewer Service Connections and Service Laterals

Cress Creek Phase 8

22-017

Cleanout to Foundation Test & Seal Report

Service Lateral Address:	
Pipe Diameter:	
Distance from cleanout to building foundation:	
Distance between pipe joints:	
Numer of joints tested:	
Test pressure :	
Duration of test:	
Number of joints passing:	
Numer of joints failing:	
Number of joints grouted:	
Gallons of grout used after initial test:	
Numer of joints re-tested after grouting:	
Number of joints failing re-test:	
Number of joints grouted after re-test:	
Operator Name:	
Date:	
Time started:	
Time ended:	
Operator Comments:	

City of Naperville Department of Public Utilities - Water

Grouting of Sanitary Sewer Service Connections and Service Laterals

Cress Creek Phase 8

22-017

Cleanout to Main Test & Seal Report

Service Lateral Address:	
Pipe Diameter:	
Distance from cleanout to main:	
Distance between pipe joints:	
Numer of joints tested:	
Test pressure :	
Duration of test:	
Number of joints passing:	
Numer of joints failing:	
Number of joints grouted:	
Gallons of grout used after initial test:	
Numer of joints re-tested after grouting:	
Number of joints failing re-test:	
Number of joints grouted after re-test:	
Operator Name:	
Date:	
Time started:	
Time ended:	
Operator Comments:	

Lateral Lining Inspections

City of Naperville Water Utilities
Lateral CIPP Inspection Form

Type of CIPP Installation Water Cure CIPP☐ Stream Cure CIPP☒ UV GR CIPP☐

Date *5/4/2022* **Inspector** *Emily E.* **Contractor** *PPI* **Work Order #** *232312*

1. Site condition (Before work)	Pass☒	Fail☐	
2. Traffic Control	Pass☒	Fail☐	N/A☐
3. By-Pass Pumping	Pass☐	Fail☐	N/A☒
4. Property Owner Notification	Yes☒	No☐	N/A☐

CIPP Inspection **Address** *209 N Julian*

1. Preinstallation Inspection	Pass ☒	Fail☐
2. Visual Liner Inspection (Before Install)	Pass☒	Fail☐
3. Witness End Seal Installation	Yes☒	No☐
4. Termination Points Sealed	Yes☒	No☐
5. Leaking Between Host Pipe and Liner	Yes☐	No☒

CIPP Installation Inspection **Foreman** *Jeremy O.* **Operator** *Dylan*

Upstrm MH	Dwnstrm MH	Main Size	Liner Dimensions	Weather	Temp (F)	Curing Log (y/n)
C07-020	*C07-019*	*8"*	*8" x 6" x 30' T*	*Dry*	*45 °*	*yes*
Resin Impregnate Time	**Resin Temp (F)**	**Steam Temp. (F)**	**Water Heater/Stream Pressure (psi)**	**Cook Start**	**Cook Finish**	**Cool Down Complete**
9:07 am	*30 °*	*270°*	*6-7*	*10:00 am*	*10:30 am*	*10:52 am*

Comments:

COMMUNICATIONS

Public

- Letters sent to property owners in all affected areas
- Sign are posted in affect areas
- Projects are posted on City's Website
- HOA are notified of work
- A City representative talks to each homeowner

Management/Council

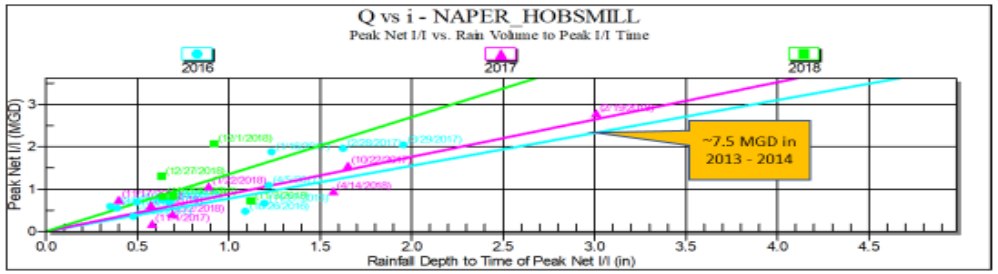

City of Naperville
DPU-Water
Cress Creek
Service Line Grouting
Bid #21-019 (Michels)
LEGEND
Grouting
Grout Entire (37)
Mainline Grouted (20)
Grouted Entire (21)
Mainline Grout Only (7)
Manhole
Collection
Drop Manhole
Lined Thru
Gravity Main
Collection
Lined Main
Low Pressure Sets
Lateral Lines
Service Line
Service Line Grouted
Cleanout
Cleanout
Parcel Boundary
Department of Public Utilities - Water
Collection & Pumping
Roderick Polk, Utility Specialist
Date Printed: 7/9/2021
ERB FARM CT
WILLIAM PENN DR
ERB FARM LN
BOB-O-LINK DR
BAUER RD
DRUID HILLS CT
BRIERGATE DR
CALCUTTA LN
CHERRY HILLS LN
LINDRICK CT
ROYAL ST GEORGE DR
N09
N13

