

New Castle County

The Gravity Side of the Sanitary Collection System

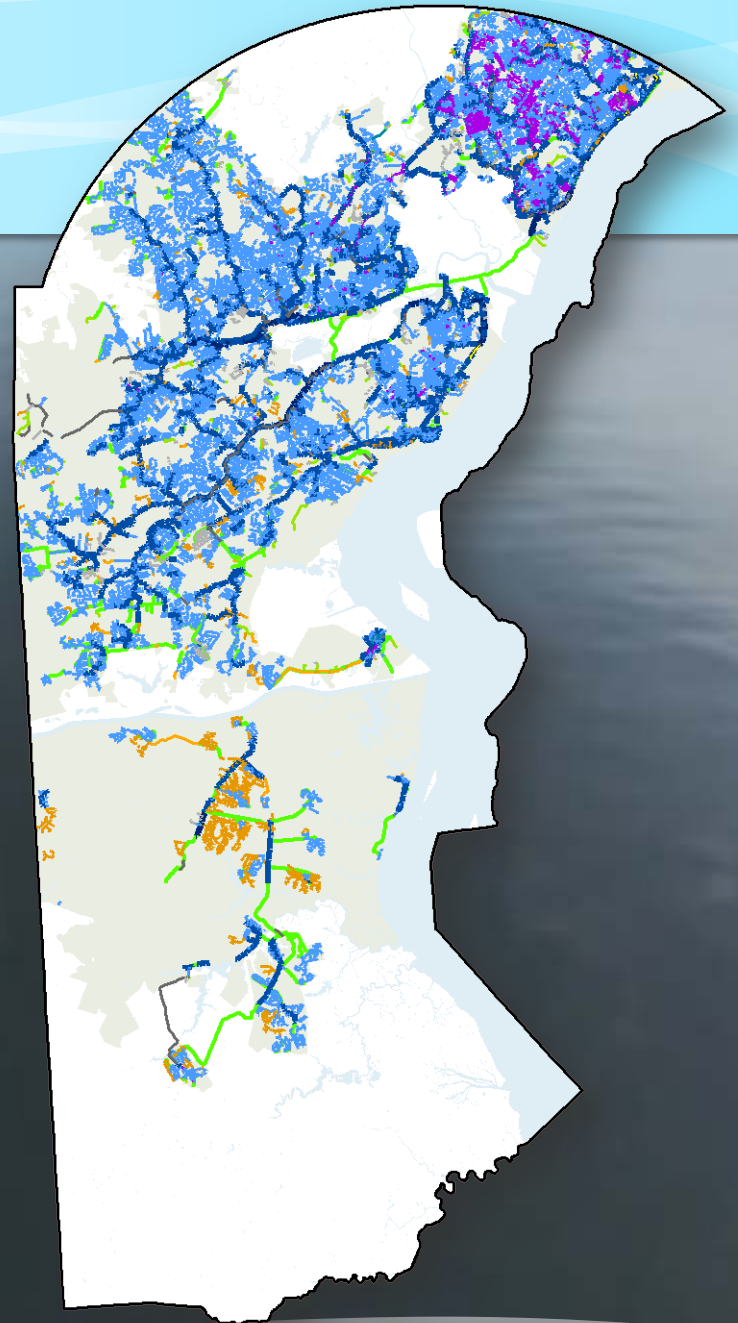
“It’s all downhill from here”

SEWER MAINTENANCE:
PREVENTATIVE MAINTENANCE PROGRAM



New Castle County Quick Stats

- New Castle County - Sanitary Sewer System
 - Mid-sized system
 - Separate
 - 50 MGD
 - 122,000 customer accounts
 - 550,000 population
 - 1,760 Miles of sewer
 - 6" to 84" in diameter
 - 169 Pump Stations
 - 44,000 Manholes



Sewer Maintenance Section

Part of Environmental Operations Division

Sewer Operations Charge

- Keep collection system clean to:
 - Prevent SSO's and mainline blockages
 - Prevent basement backups
- Identify causes of SSO's and mainline blockages
- Prevent recurring SSO's and mainline blockages
 - Increased cleaning
 - Modified/enhance methods
 - Structural fixes
- Maximize capacity of trunk lines and interceptors
- Extend life of aging/failing components until engineering programs catch up



Sewer Maintenance Section

Part of Environmental Operations Division

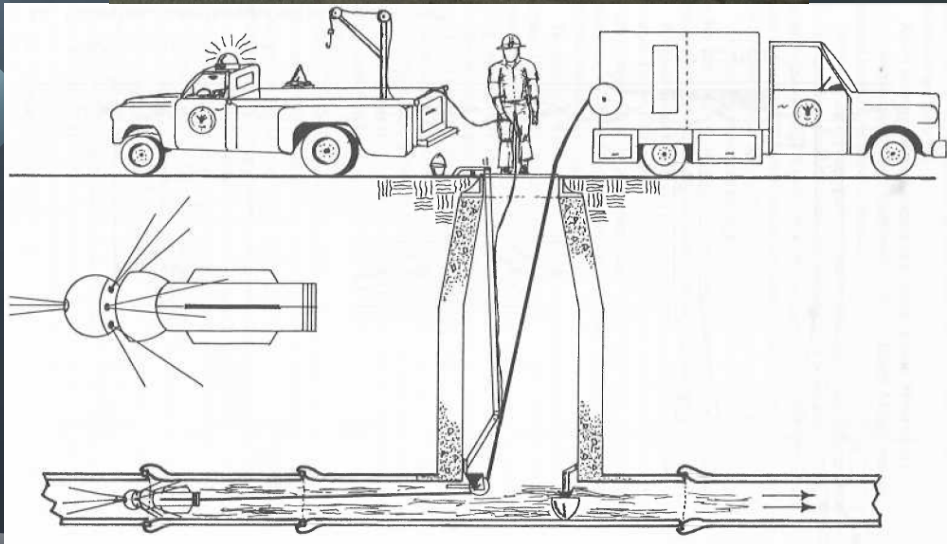
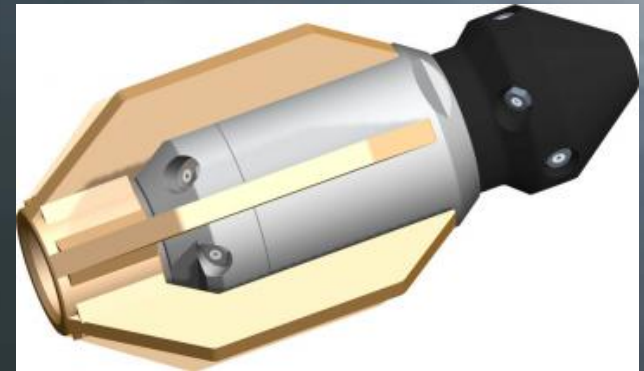
- **Sewer Maintenance Responsibilities**
 - **Preventative Maintenance Program (PM)**
 - **Emergency Response**
 - **CMOM Enhancement Programs**
 - **Trunk Line Preventative Maintenance Program**
 - **Chemical Root Control Program**
 - **CCTV System Investigation Program**
 - **Operate CCTV (Closed Circuit TV)**
 - **Utility Marking (MISS Utility)**
 - **Dye Testing to verify sewer connections**

