

Regular Workshop – January 23, 2017
Agenda Item 7

Agenda Item: Inflow and Infiltration (I&I) Pilot Study Project Status

Presenter: Town Manager & Staff

Summary: The Town Commission requested a staff update on the recent Inflow & Infiltration Pilot Study (I&I) and engineering recommendations. The Public Works Director and Ms. Laura Baumberger with Carollo Engineers will present an update on the Town's I&I Pilot Study Project, and future plans.

Attachments: 1-18-17 Memo, Public Works Director to Manager;
Carollo Engineers' PowerPoint Presentation.

Recommended
Action: None, informational only.

M E M O R A N D U M

Date: January 18, 2017

TO: Dave Bullock, Town Manager
FROM: Juan Florensa, Public Works Director
SUBJECT: Inflow and Infiltration (I&I) Pilot Study Project Status

Inflow and Infiltration (I&I) occurs in all sewer systems. Some to a greater extent than others due to factors such as pipe material, age, quality of installation, soil conditions, groundwater table. A high groundwater table causes coastal areas to have more infiltration. I&I cannot be eliminated; it can only be reduced (similar to beach erosion).

On April 20, 2015, Town staff and Carollo Engineers' Ms. Laura Baumberger presented an update on the Town's I&I study, project status, and future plans. The recommendation in the original study was for a Pilot Study Project on Broadway Street and Jungle Queen Way, including analyzing data before and after improvements. The pilot study results are being presented at the January 23, 2017, Regular Workshop Meeting.

Town staff and Ms. Baumberger will present a status update of the project to the Commission and outline how improvements are impacting the operation of our wastewater system.

Please don't hesitate to contact me if you have any questions.

Attachments: Carollo Engineers PowerPoint Presentation

Inflow & Infiltration (I&I) Rehabilitation Pilot Study



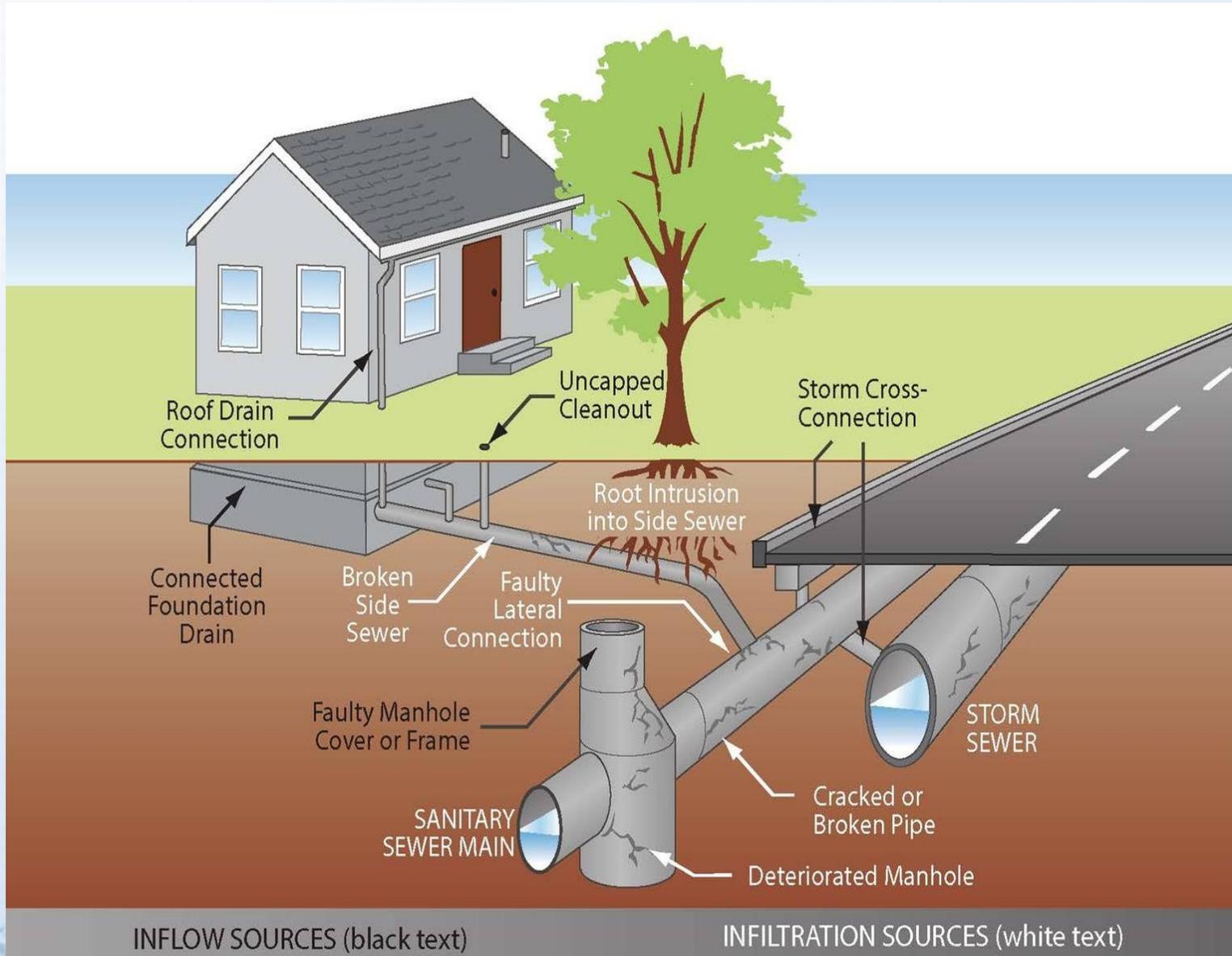
Town Commission Workshop

December 12, 2016

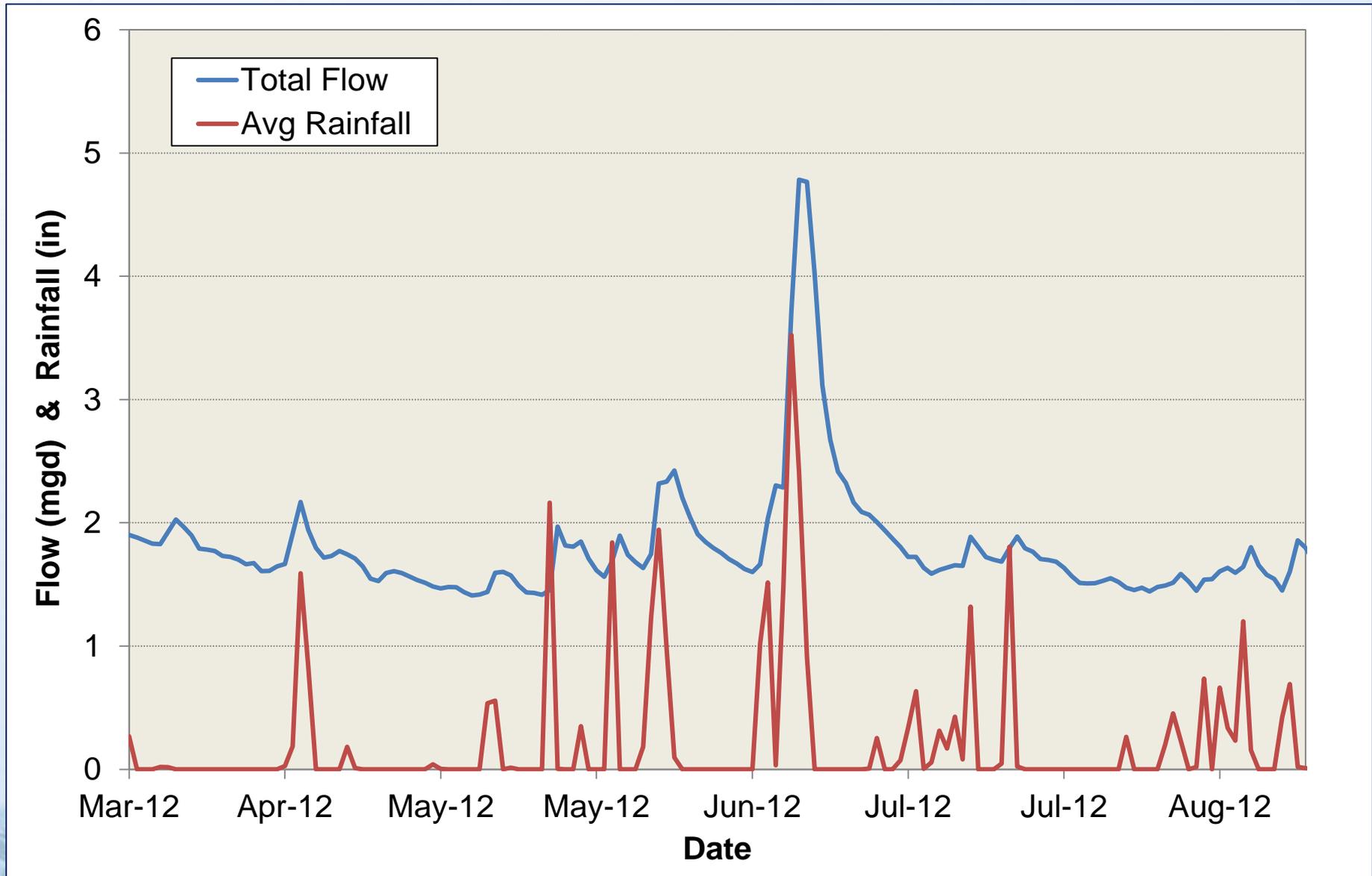
I&I Study and Pilot Study - Background

- I&I Study completed in 2012-2013
- Prioritized recommendations for sewer pipe rehabilitation and repairs
- Procurement of rehabilitation contractors in Fall 2013 for Pilot Study
- Pilot Study is ongoing
 - Two areas selected for monitoring and rehabilitation:
 - Jungle Queen Way - completed
 - Broadway Street - ongoing

What is Infiltration and Inflow (I&I)?