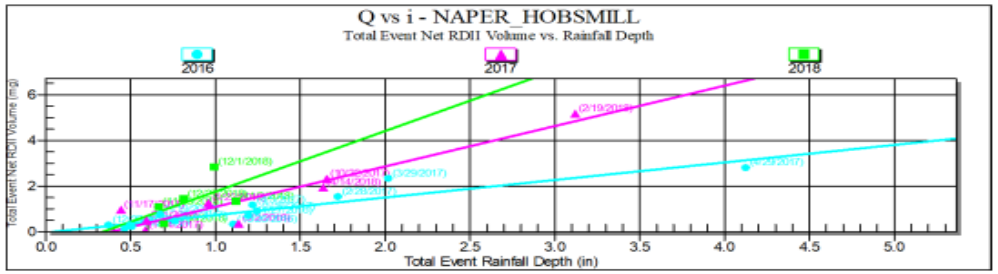
What's Working in Naperville and Why

Area	Estimated I&I from Main Line	Estimated I&I from Lateral	Estimated I&I from Manhole	2013 Peak I&I	2017 Peak I&I		
Burning Tree	20%	70%	10%	1.3 MGD	.06 MGD	53.8% Reduction	
Hobson Mill	25%	65%	10%	7 MGD	2.3 MGD	67.1% Reduction	
Prescott	20%	70%	10%	2.75 MGD	2 MGD	27.3% Reduction	
Riverview	30%	60%	10%	8 MGD	4 MGD	50% reduction	
* Based on a 3" rain fall							

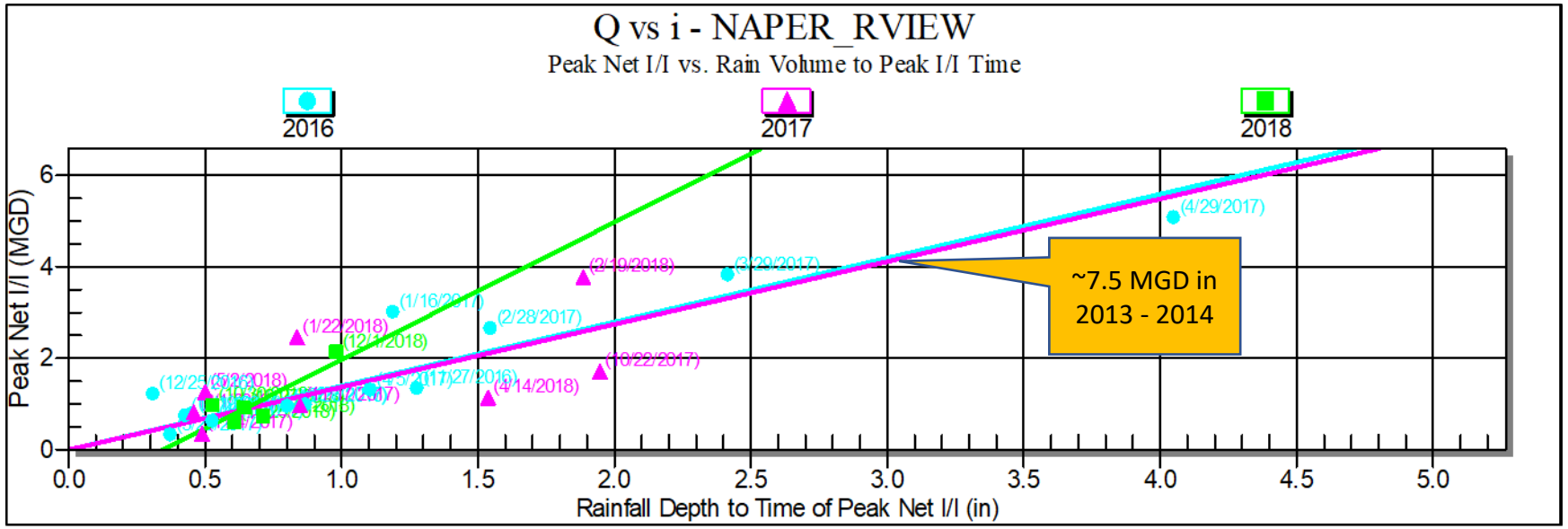
"The improvements may be the best I have seen for basins this size."