Preventative Maintenance Program (PM)

- PM program, as currently defined, cleans 500 miles of gravity sewer collection system per year.
- Approach implemented in late 1980's
- Shift from Reactive Maintenance to focus on Preventive Maintenance
- Decreased SSO's and mainline blockages dramatically
- Mapped cleaning schedules with standardized frequencies: 6 month, 1 year, 2 year, 3 year, 4 year, 5 year.
- Prioritization based on cleaning demand of sewer sub-area build up of materials, roots, grease, and debris, etc.
 - Work order History
 - Visual determination
 - CCTV & Zoom
 - Quality control and frequency adjustment
- Analysis of sequencing
- Schedule of cleaning projects - affected by many factors
 - Weather - extreme cold/wet
 - Equipment downtime - jet/vac combination units
 - Manpower resources - off-road work
- Tracking year-to-date PM numbers



Preventative Maintenance Program (PM)



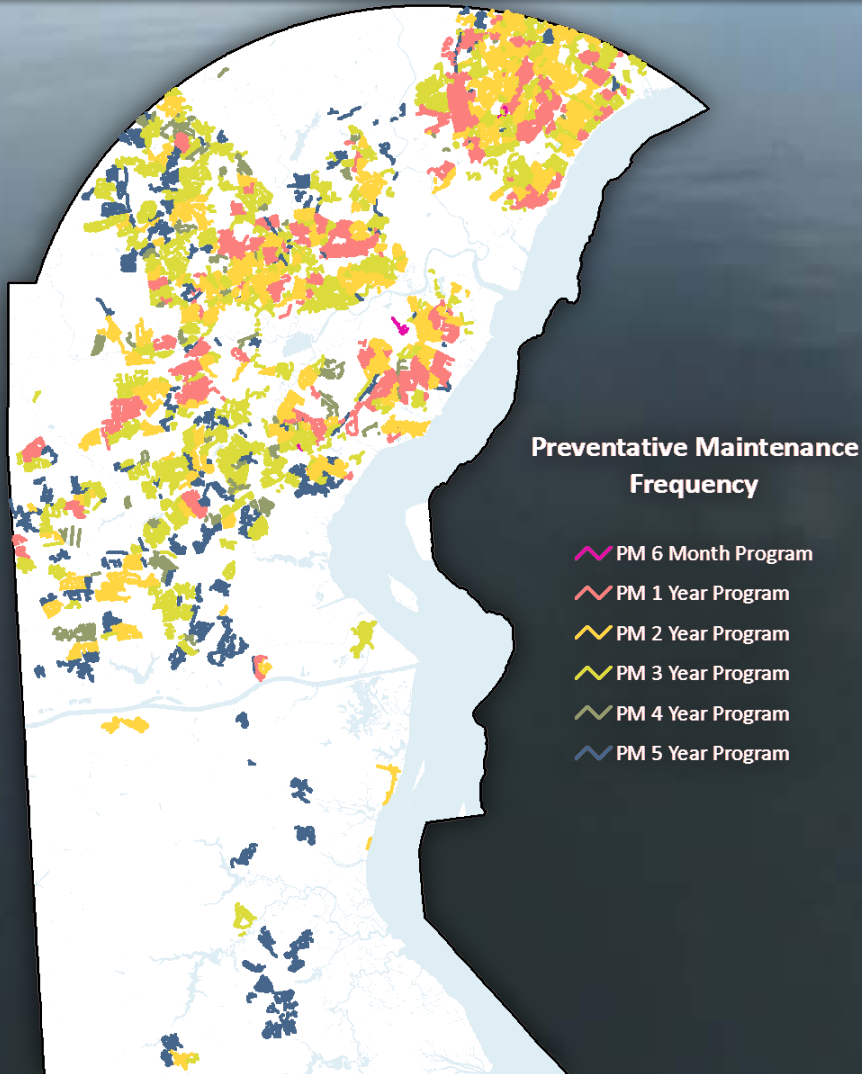
Preventative Maintenance Program (PM)