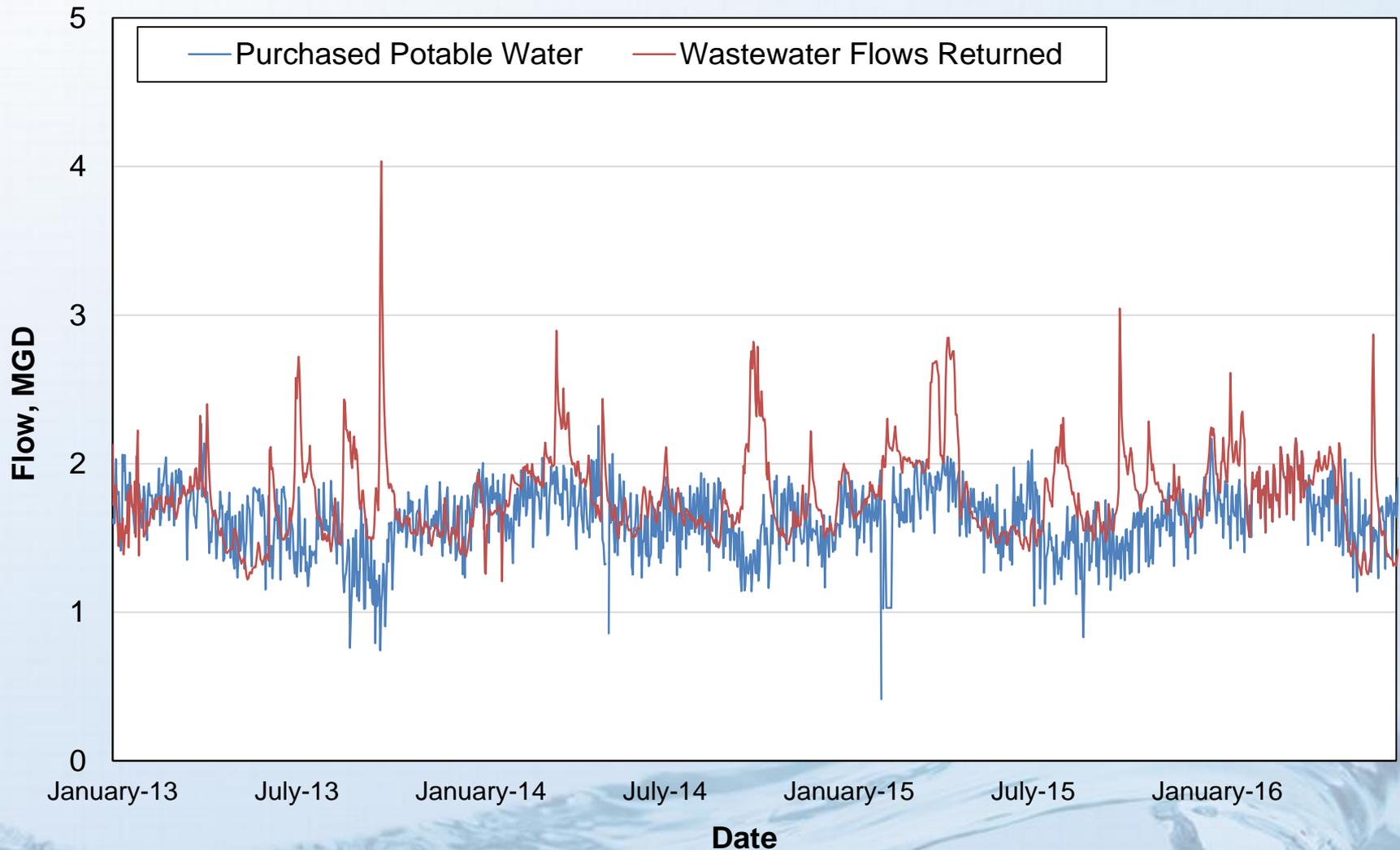
Inflow Occurs During Rainfall Events



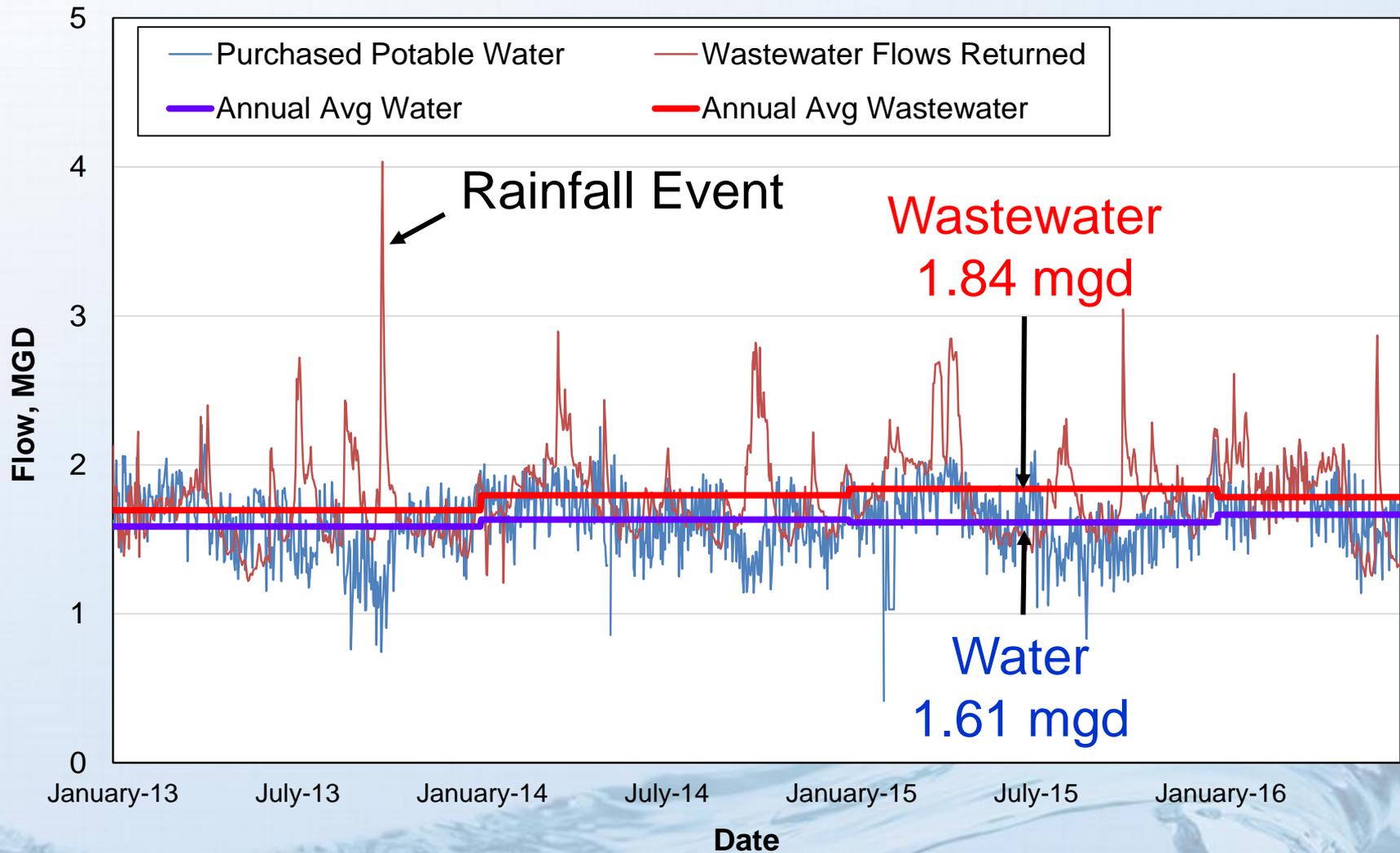
Why is I&I a Problem for Longboat Key?

1. Treatment fees are paid to Manatee County to treat this excess water
2. Manatee County Sewer Use Ordinance requires chloride concentration of less than 287 mg/L

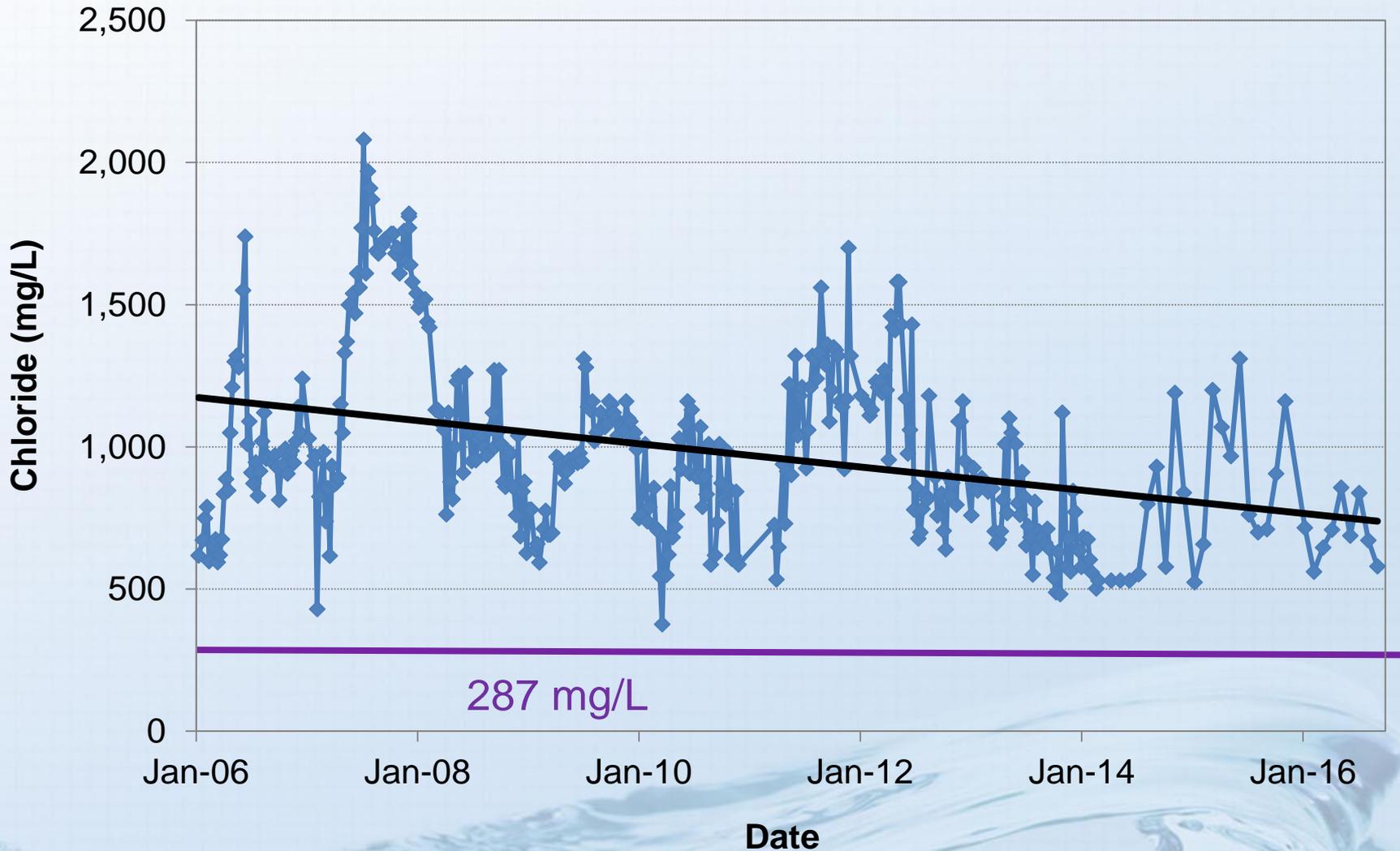
Comparison of Potable Water Purchases and Wastewater Flows Returned