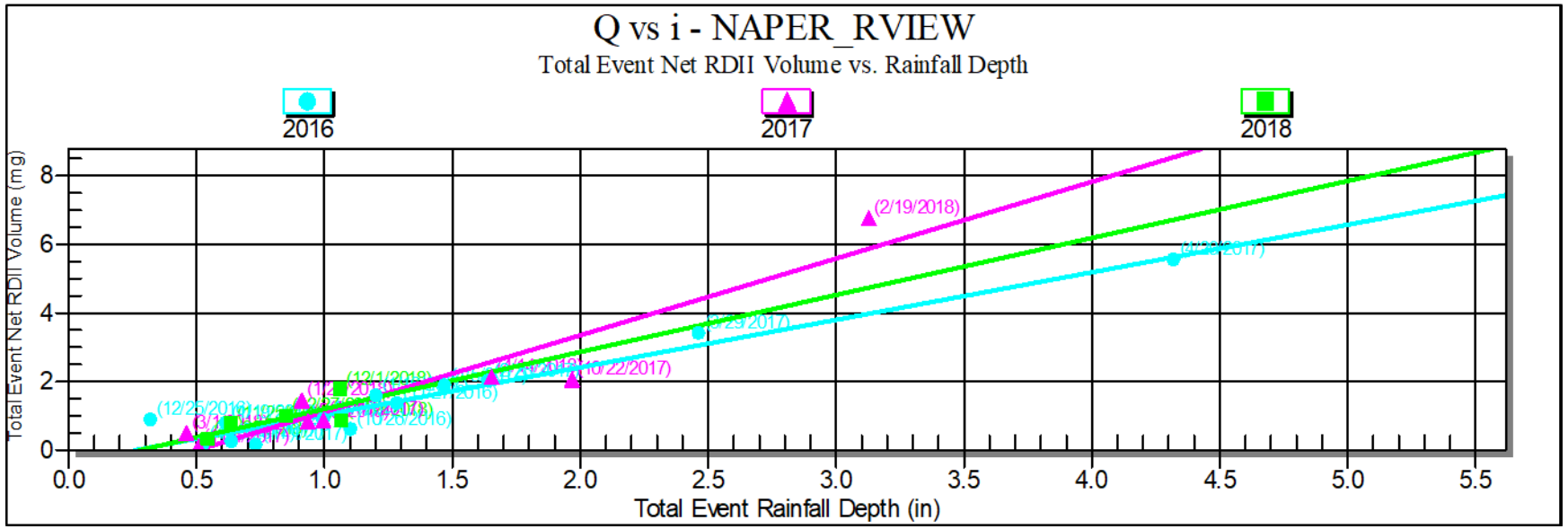
City of Naperville Flow Meter Service Provider.