Random
Obstruction

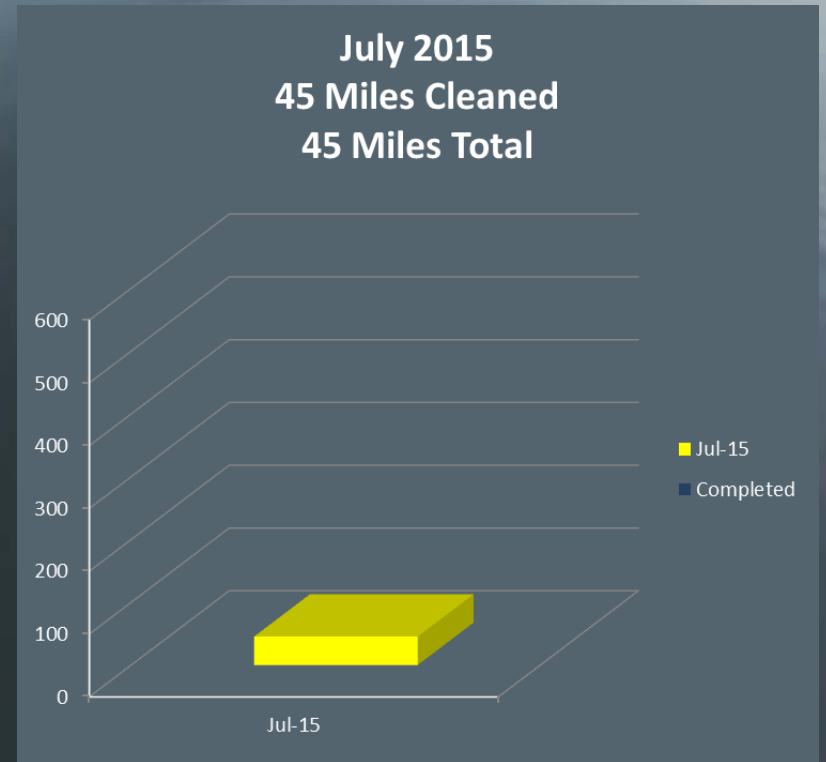
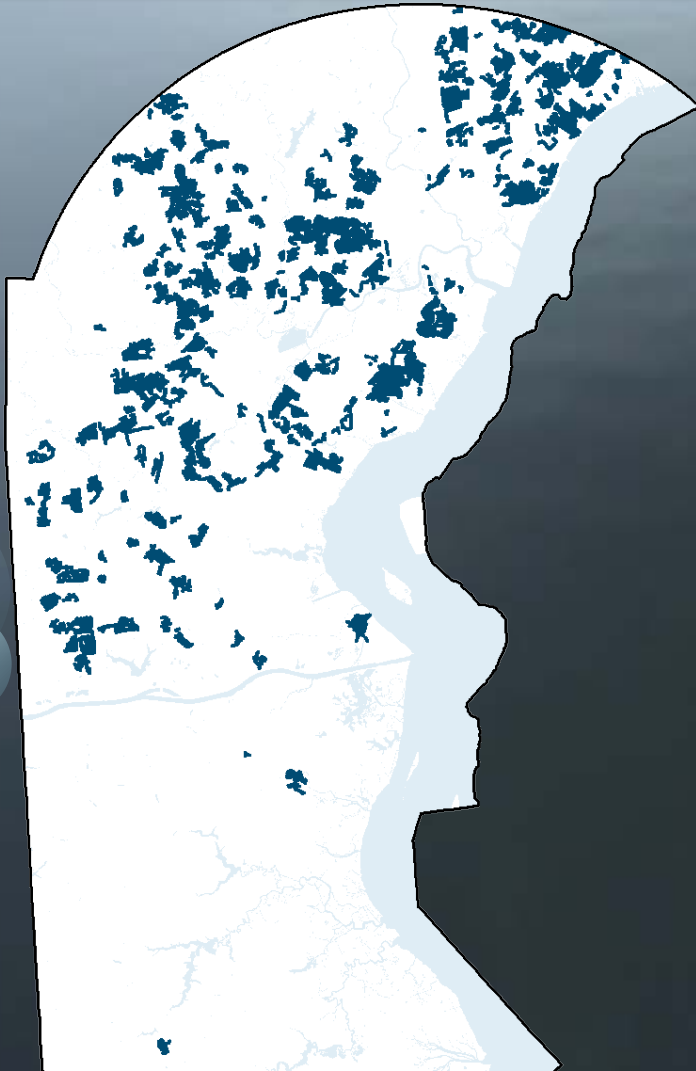
Regularly Cleaned
Sewer