Comparison of Potable Water Purchases and Wastewater Flows Returned



Historical Wastewater Chloride Concentration



287 mg/L

Collection System I&I Study

- I&I Study completed in 2012-2013
- Prioritized areas for I&I reduction and collection system rehabilitation

Flow Meters Installed for Lift Stations A & F



Flow monitoring equipment for LS-F (Manhole E-10).

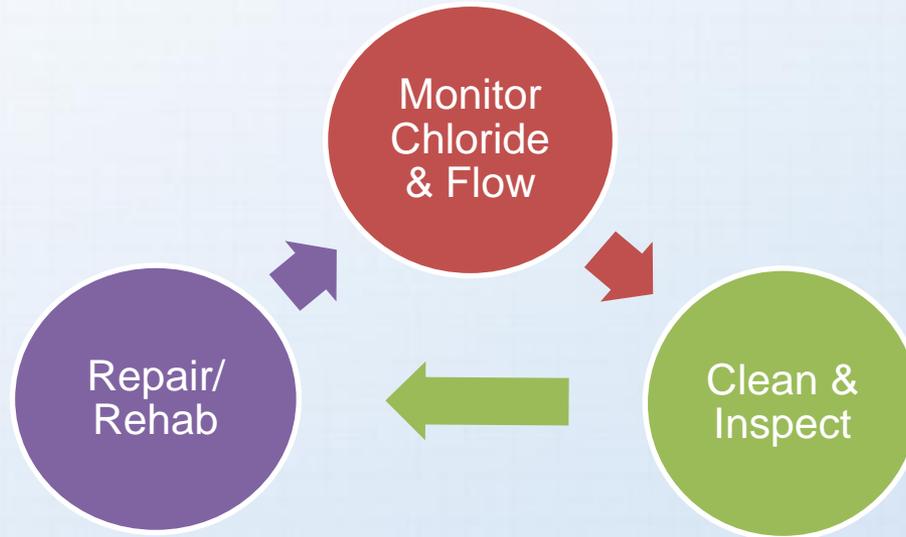
I&I Study Report Identifies Target Areas for Chloride Reduction



I&I Corrective Action Plan

- Based on Town's historical annual budgets:
 - Gravity Sewer Lining and Services: \$600K
 - Wetwell and Manhole Repair: \$75K
- Basin rehabilitation prioritized based on infiltration (chloride mass) and inflow.
- Focus areas for infiltration repairs selected using chloride mapping

I&I Study Suggests a Three-Step Rehabilitation Process



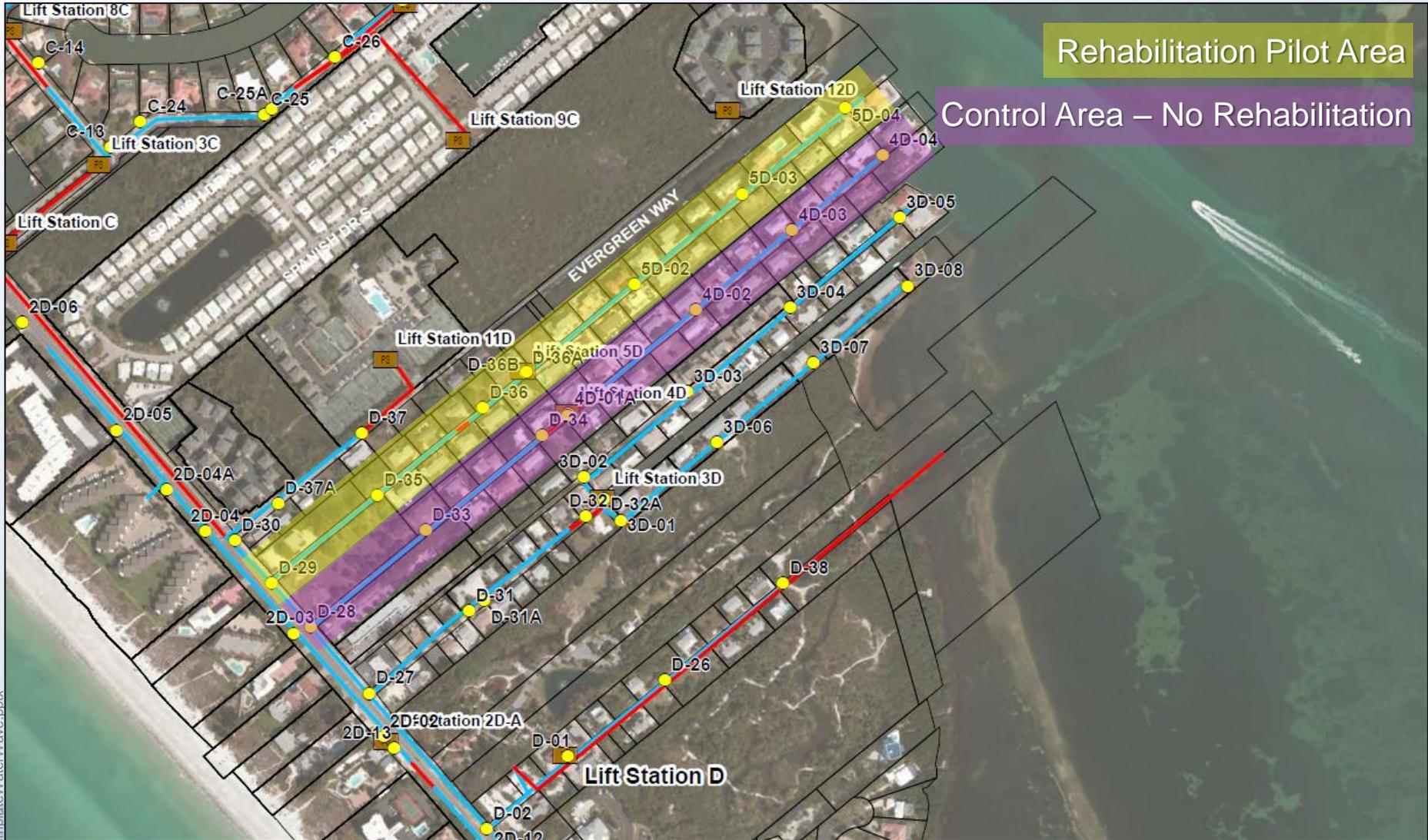
- Options for rehabilitation are dependent on condition and economics of repair
- Each prioritized area should be inspected to determine the appropriate corrective action measures