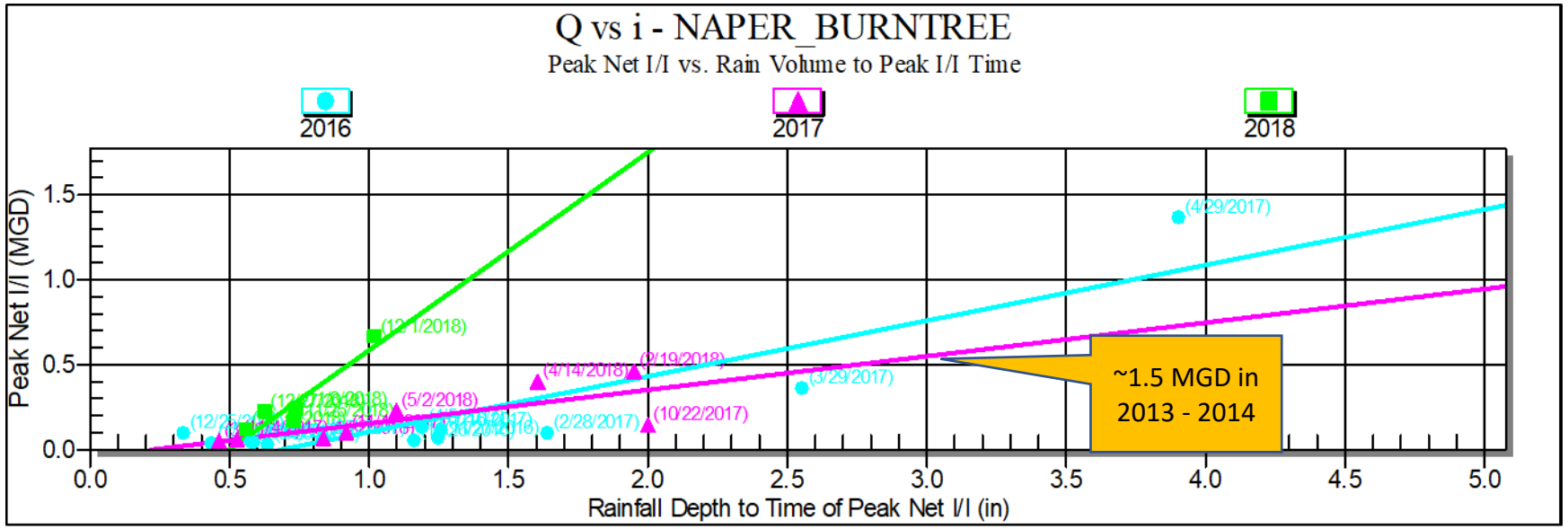


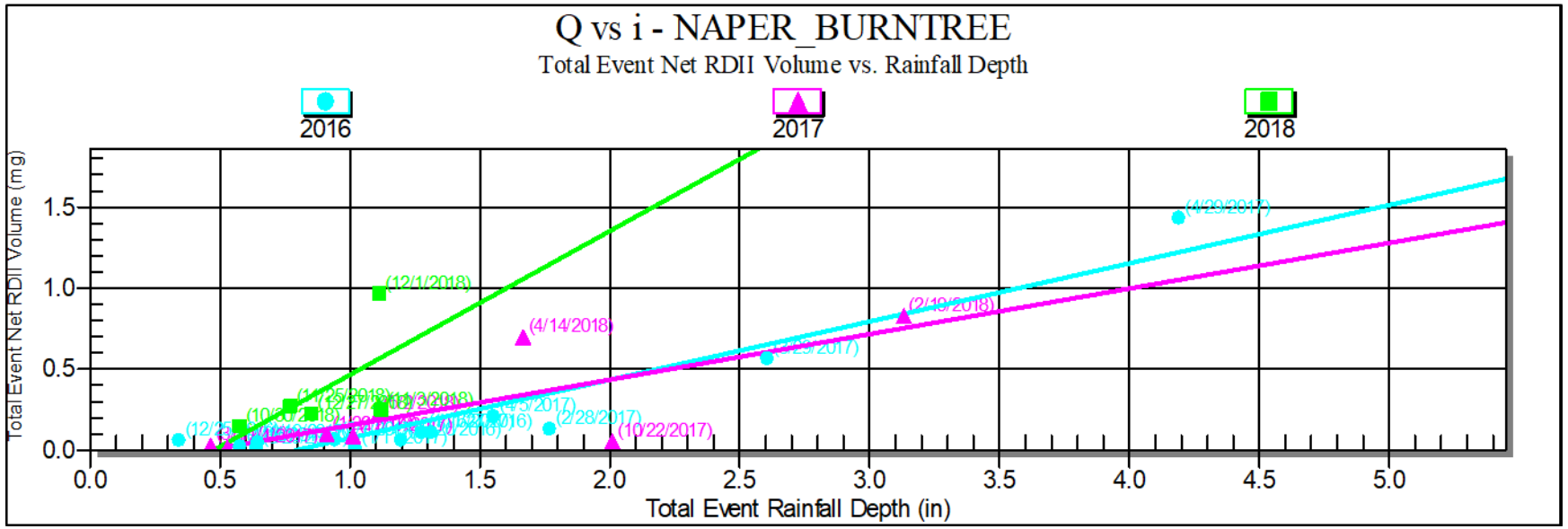


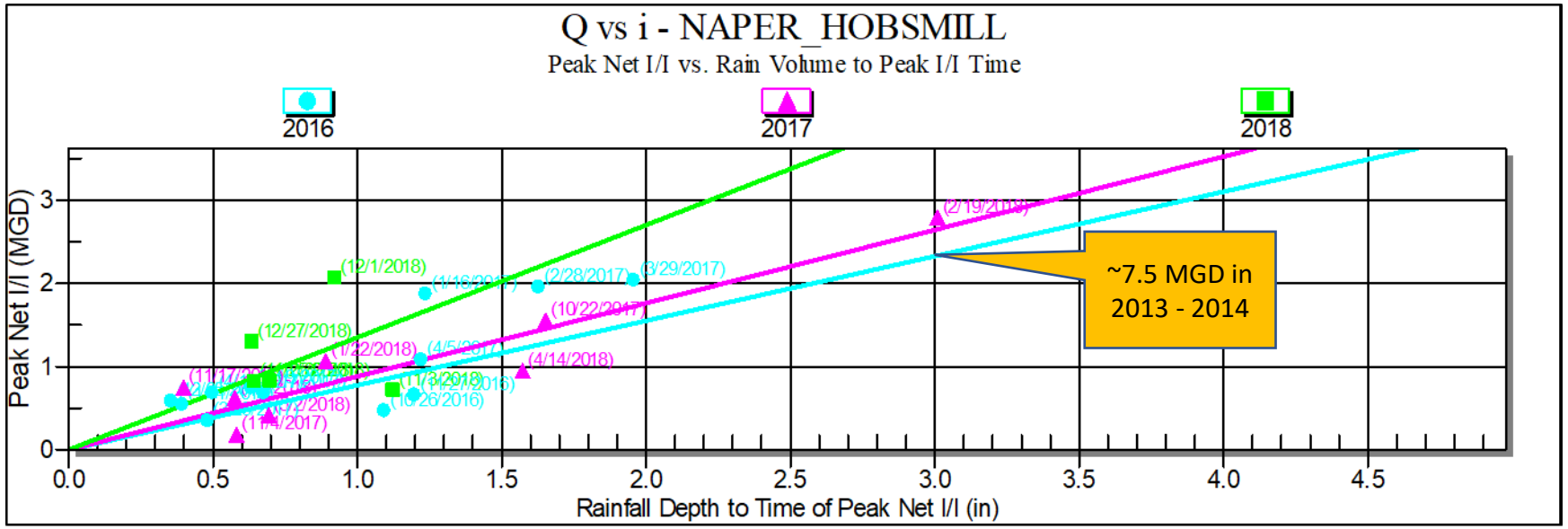
I assembled a quick comparison of wet weather performance of 4 of your sewer shed and the improvements have been impressive. The improvements may be the best I have seen for basins this size.