Preventative Maintenance Cleaning Schedules

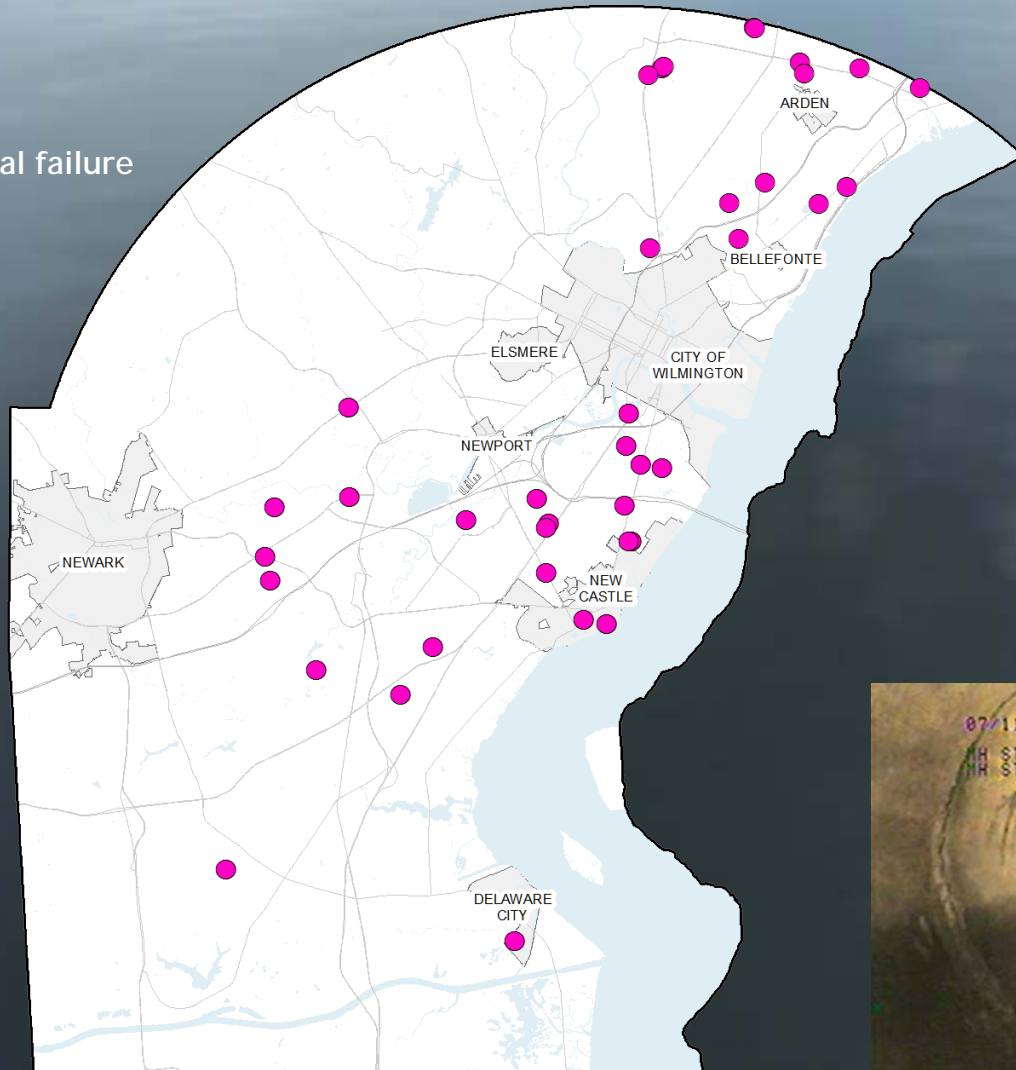


Tracking Preventative Maintenance

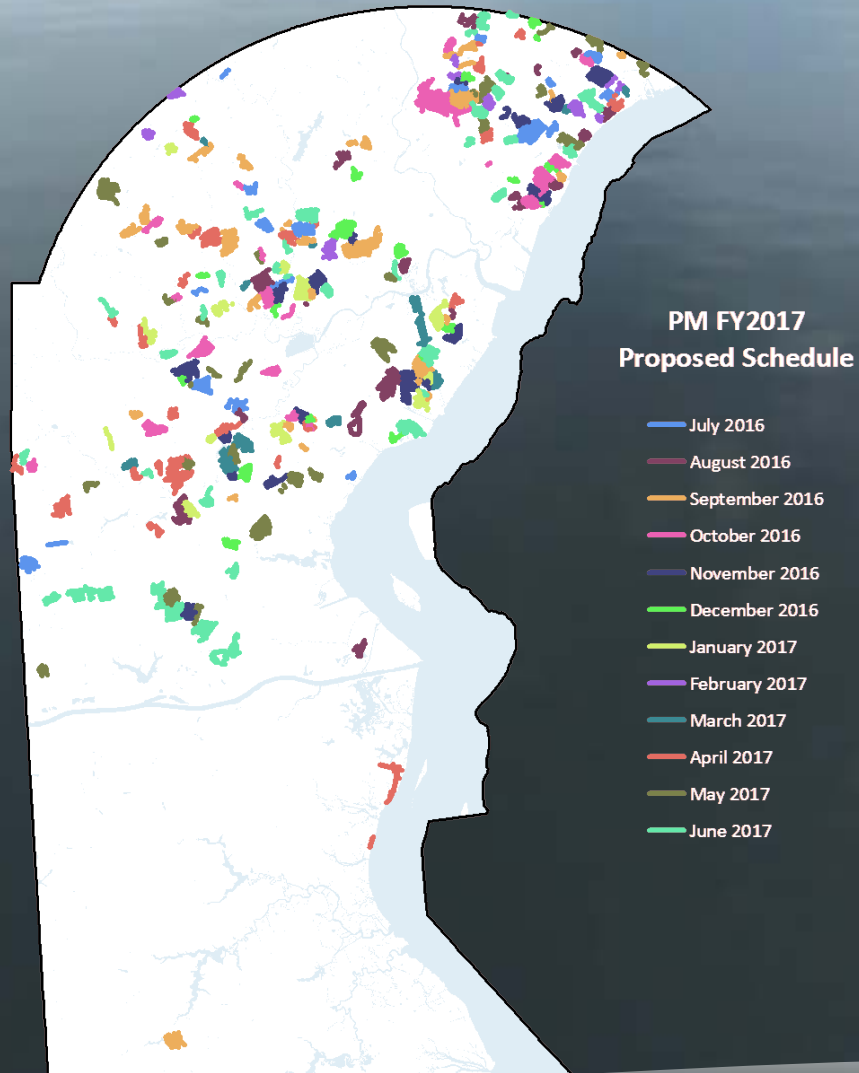


Preventative Maintenance - Weekly Checks

- Roots
- Grease
- Debris
- Structural failure



Preventative Maintenance Schedules for FY2017 - Projected



Preventative Maintenance (by council district)

Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
7/27/16	1	FIRST STATE PLZ.	1YR PM
8/13/16	1	ELSMERE PM	1YR PM
8/20/16	1	HERSHEY RUN PM	1YR PM
9/9/16	1	MANNETTE HEIGHTS PM	3YR PM
9/25/16	1	FIRST STATE PARK PM	1 YR PM
10/10/16	1	CAVALIERS PM	2YR PM
10/16/16	1	BELVEDERE PM	1YR PM
10/17/16	1	ROLLING HILLS PM	2YR PM
10/17/16	1	STANTON HEIGHTS PM	2YR PM
10/21/16	1	OAK GROVE PM	1YR PM
11/4/16	1	CEDAR HEIGHTS PM	3YR PM
11/14/16	1	RAINTREE VILLAGE PM	3YR PM
11/20/16	1	WILLOW RUN PM	1YR PM
11/24/16	1	CLELAND HEIGHTS	2YR PM
12/5/16	1	ARBOR POINTE PM	3YR PM
12/10/16	1	EASTBURN HEIGHTS	2YR PM
12/10/16	1	EAGLE GLEN	2YR PM
12/19/16	1	GLEN BERNE ESTS	2YR PM
1/7/17	1	ROSELLE PM	1YR PM
2/17/17	1	MIDWAY PK APTS PM	1YR PM
4/28/17	1	EXECUTIVE CAMPUS	2YR PM
5/1/17	1	OMEGA/MBNA	2YR PM
5/26/17	1	KIAMENSI MANOR PM	1YR PM
6/13/17	1	WOODCREST PM	2YR PM
6/20/17	1	TANGLEWOOD PM	1YR PM

Preventative Maintenance (by council district)

Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
8/3/16	2	RESTURANT ROW +	1YR PM
8/20/16	2	MCDANIEL CREST PM	1YR PM
8/20/16	2	DEVON PM	1YR PM
8/21/16	2	MCDANIEL HEIGHTS PM	1YR PM
8/23/16	2	VALMY LANE PM	5YR PM
8/28/16	2	BROOKVALLEY PM	1YR PM
9/2/16	2	GREENVILLE MANOR PM	2YR PM
9/11/16	2	BRANDYWINE COMMN PM	1YR PM
9/15/16	2	FAIRFAX SHOPPES PM	1YR PM
9/21/16	2	BLUE ROCK MANOR PM	1YR PM
9/26/16	2	GREENVIEW PM	2YR PM
10/10/16	2	SHARPLEY PM	3YR PM
10/10/16	2	EDENRIDGE PM	3YR PM
10/13/16	2	COLONIAL WOODS PM	1YR PM
10/23/16	2	GRAYLYN CREST OUTFALL	6 MONTH PM
11/21/16	2	OLDE COLONIAL VL PM	1YR PM
11/25/16	2	LONGWOOD PM	1YR PM
12/5/16	2	WESTOVER HILLS 2 PM	3YR PM
12/5/16	2	BIRCH KNOLL PM	3YR PM
1/15/17	2	WINDSOR HILLS	2YR PM
1/20/17	2	CONCORD PK VILL PM	1YR PM
4/1/17	2	CRESTFIELD PM	2YR PM
4/25/17	2	SURREY PARK PM	2YR PM
5/2/17	2	PENARTH PM	2YR PM
5/11/17	2	OAK LANE MANOR PM	2YR PM
5/16/17	2	PERTH PM	2YR PM
5/22/17	2	BEAU TREE PM	2YR PM
5/22/17	2	BROOKMEADE PM	2YR PM
5/26/17	2	STRATFORD APTS.	1YR PM
6/22/17	2	CHALFONTE PM	2YR PM
6/25/17	2	HOLIDAY HILLS PM	2YR PM

Preventative Maintenance (by council district)

Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
8/29/16	3	MEADOWDALE PM	3YR PM
9/6/16	3	PATTERSON FARM PM	3YR PM
9/13/16	3	BRACKIN ESTATES PM	4YR PM
9/13/16	3	BRACKENVILLE RD PM	4YR PM
9/13/16	3	COKESBURY VILL PM	4YR PM
9/13/16	3	BERKSHIRE PM	4YR PM
10/17/16	3	THE RIDGE PM	2YR PM
10/27/16	3	MARRA LANDING PM	5YR PM
12/19/16	3	CREST DR PM	4YR PM
12/23/16	3	MANLEY	2YR PM
2/21/17	3	PIERSONS RIDGE PM	3YR PM
2/24/17	3	FOXMEADOW FARMS PM	3YR PM
4/30/17	3	THE PINES PM	2YR PM
6/21/17	3	HIGHLAND WEST PM	1YR PM
6/23/17	3	HICKORY HILLS PM	1YR PM

Proj Start Date	Council	Location Details	PM Frequency
5/18/17	4	PENNROSE PM	2YR PM
8/17/16	5	CHESTNUT CROSSNG PM	1YR PM
10/7/16	5	BEAULIEU PM	3YR PM
12/10/16	5	PENCADER*GREASE PM	1YR PM
9/20/16	6	TOWNSEND VILL II PM	5YR PM

Preventative Maintenance (by council district)

Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
7/27/16	7	AIRPORT PLAZA PM	1YR PM
8/11/16	7	NEW CASTLE POINT PM	1YR PM
8/17/16	7	CEDAR POINTE PM	6MON PM
8/27/16	7	NEW CASTLE MANOR PM	1YR PM
8/31/16	7	CASTLE HILLS PM	1YR PM
9/6/16	7	GOVERNORS FIELD PM	5YR PM
9/29/16	7	WOODBURNE PM	5YR PM
10/8/16	7	JEFFERSON FARMS PM	1YR PM
10/14/16	7	STRATFORD PM	1YR PM
10/17/16	7	CARRIAGE RUN PM	2YR PM
10/23/16	7	ROGERS MANOR PM	1YR PM
10/28/16	7	BUCKLEY PM	3YR PM
10/31/16	7	MELANIE WOOD PM	2YR PM
11/2/16	7	PLEASANTVILLE PM	1YR PM
11/4/16	7	WILLARD MANOR PM	1YR PM
11/11/16	7	OLDE MILL VILL PM	3YR PM
12/4/16	7	BOOTHURST PM	1YR PM
12/5/16	7	CENTENNIAL VILL	3YR PM
1/13/17	7	VAN DYKE VILLAGE PM	3YR PM
2/9/17	7	CHURCHMANS CNTR	2YR PM
2/27/17	7	BUTTONWOOD	2YR PM
3/7/17	7	TAYLORTOWNE PM	3YR PM
3/11/17	7	CHARWOOD ESTATES	2YR PM
3/25/17	7	GREENBRIAR	2YR PM
4/15/17	7	MANOR PARK PM	2YR PM
4/20/17	7	LEEDOM ESTATES PM	2YR PM
5/14/17	7	SWANWYCK ESTATES & GARDENS PM	2YR PM

Preventative Maintenance (by council district)

Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
8/25/16	8	RIVERWOODS PM	1YR PM
8/26/16	8	WHITES VILLAGE PM	1YR PM
8/29/16	8	BEVERLY WOODS PM	3YR PM
9/2/16	8	EDGEMOOR GARDENS PM	1YR PM
9/10/16	8	DARLEY WOODS PM	1YR PM
9/19/16	8	MERIDEN PM	3YR PM
9/24/16	8	EDGEMOOR TERRACE PM	1YR PM
10/6/16	8	BELLEFONTE PM	2YR PM
10/7/16	8	BELLEVUE HILLS PM	3YR PM
10/8/16	8	WINDYBUSH PM	1YR PM
10/10/16	8	BRANDYWINE FARMS PM	3YR PM
10/24/16	8	ASHBOURNE HILLS PM	1YR PM
10/29/16	8	GORDON HEIGHTS PM	1YR PM
10/31/16	8	LYNNFIELD PM	2YR PM
10/31/16	8	KUTZ HOME PM	1YR PM
11/17/16	8	SPRING VALLEY APTS PM	1YR PM
11/19/16	8	PENNY ACRES PM	1YR PM
12/5/16	8	BELLEVUE HALL PM	3YR PM
1/6/17	8	EAST POINTE APTS PM	1YR PM
1/28/17	8	NORTHRIDGE	2YR PM
2/4/17	8	TOP OF THE HILL PM	1YR PM
2/6/17	8	ASHBOURNE HLS EX PM	3YR PM
2/18/17	8	CLAYMONT CENTRE PM	1YR PM
3/31/17	8	FOREST HILLS PK PM	2YR PM
4/17/17	8	VALLEY RUN ETC. PM	2YR PM
4/30/17	8	BROOKSTONE PM	2YR PM
4/30/17	8	HOLLY OAK TERRACE PM	2YR PM
5/6/17	8	BRANDYW 100 APTS PM	1YR PM
5/7/17	8	RADNOR GREEN PM	2YR PM
5/7/17	8	HILLTOP MANOR PM	2YR PM
5/7/17	8	CLAYMONT ADDITION PM	2YR PM
5/18/17	8	DELAIRE PM	2YR PM
5/22/17	8	SHELLBURNE	2YR PM
5/22/17	8	SHELLBURNE	2YR PM