Pilot Study

I&I Pilot Study

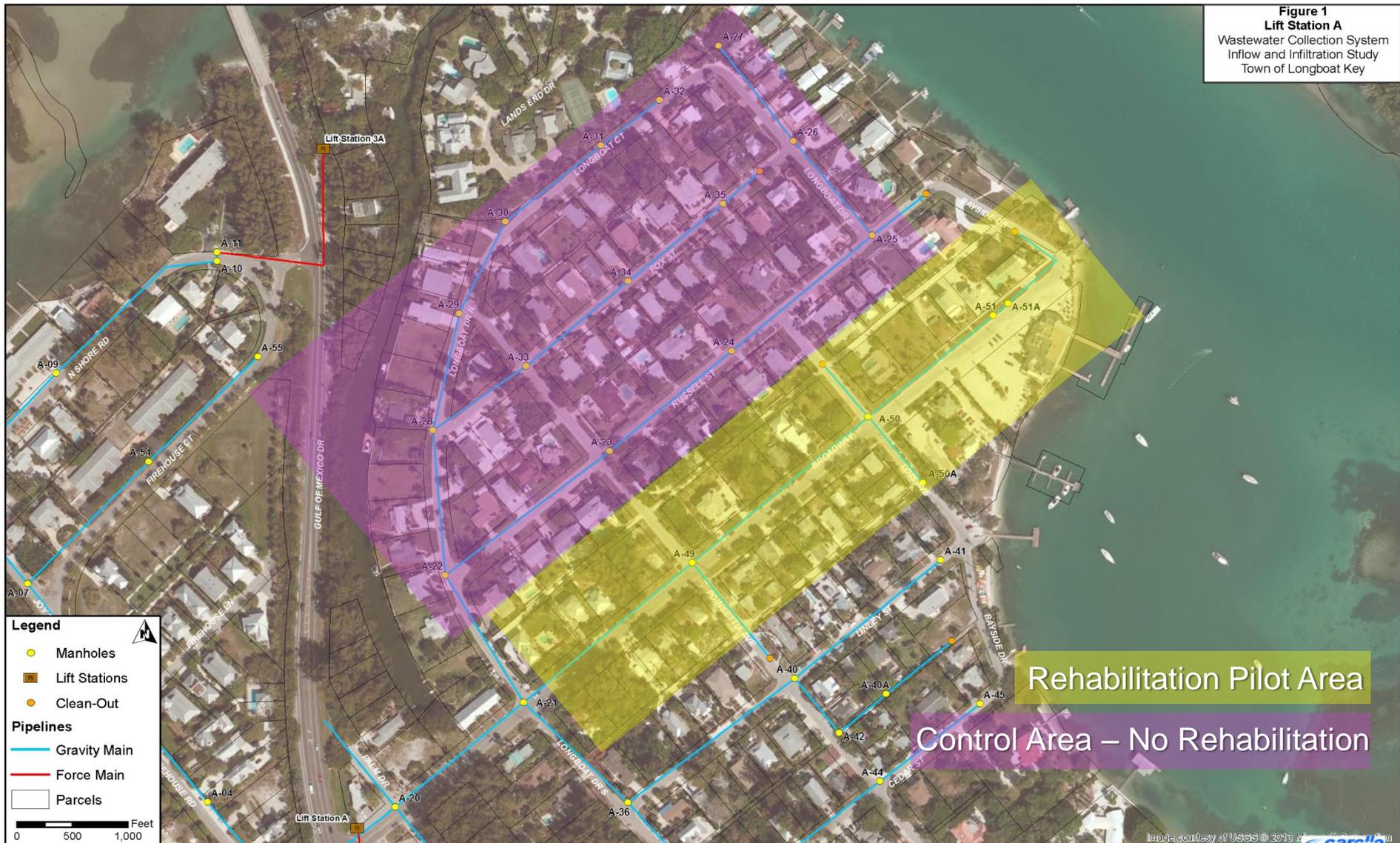
- Selected two areas prioritized for rehabilitation
- Conducted cleaning and testing to determine necessary repairs/rehabilitation
 - Fog testing
 - Pipeline cleaning and video inspection (mainlines and laterals to homes)
 - Manhole inspections
- Perform rehabilitation
- Measure improvements (decrease) in chloride concentration and flow

Pilot Test Area – Jungle Queen Way



Pilot Test Area – Broadway Street

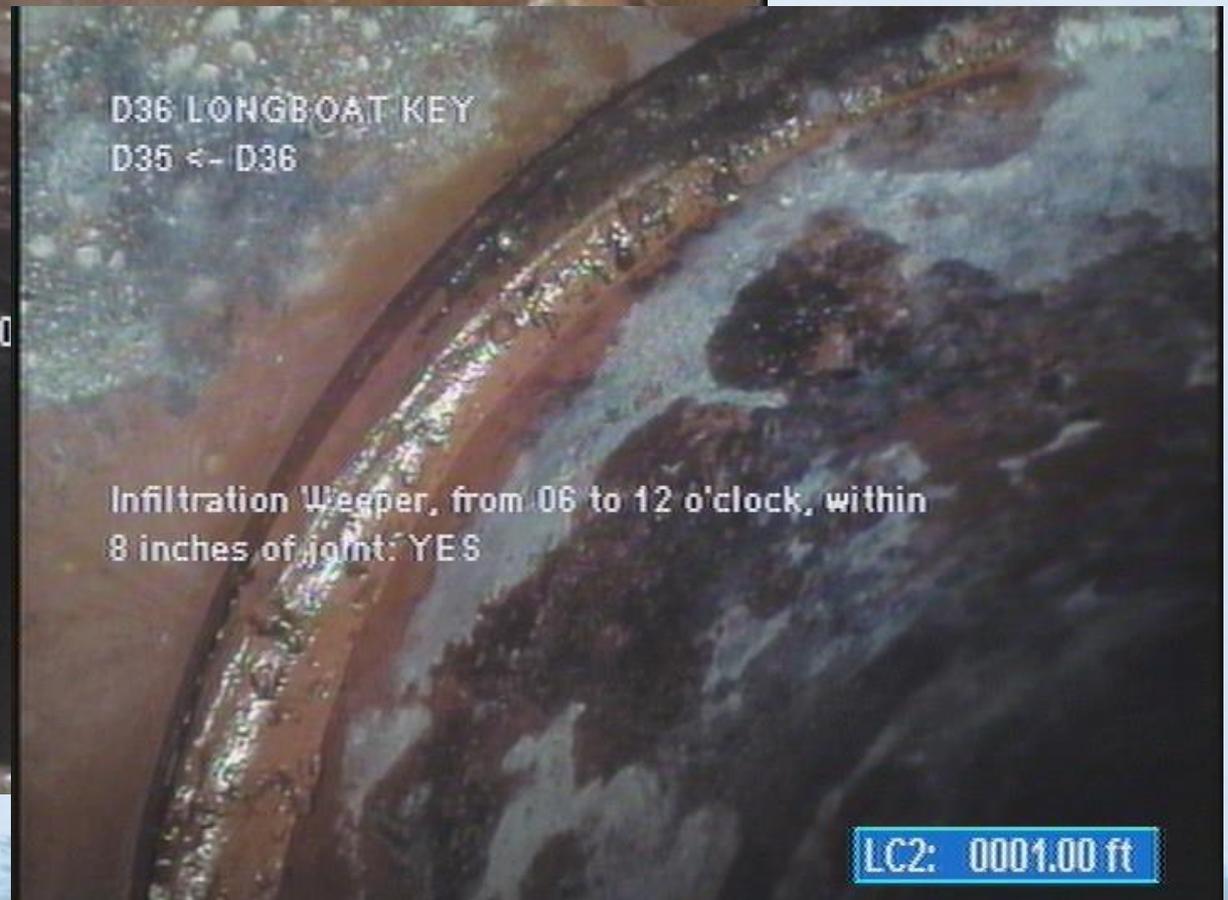
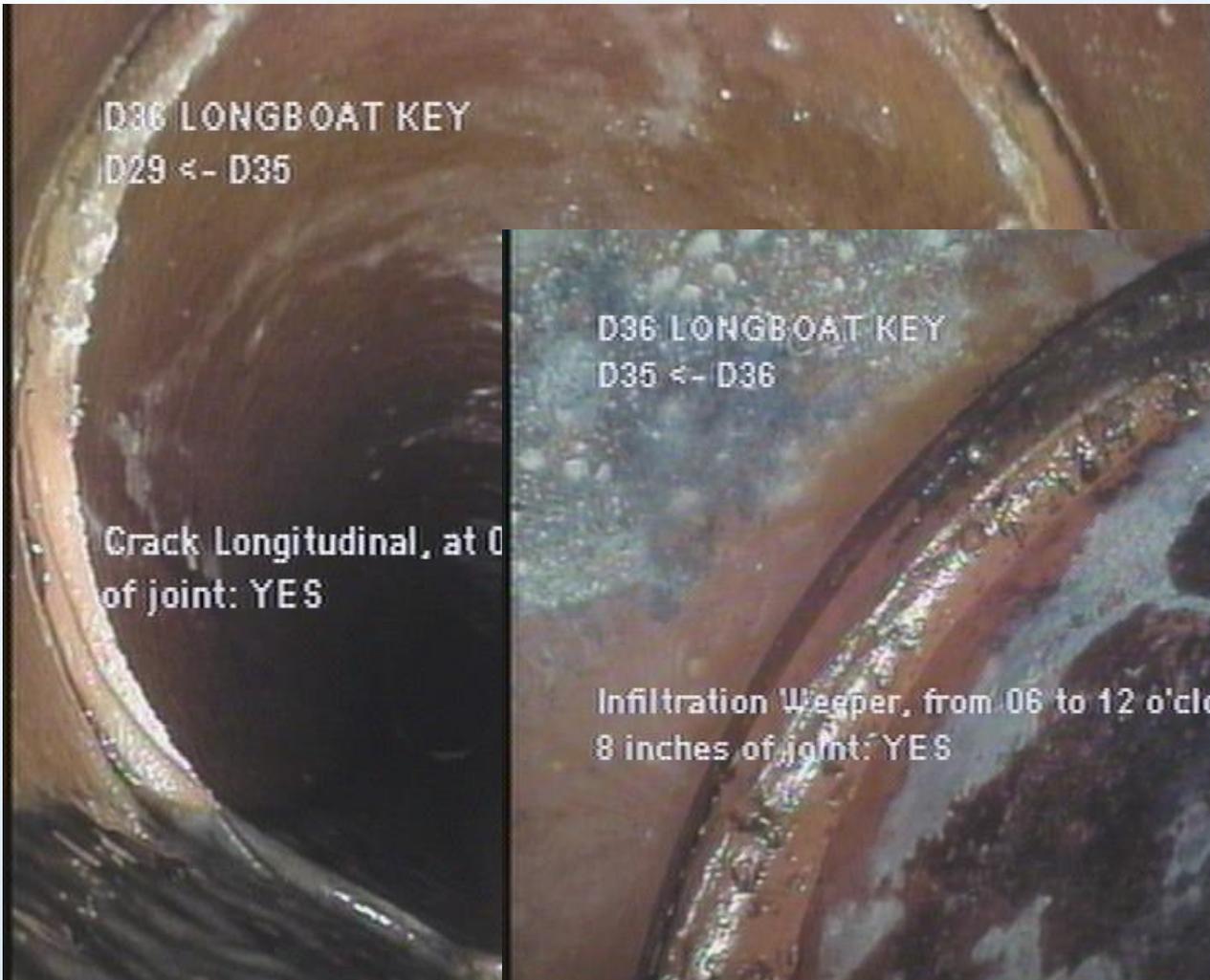
Figure 1
Lift Station A
 Wastewater Collection System
 Inflow and Infiltration Study
 Town of Longboat Key