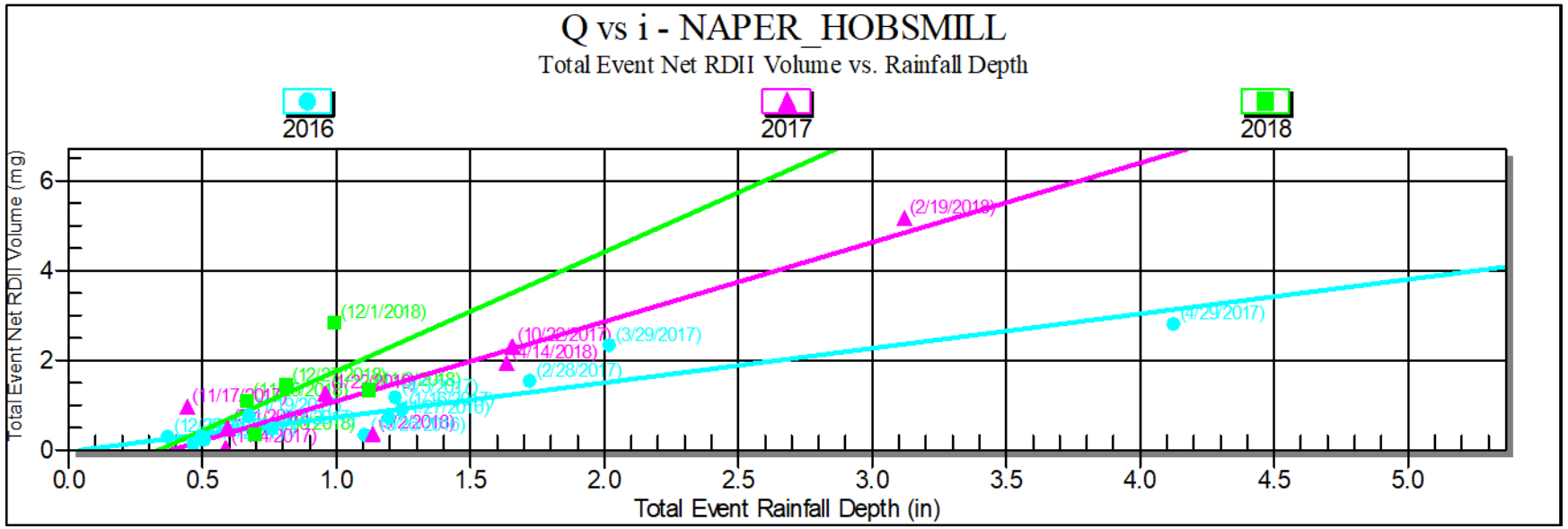

Q vs i - NAPER_RVIEW
Peak Net I/I vs. Rain Volume to Peak I/I Time
2016
2017
2018
Peak Net I/I (MGD)
Rainfall Depth to Time of Peak Net I/I (in)
~7.5 MGD in
2013 - 2014
(4/29/2017)
(2/19/2018)
(3/29/2017)
(1/16/2017)
(2/28/2017)
(1/22/2018)
(12/1/2018)
(10/22/2017)
(4/14/2018)