Preventative Maintenance (by council district)

Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
8/19/16	9	ALBERTSON PARK PM	1YR PM
8/25/16	9	ARUNDEL PM	1YR PM
9/13/16	9	BRAND SPR PK PM	4YR PM
10/1/16	9	HARMONY HILLS PM	1YR PM
10/2/16	9	HARMONY CREST PM	1YR PM
10/7/16	9	TREE TOP PM	3YR PM
10/14/16	9	KIAMENSI GARDENS PM	1YR PM
10/25/16	9	BELFORD MANOR PM	3YR PM
11/19/16	9	SKYLINE CREST PM	1YR PM
12/3/16	9	MARSHALLTON GREEN	2YR PM
12/4/16	9	ROSEVILLE PARK	2YR PM
12/5/16	9	WELLINGTON ARMS PM	3YR PM
2/26/17	9	DRIFTWOOD PM	1YR PM
3/11/17	9	DELAPLANE MANOR	2YR PM
3/16/17	9	SKYLINE RIDGE	2YR PM
3/20/17	9	WEST MEADOW PM	2YR PM
4/6/17	9	HENDERSON HGHTS. PM	1YR PM
5/20/17	9	ABBAY WALK PM	1YR PM
5/22/17	9	MONTCLARE PM	2YR PM
6/7/17	9	WOODLAND HEIGHTS PM	1YR PM
6/25/17	9	MARSHALLTON PM	2YR PM

Preventative Maintenance (by council district) Schedules for FY2017 - Projected

Proj Start Date	Council	Location Details	PM Frequency
7/31/16	10	RIZZO PM	1YR PM
8/11/16	10	MANSION PARK PM	1YR PM
8/19/16	10	ALBAN PARK PM	2YR PM
10/30/16	10	HOLLOWAY TERRACE PM	1YR PM
11/10/16	10	MAYVIEW MANOR PM	1YR PM
12/7/16	10	DUNLEITH PM	1YR PM
2/10/17	10	MINQUADALE	2YR PM
12/2/16	11	SPARROW RUN	2YR PM
1/30/17	11	BUCKINGHAM PL PM	4YR PM
4/20/17	11	CEDARWOOD APTS. PM	1YR PM
5/14/17	11	PORTER SQUARE PM	2YR PM
6/7/17	11	ELMWOOD PM	1YR PM
6/10/17	11	SHERWOOD FOREST PM	2YR PM
10/28/16	12	CARAVEL HUNT PM	3YR PM
11/21/16	12	DOBBINSVILLE PM	1YR PM
12/5/16	12	COUNTRY WOODS PM	3YR PM
3/13/17	12	PORT PENN	2YR PM
4/7/17	12	BEAVERBROOK APTS PM	2YR PM
5/20/17	12	NEW CASTLE 2 PM	2YR PM
5/20/17	12	NEW CASTLE 1 PM	2YR PM
5/26/17	12	NEW CASTLE 3 PM	2YR PM
6/4/17	12	NEW CASTLE 4 PM	2YR PM
6/12/17	12	KINGSCROFT PM	2YR PM

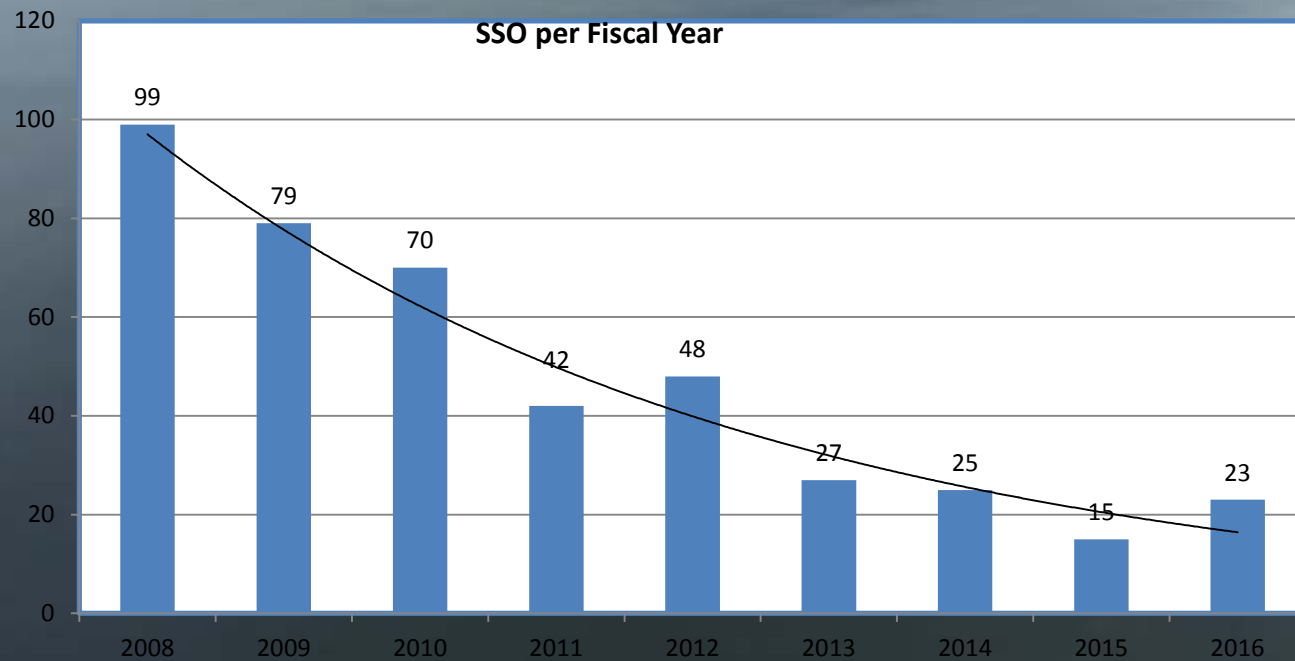
Sanitary Sewer Overflow Summary - FY2016