Rehabilitation Pilot Area

Control Area – No Rehabilitation

Pilot Study – Pipeline TV and Cleaning



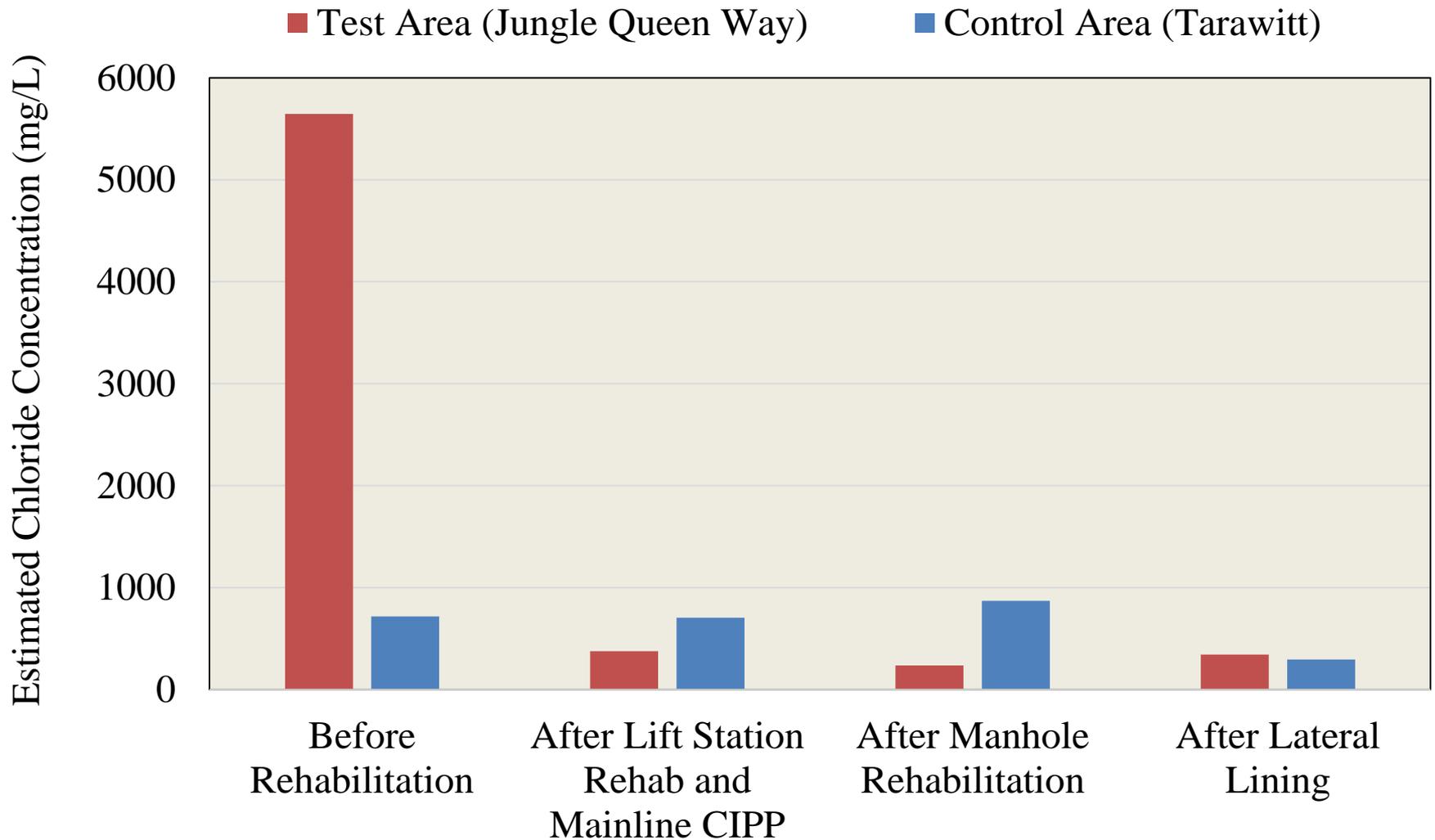
Pilot Study Results on Jungle Queen Way – Laterals to Homes

Address	Material	Length (ft)	Remarks/Recommendations
708 JQW	VCP	11	Good condition
687/705 JQW	VCP	6	Good condition
690 JQW	VCP	10	Recommend CIPP lining (crack)
798 JQW	VCP	12	Good condition
780 JQW	VCP	12	Good condition
777 JQW	VCP	9	Recommend CIPP lining (infiltration)
762 JQW	VCP	13	Recommend CIPP lining (infiltration)
765 JQW	VCP	8	Good condition
744 JQW	VCP	12	Recommend CIPP lining (infiltration)
741 JQW	VCP	11	Recommend CIPP lining (infiltration)
726 JQW	VCP	12	Recommend CIPP lining (infiltration)

Summary of Jungle Queen Way Pilot Study

- Previously unlined
- Installed Cured-in-Place-Pipe (CIPP) in the mainline
- Lined laterals where needed, based on inspection
- Repaired and lined manholes where needed
- Rehabilitated Lift Station 5D wetwell

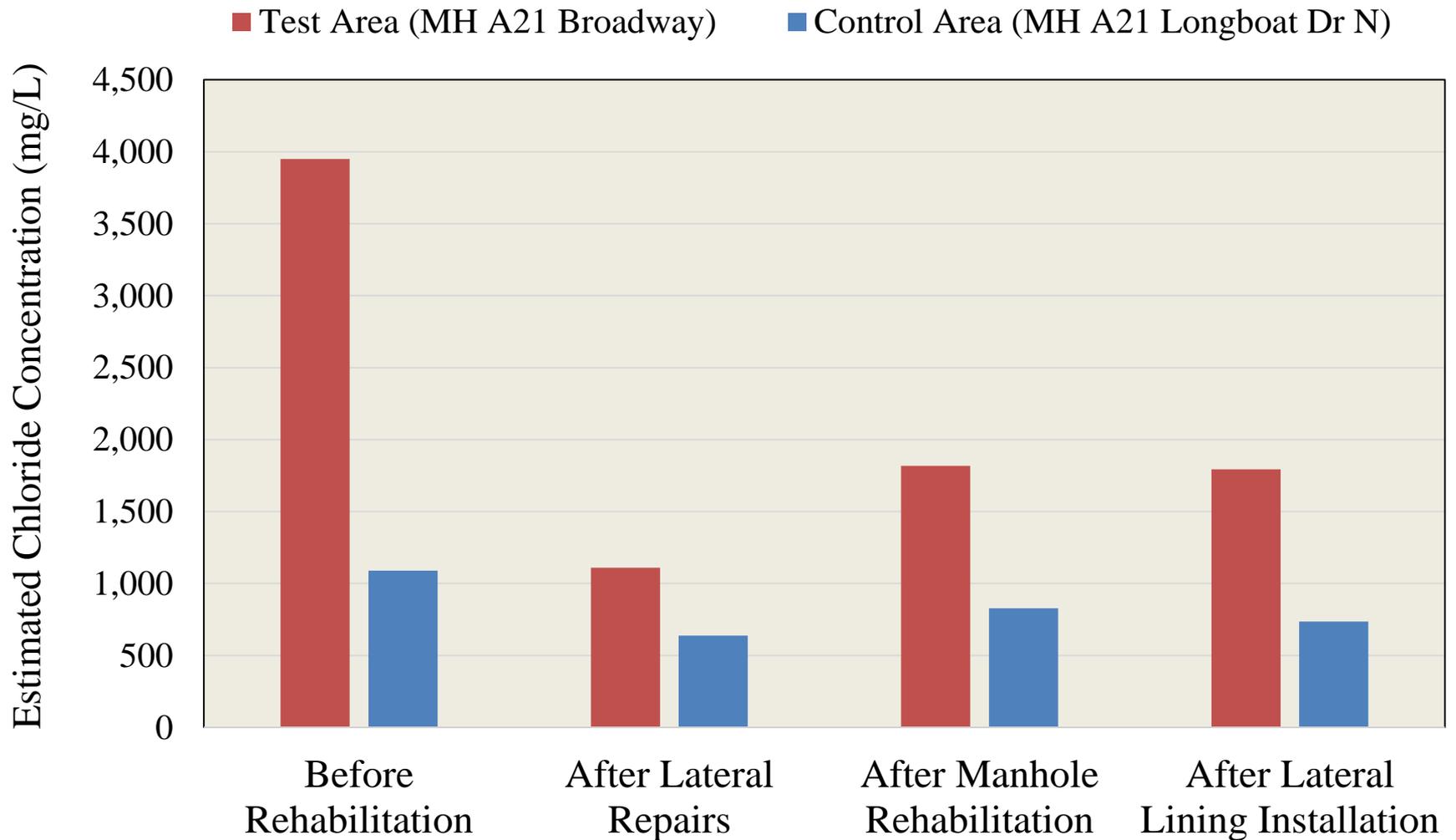
Jungle Queen Way – Pilot Study Results



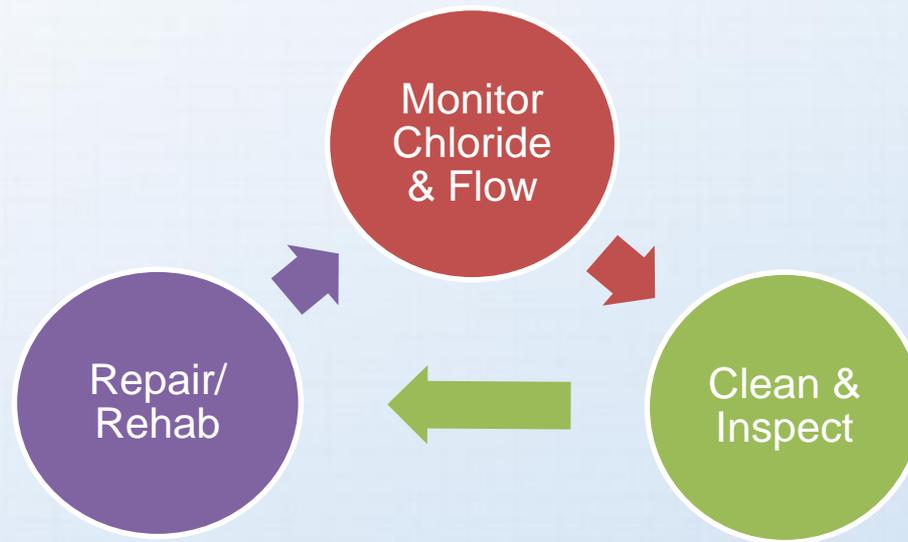
Summary of Broadway Pilot Study to Date

- Mainline previously lined with CIPP and top-hats installed on some laterals
- Previously installed CIPP seen during video inspections and found to be in good condition
- Repaired/lined four laterals that were in poor condition
- Next step - Will install manholes on side streets to allow lining of those streets