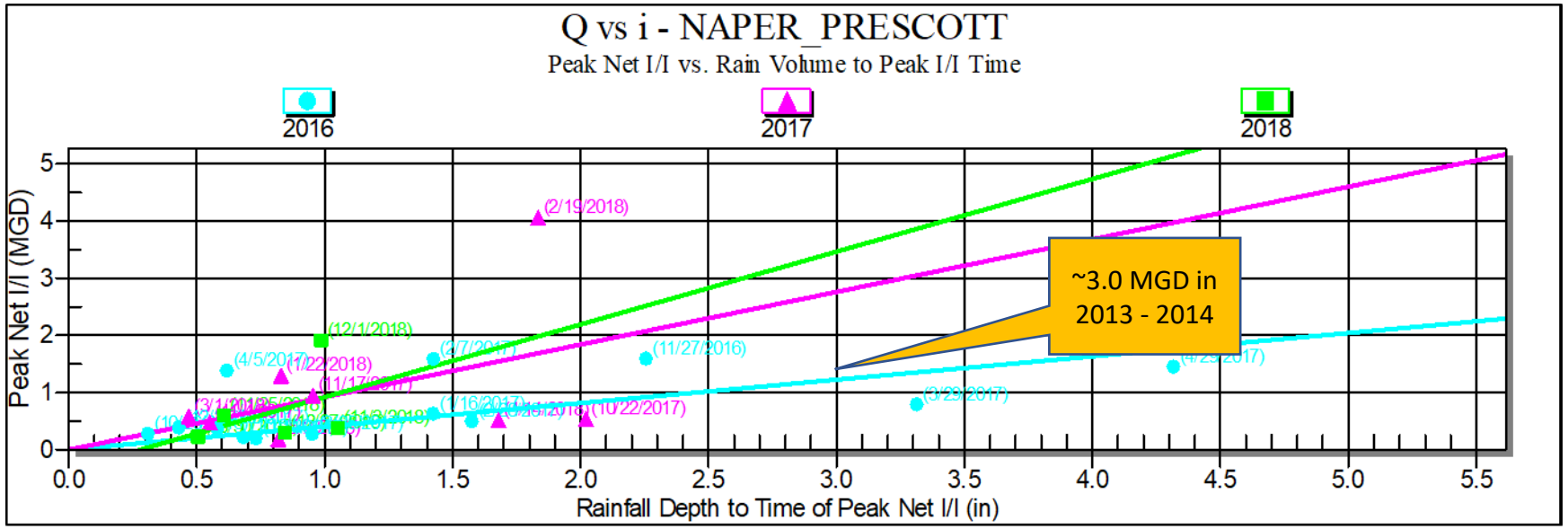

Q vs i - NAPER_RVIEW
Total Event Net RDII Volume vs. Rainfall Depth
2016
2017
2018
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
(2/19/2018)
(10/22/2017)
(12/1/2018)