New Castle County Sanitary Sewer Overflows

Fiscal Year 2016 SSO Summary

Fiscal Year	Debris	Grease	Rain	Root	Structural Failure	Third Party Action	Misc.	TOTAL	Miles of Sewer	SSO/ 100 miles
2016 - 1st Q 7/1 - 9/30/2015		3 13.04%						3 13.04%	1758	0.171
Gallons		1,075						1,075		
2016 - 2nd Q 10/1 - 12/31/2015	1 4.35%	3 13.04%						4 17.39%	1758	0.228
Gallons	300	800						1,100		
2016 - 3rd Q 1/1 - 3/31/2016	1 4.35%	2 8.70%				1 4.35%		4 17.39%	1758	0.228
Gallons	100	600				600		1,300		
2016 - 4th Q 4/1 - 6/30/2016	1 4.35%	6 26.09%		4 17.39%	1 4.35%			12 52.17%	1758	0.683
Gallons	600	2,005		1,100	300			4,005		
2016 FY Total Count	3	14	0	4	1	1	0	23	1758	1.308
Total Gallons	1,000	4,480	0	1,100	300	600	0	7,480		

Sanitary Sewer Summary - Fiscal Years 2008 - 2016



Key Changes to Current PM Practices



Gymnasium cleaning

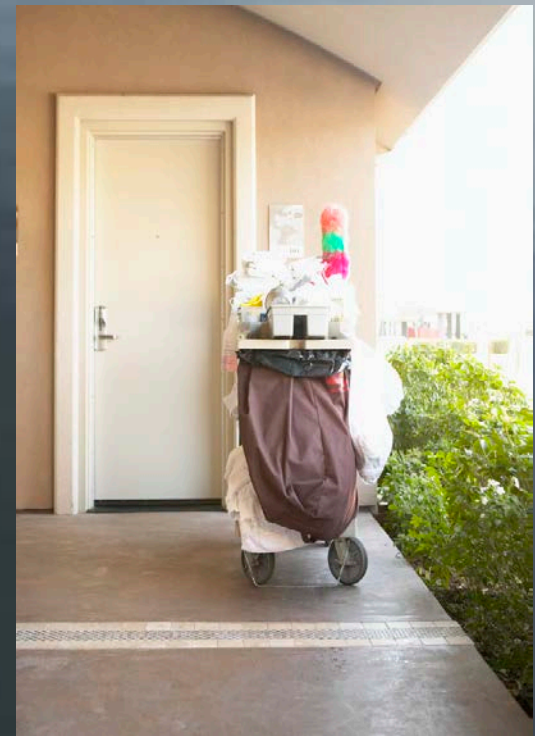
PM Program Change - Philosophy of Cleaning

- Pipes clog at varying rates
 - Slope/velocity
 - FOG
 - Trees
 - Age/Materials of Construction
- Only some pipes need to be cleaned frequently
- Some pipes may almost never need cleaning

Hotel Cleaning

- Switch from Gymnasium Cleaning to Hotel Cleaning
- Only clean pipes that need cleaning (~30% -75% need to be cleaned)
- Prevent mainline blockages and SSO's by cleaning before clog occurs.

Minimize cost by using
JUST IN TIME CLEANING



PM Program Change - Determine cleaning need

- Pre-cleaning inspections: determine *extent of pipe blockage* (i.e., define cleaning need)
 - Use acoustic tool: Sewer Line Rapid Assessment Tool
 - Inspect over 10,000 ft/day



Interceptor/Trunkline Evaluation

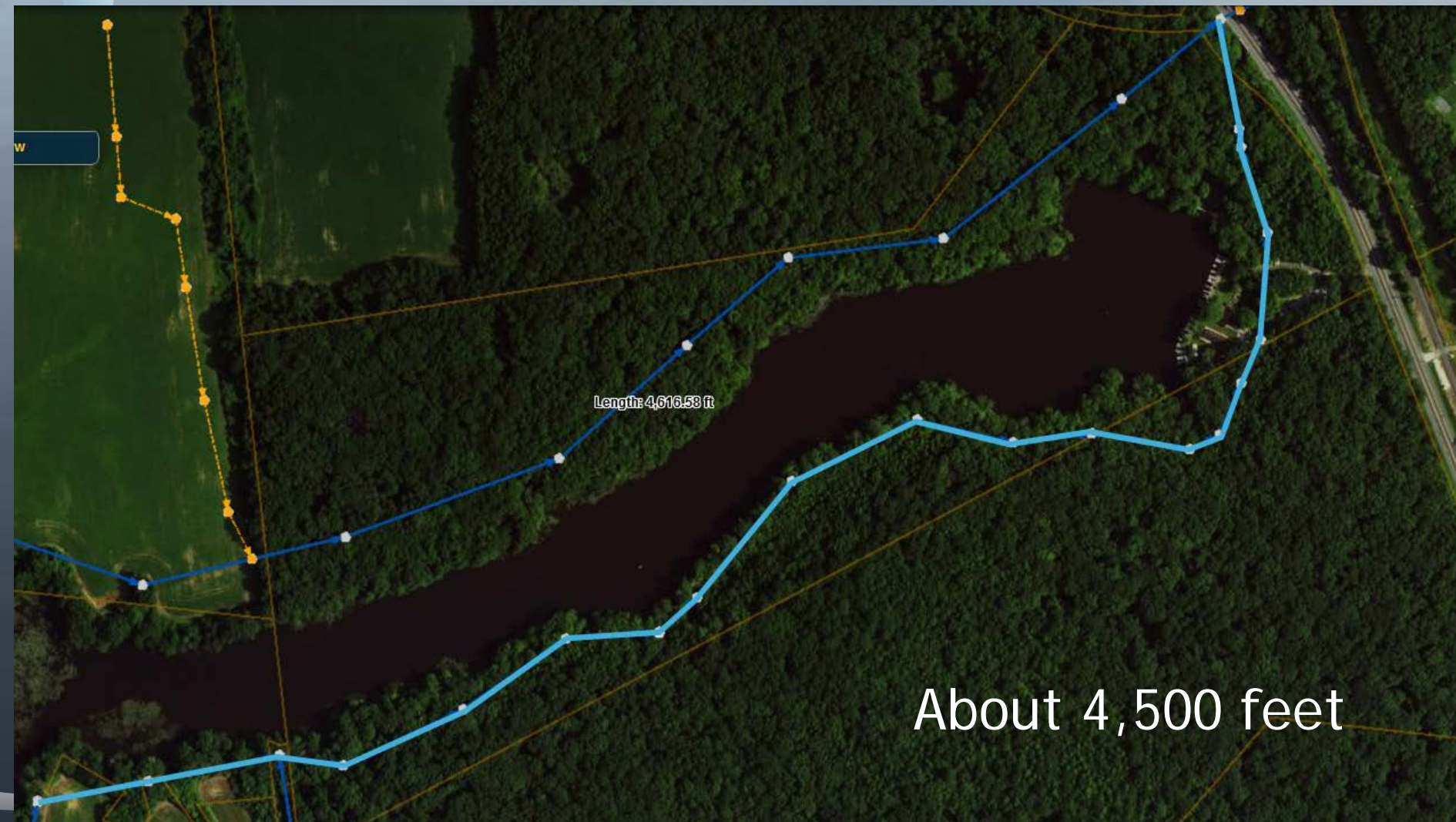
- Typical Sewer Basin Rehabilitation Process
 - Flow Monitoring and Modelling
 - Conduct Smoke Testing and CCTV as needed in Neighborhoods
 - Rehabilitate Neighborhood Sewers
 - Best/Least expensive to reduce I/I at the source
 - Evaluate Interceptors/Trunklines
 - Rehabilitate or Replace Interceptors/Trunklines
- Sewer Cleaning is first step in Evaluation