Broadway Street – Results to Date



Pilot Study Supports a Three-Step Rehabilitation Process



- Options for rehabilitation are dependent on the condition and economics of repair
- Each prioritized area should be inspected to determine the appropriate corrective action measures
- Targeted I&I repairs provide highest cost-benefit

Pilot Study Recommendations

1. Inspect areas identified in I&I Study
 - Fog testing
 - Video inspection of mainline and laterals
 - Manhole and lift station inspections
2. Determine the appropriate rehabilitation/repair in those areas
3. Ongoing monitoring of flow and chloride concentration

Town is Moving Forward with a Comprehensive and Efficient Approach to Collection System Rehabilitation

- Previous approach included:
 - Flow/chloride monitoring at major lift stations
 - Cleaning and video inspection
 - CIPP of mainline
 - Installation of “top-hats” on laterals

Town is Moving Forward with a Comprehensive and Efficient Approach to Collection System Rehabilitation

- Recommendations from the I&I Study (a more scientific approach to identifying problem areas) and I&I Pilot Study expand on the existing approach:
 1. Implementation of the I&I Study's rehabilitation plan targets the most problematic areas for inspection/repair
 2. Fog testing added as an inspection technique to identify defects causing inflow
 3. Inspection and CIPP lining of lateral to cleanout allows more comprehensive rehabilitation and better I&I reduction
 4. Simplified sample analysis using handheld conductivity meters improves staff's ability to locate problem areas causing infiltration for inspection/repair

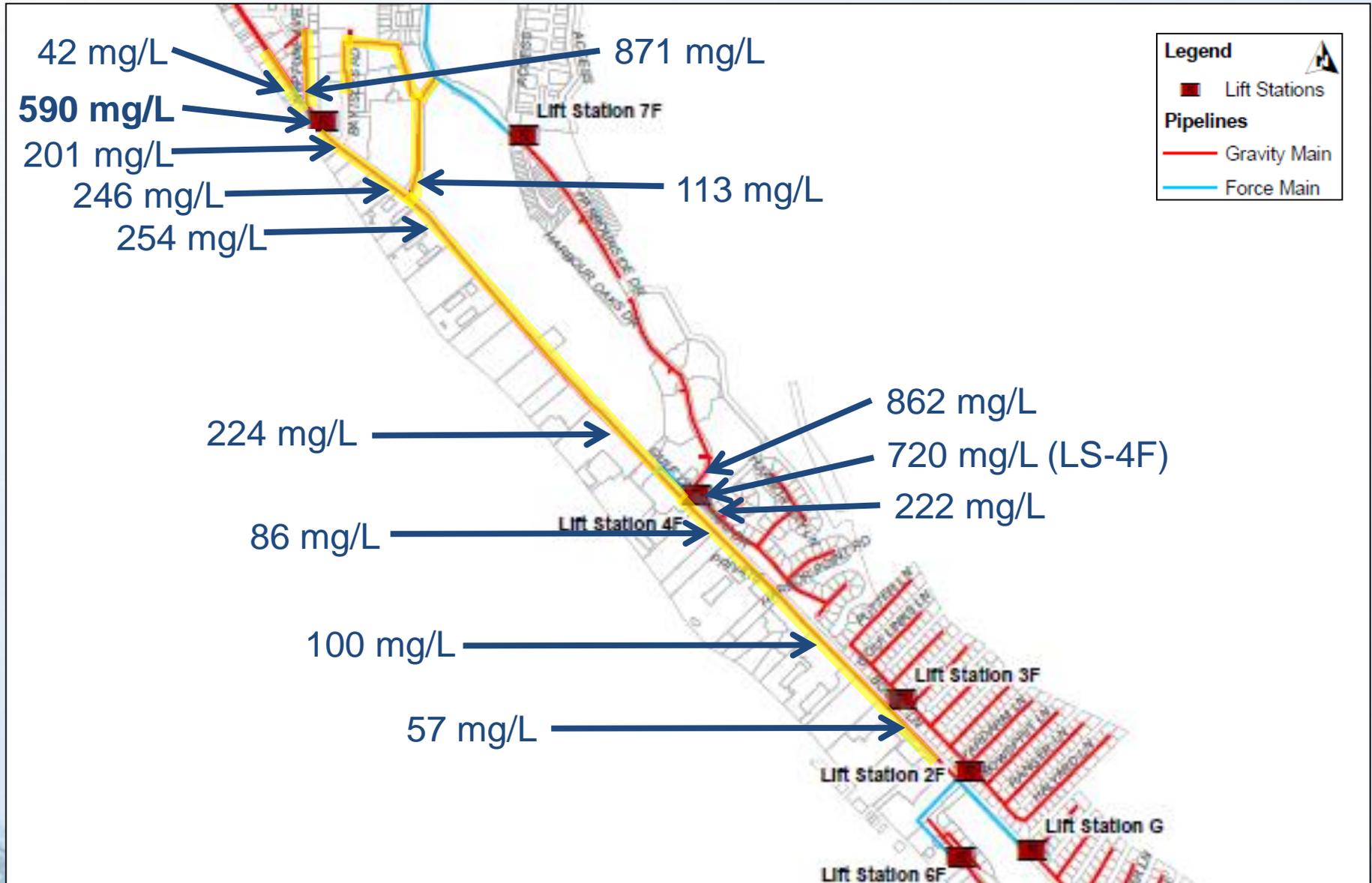
Carollo Engineers, Inc. Recommends:

- Install manholes in The Village – 4th Quarter 2016
- Line remaining streets in The Village after manhole installation – 1st Quarter 2017
- Finalize Pilot Study Report – 3rd Quarter 2017
- Move forward with inspection of other prioritized areas from the I&I Study and based on Town staff input – 2nd Quarter 2017
- On-going monitoring of flow and chloride

Questions?