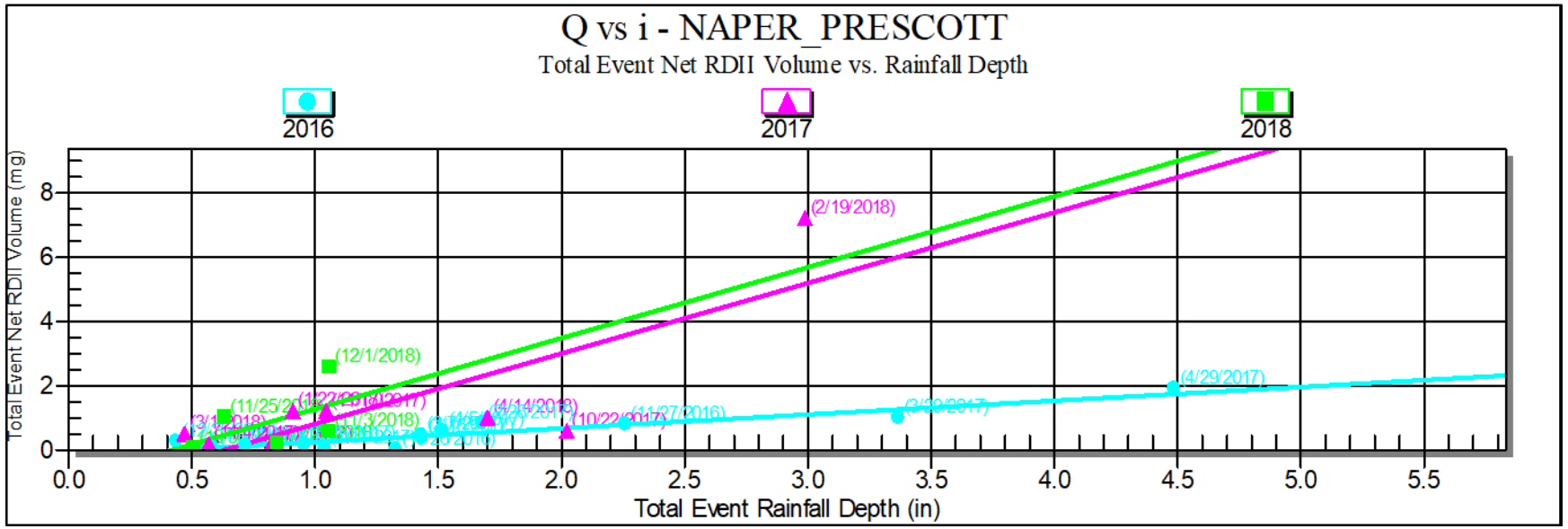

Q vs i - NAPER_BURNTREE
Peak Net I/I vs. Rain Volume to Peak I/I Time
2016
2017
2018
Peak Net I/I (MGD)
Rainfall Depth to Time of Peak Net I/I (in)
(4/29/2017)
(12/1/2018)
(4/14/2018)
(2/19/2018)
(5/2/2018)
(3/29/2017)
(2/28/2017)
(10/22/2017)
~1.5 MGD in
2013 - 2014