Interceptor/Trunkline Evaluation

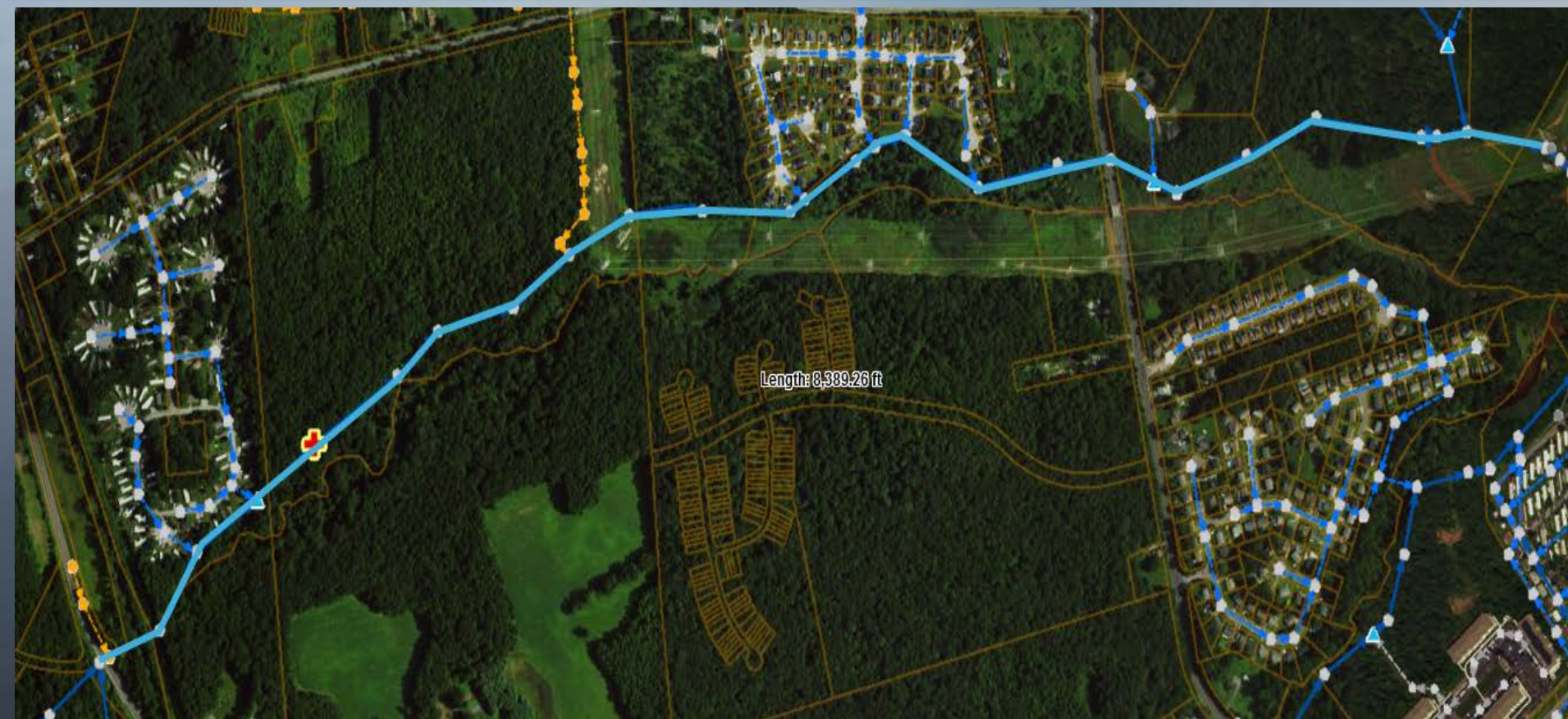
- Interceptor/Trunkline Challenges
 - Large Diameter Pipe
 - Requires a lot of water for cleaning
 - Large Amount of Debris
 - Quantity and size
 - Poor Access
 - Requires detailed planning/coordination
- NCC has used Doetsch Environmental
 - Recycles wastewater for cleaning
 - Cleans up to 6,000 feet from one location



South Christiana Evaluation - Part 1A



South Christiana Evaluation - Part 1B



About 8,500 feet

Thank you!



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