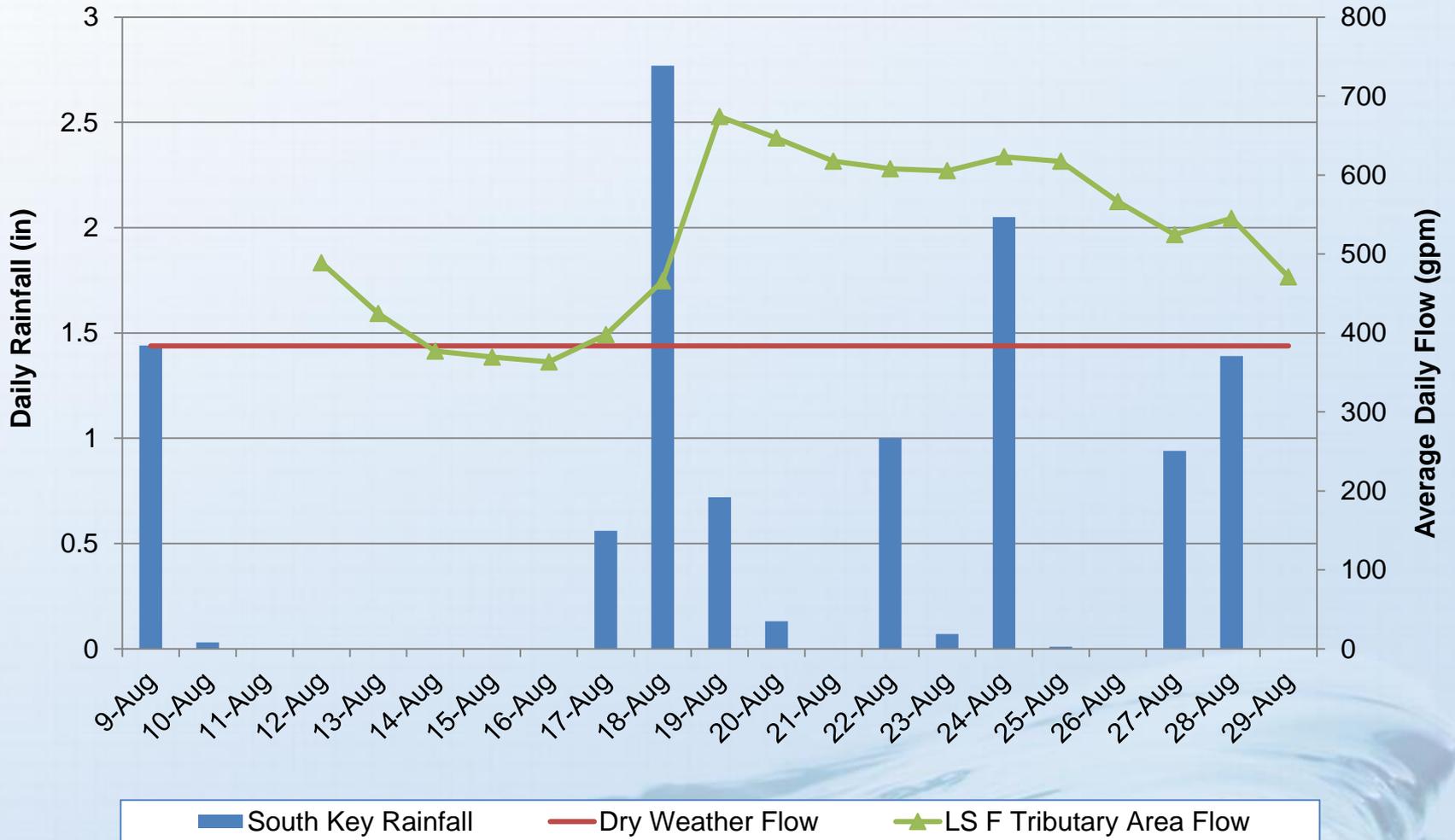
Extra Slides

Lift Station F Chloride Concentration Map



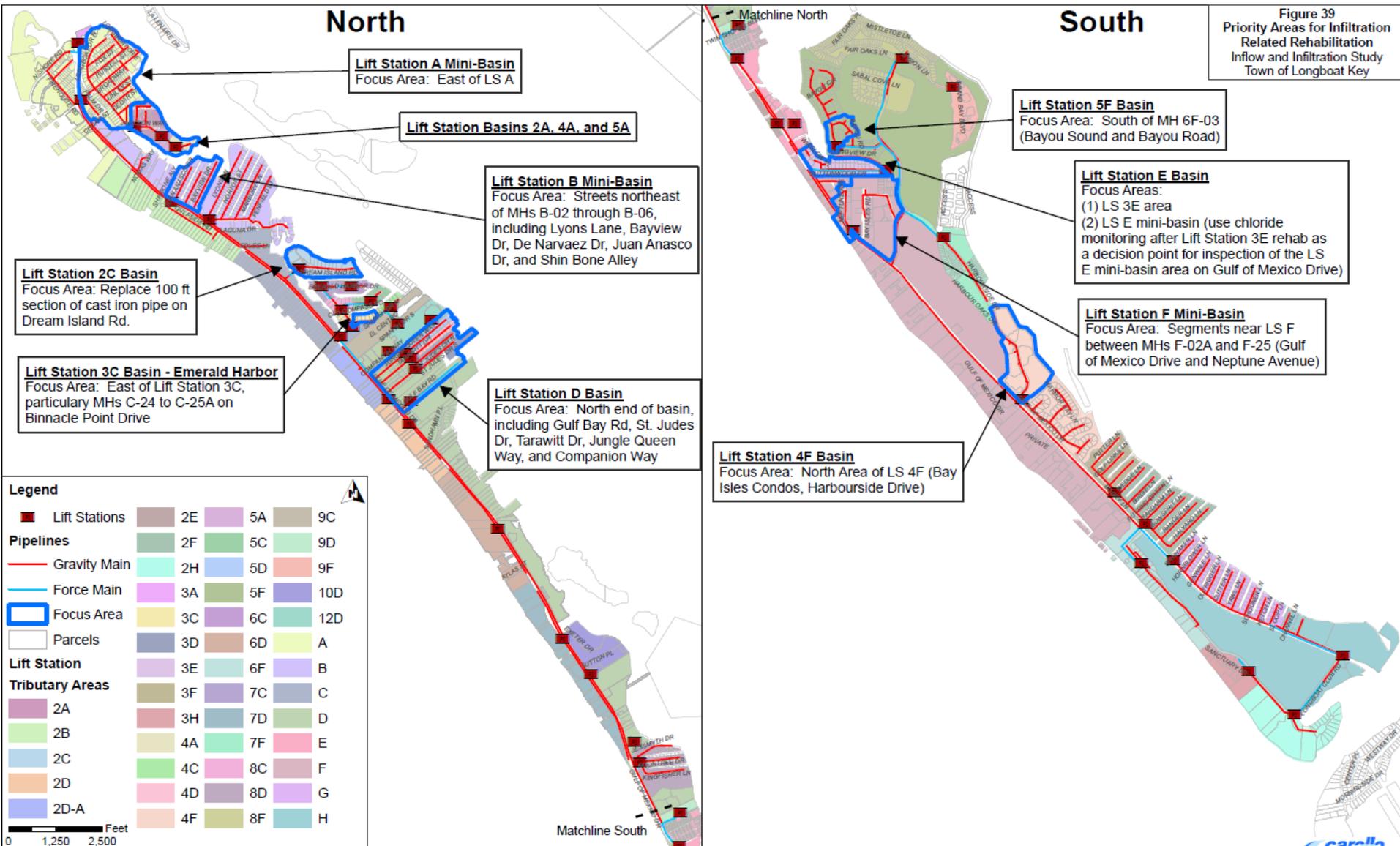
Daily Rainfall and Lift Station F Flow

Lift Station F Tributary Area Hydrograph
(Using flow measured at MH E-10)



Priority Areas for Infiltration Related Rehabilitation

Figure 39
Priority Areas for Infiltration
Related Rehabilitation
Inflow and Infiltration Study
Town of Longboat Key



I&I Corrective Action Plan

Priority	Basin	Scope for Infiltration Repairs	Scope for Inflow Repairs	Estimated Cost	Schedule
1	LS F Mini-Basin	Between MH F-02A and F-25 (Gulf of Mexico Drive and Neptune Ave)	All of LS F Mini-Basin	\$613,000	Year 1
2	LS D Basin	Gulf Bay Rd, St. Judes Dr, Tarawitt Dr, Jungle Queen Way, and Companion Way	LS D Mini-Basin, LS 2D and 2D-A, LS 6D, LS 7D	\$1,867,000	Year 1 - 4
3	LS A Mini-Basin	Area east of LS A	NA	\$1,402,000	Year 4 - 6
4	LS 2C Basin	Entire LS 2C basin	NA	\$247,000	Year 6-7

I&I Corrective Action Plan

Priority	Basin	Scope for Infiltration Repairs	Scope for Inflow Repairs	Estimated Cost	Schedule
5	LS 4F Basin	North area of LS 4F (Bay Isles Condos, Harbourside Drive)	NA	\$807,000	Year 7 - 8
6	LS E Basin	Winslow Place	LS E Mini-Basin	\$573,000	Year 8 - 9
7	LS B Mini-Basin	Lyons Lane, Bayview Dr, De Narvaez Dr, Juan Anasco Dr, and Shin Bone Alley	All of Lift Station B Mini-Basin	\$781,000	Year 9 - 10
8	LS 2A, 4A, and 5A Basins	Inspection and lateral reconstruction of basin areas	NA	\$285,000	Year 10

I&I Corrective Action Plan

Priority	Basin	Scope for Infiltration Repairs	Scope for Inflow Repairs	Estimated Cost	Schedule
9	LS 3C Basin	LS 3C basin area, Binnacle Point Drive	All of Emerald Harbor (LS 3C Basin)	\$372,000	*Note
10	LS 5F Basin	Area south of Manhole 6F-03 (Bayou Sound and Bayou Road)	NA	\$550,000	
11	LS C Mini-Basin	NA	All of LS C Mini-Basin	\$83,000	
12	LS 10D Basin	NA	Work with private owners to reduce inflow in this area.	\$55,000	

***Note:** If actual project costs are less than estimated or available budget increases, accelerate the plan to include additional priority areas as budget allows.

Summary of Total Estimated Cost for Rehabilitation over 10 Years

Infiltration

- Cleaning
- Inspection
- CIPP lining of mainlines
- Lateral reconstruction/lining
- Manhole lining
- Contingency
- Engineering/Admin

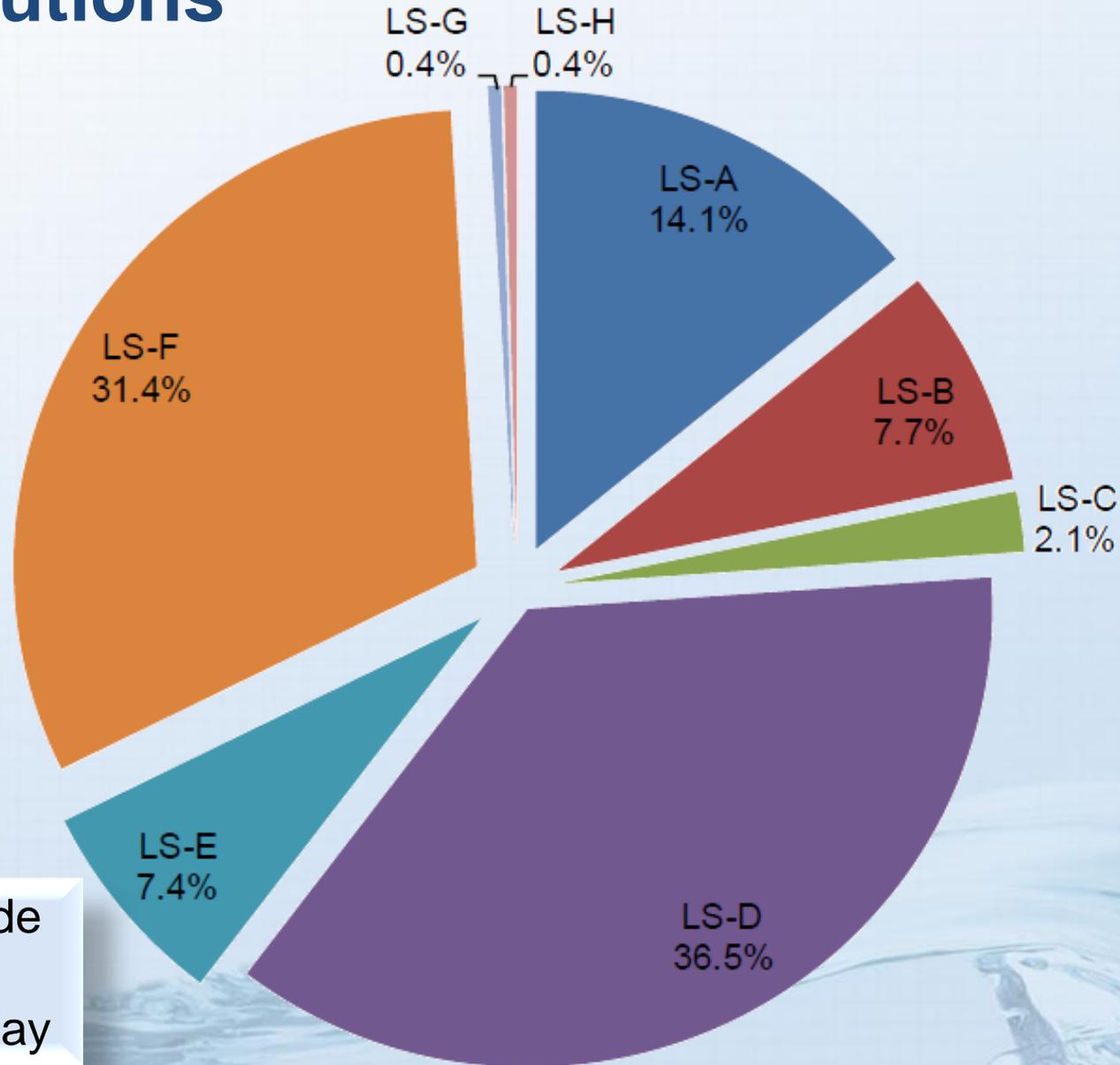
\$5.90 Million

Inflow

- Smoke testing
- Lateral reconstruction/lining (10%)
- Manhole inspection
- Chimney seals
- Inflow dishes
- Contingency
- Engineering/Admin