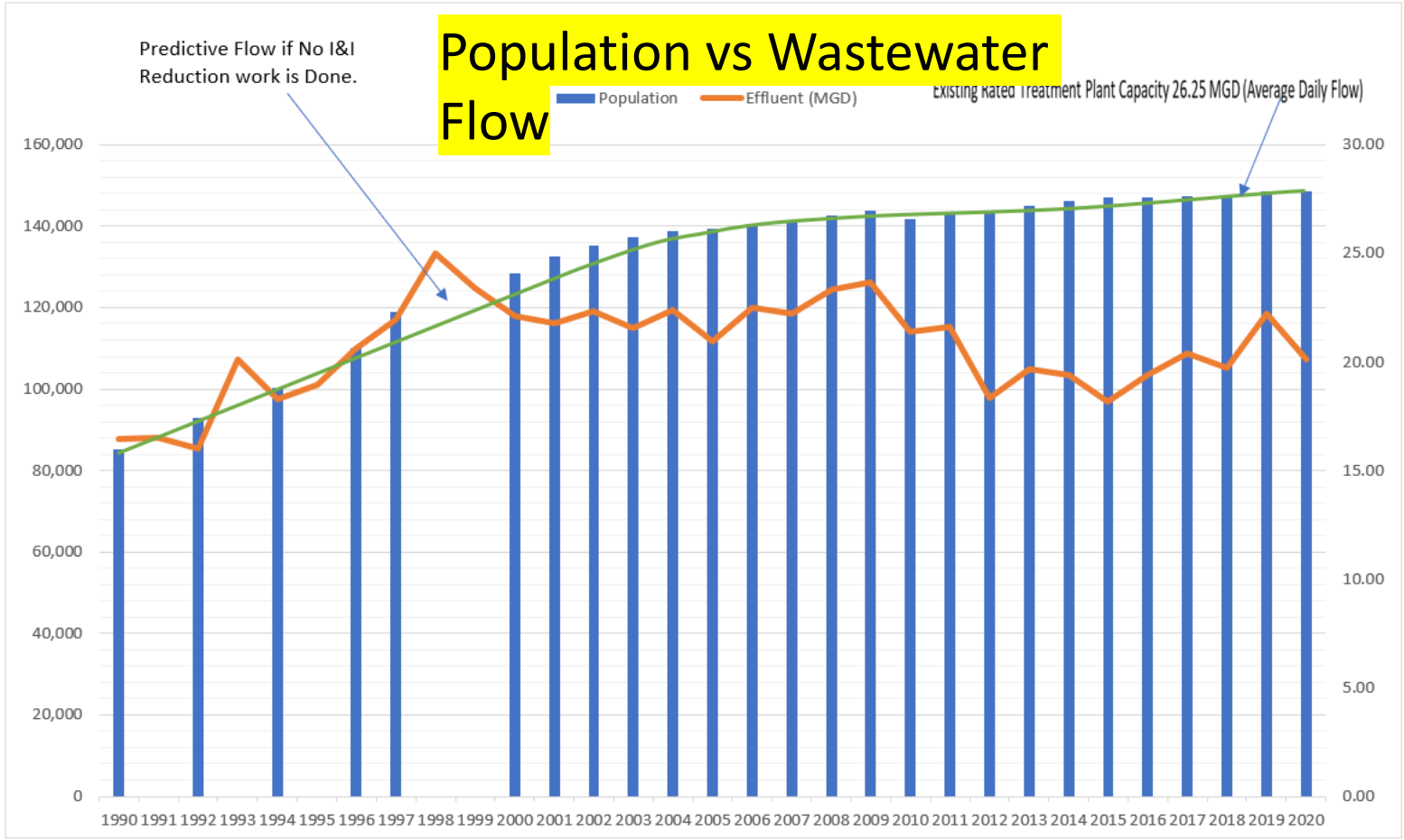

Q vs i - NAPER_BURNTREE
Total Event Net RDII Volume vs. Rainfall Depth
2016
2017
2018
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
(4/29/2017)
(12/1/2018)
(4/14/2018)
(2/28/2017)
(10/22/2017)


Q vs i - NAPER_HOBSMILL
Peak Net I/I vs. Rain Volume to Peak I/I Time
2016
2017
2018
Peak Net I/I (MGD)
Rainfall Depth to Time of Peak Net I/I (in)
~7.5 MGD in
2013 - 2014
(12/1/2018)
(12/27/2018)
(1/22/2018)
(2/28/2017)
(3/29/2017)
(10/22/2017)
(4/14/2018)
(2/19/2018)
(10/26/2016)
(11/4/2017)


Q vs i - NAPER_HOBSMILL
Total Event Net RDII Volume vs. Rainfall Depth
2016
2017
2018
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
(12/1/2018)
(2/19/2018)
(4/29/2017)
(3/29/2017)
(10/22/2017)
(4/14/2018)
(2/28/2017)


Q vs i - NAPER_PRESCOTT
Peak Net I/I vs. Rain Volume to Peak I/I Time
2016
2017
2018
Peak Net I/I (MGD)
Rainfall Depth to Time of Peak Net I/I (in)
(2/19/2018)
(12/1/2018)
(4/5/2017)
(1/22/2018)
(11/27/2016)
(4/29/2017)
(3/29/2017)
(10/22/2017)
~3.0 MGD in
2013 - 2014


Q vs i - NAPER_PRESCOTT
Total Event Net RDII Volume vs. Rainfall Depth
2016
2017
2018
Total Event Net RDII Volume (mg)
Total Event Rainfall Depth (in)
(2/19/2018)
(12/1/2018)
(4/29/2017)
(11/3/2018)
(4/14/2018)
(11/27/2016)
(3/29/2017)


Population vs Wastewater Flow
Predictive Flow if No I&I Reduction work is Done.
Population
Effluent (MGD)
Existing Rated Treatment Plant Capacity 26.25 MGD (Average Daily Flow)
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Positive Impact

Naperville's proactive approach to combating I&I has yielded positive results. Since 1998 the population of Naperville has increased by roughly 30,000 people or about 20%. Yet when looking at the average amount of water treated at the SWRC flows have decreased by roughly 30% over the same period.

Before Grouting

After Grouting

RESULTS

- **Reduced Customer Service Calls -** 2007: Responded to 600 Calls. 2019: Responded to 295 Calls. **Yearly Saving Of $61,000**
- Less Time on Customer Service means crews can spend more time on I/I work which reduces the chance of main line Back-ups.
- **Reduced Sewer Maintenance Cost -** Yearly Root Cutting is now Jet Flushing only every four years. **$64,513 Yearly Savings**
- **Reduced Chance Of Injuries** - **Priceless**
- **Reduced Pumping Cost -** Reduces the cost of operating a wastewater pump station.
- Reduced Electric Cost
- Reduced Maintenance Required
- Reduced By-Pass Pumping needed due to high flows
- **Treatment Plant Flow -** Current flow Is 19.75 MGD. Plant capacity is 26.75 MGD.
- Current I&I program contributed to delay in plant expansion
- Plant expansion cost in 1998 estimated at $9 MILLION.

CMOM

Naperville

CITY OF NAPERVILLE WATER UTILITIES

CAPACITY, MANAGEMENT, OPERATIONS AND MAINTENANCE **(CMOM)** PROGRAM

Tony Conn Sr. | Water Distribution and Collection Manager
Katy Librizzi | Collection and Pumping Supervisor
Rev. 12/2019

Annual I&I Status Report

Naperville

Revised 12/30/21

City of Naperville Ten-Year I&I Reduction Plan and Status Report

Tony Conn-Water Distribution and Collection Manager
CITY OF NAPERVILLE

Questions?