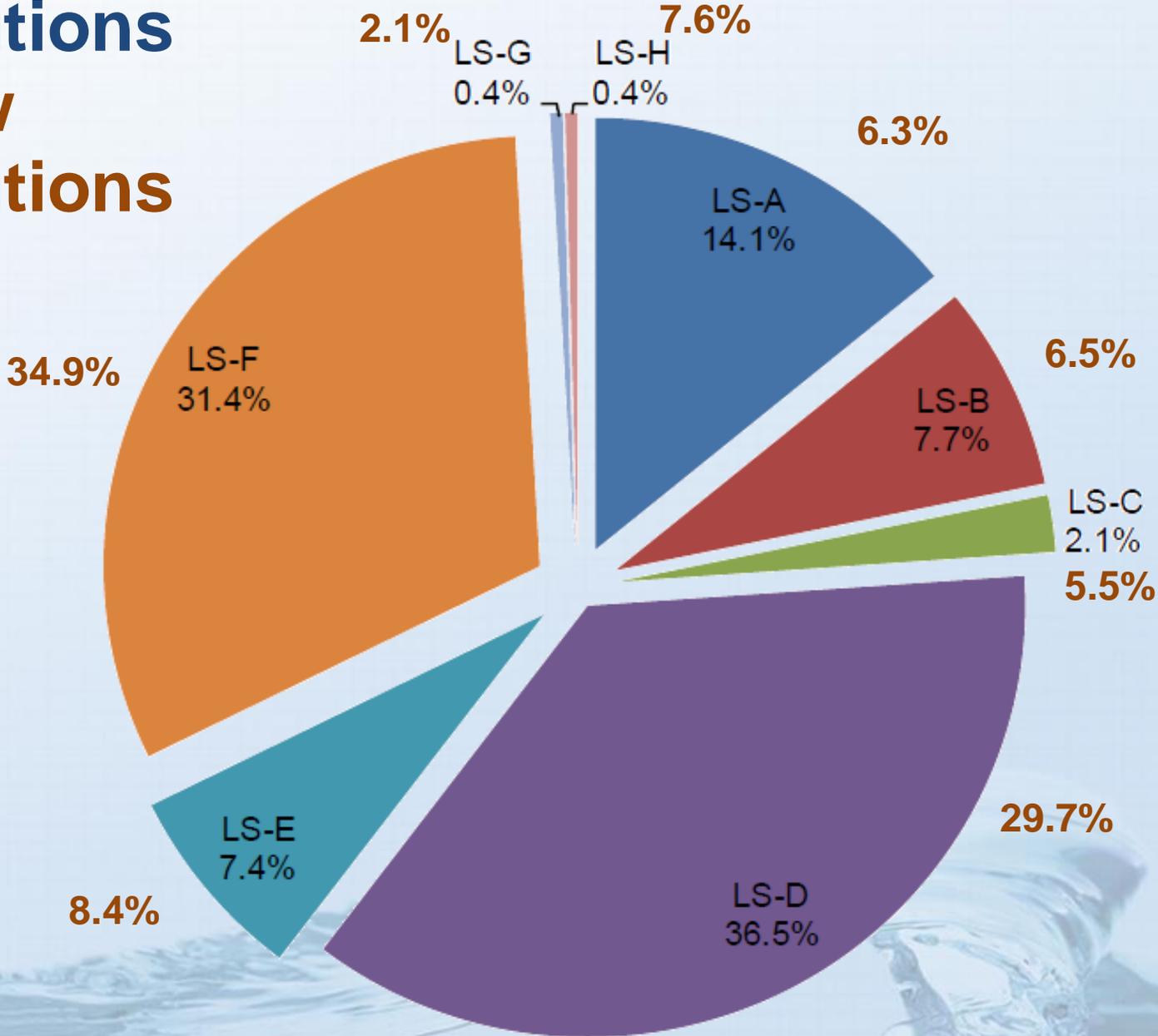
\$0.74 Million

I&I Study Sewer Basin Chloride Contributions

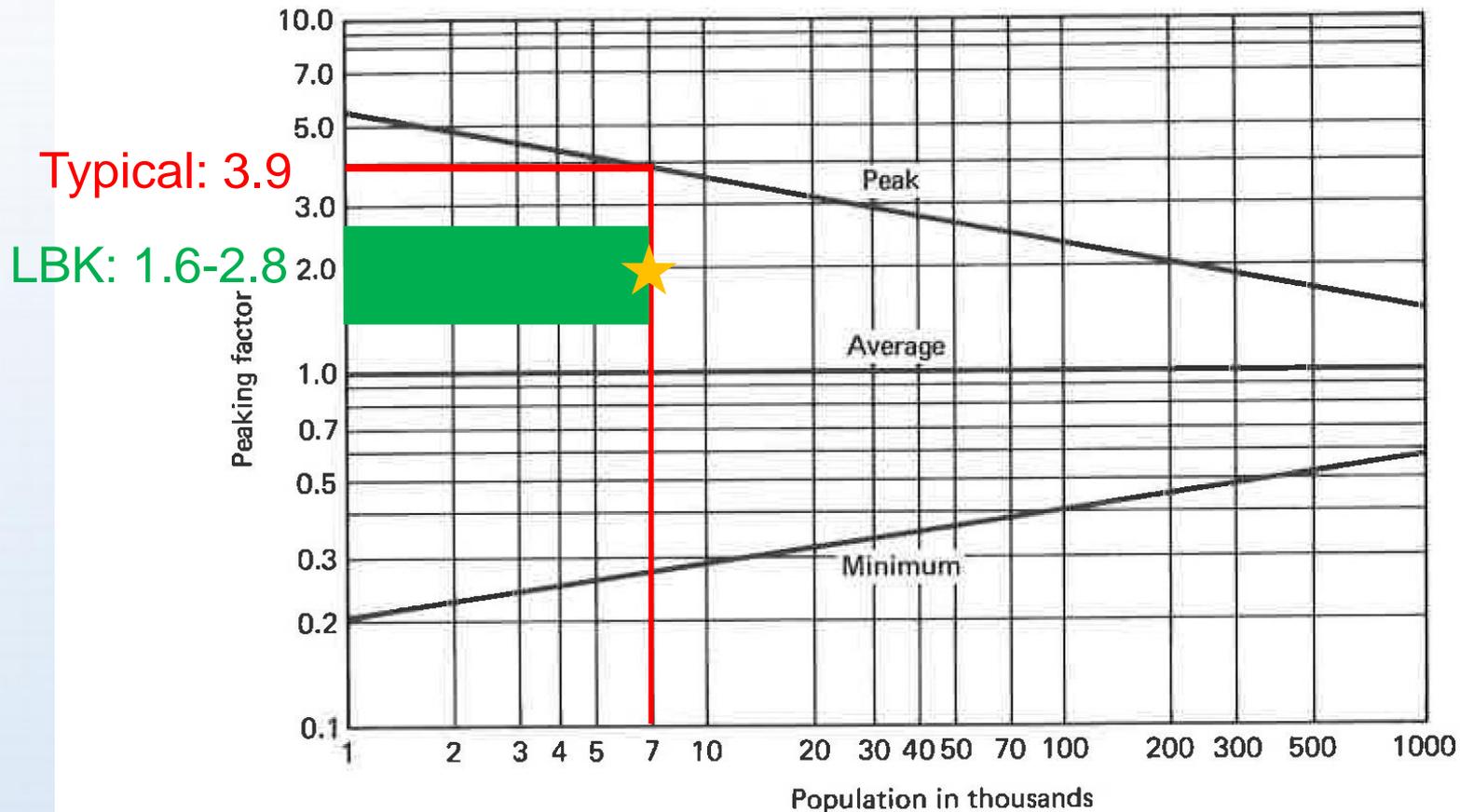


Total Chloride
Mass =
15,610 lbs/day

I&I Study Sewer Basin Chloride Contributions and Flow Contributions



Typical Extreme Flow Peaking Factors



Typical: 3.9

LBK: 1.6-2.8

Figure 3-2 Ratios of Extreme Flows to Average Daily Flow (Peaking Factor) for Municipal Wastewater Under Dry Weather Conditions (from Ref. 16; used with permission of Water Environment Federation, and American Society of Civil Engineers).

I&I Inspection and Rehabilitation Expenditures by Fiscal Year

Fiscal Year	Expenditure
2006	\$694,901
2007	\$368,248
2008	\$440,646
2009	\$499,853
2010	\$734,095
2011	\$370,723
2012	\$234,199
2013	\$219,773
2014	\$46,373
2015	\$16,528
2016	\$523,208
Total	\$4,148,547

CIPP lining, “top hats” on laterals, wetwell rehabilitation, manhole lining and repairs

Pilot Study inspection, cleaning, CIPP lining, lateral lining, manhole repairs, and wetwell rehabilitation

Jungle Queen Way Lift Station 4D and 5D Flows Before and After Rehabilitation

	LS 4D (Tarawitt)	LS 5D (Jungle Queen)
Sept. 1-17, 2013	2.4 gpm	4.6 gpm
March 6-20, 2015	3.4 gpm	6.7 gpm
Aug. 1 – Sept. 29, 2016	1.6 gpm	1.4 gpm
Oct. 1-28, 2016	1.2 gpm	1.2 gpm

↓
After
Rehabilitation



End of Agenda Item