

Infiltration and Inflow



Agenda

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Existing
Conditions

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Why is
Rainfall
Derived
Infiltration &
Inflow
Important?

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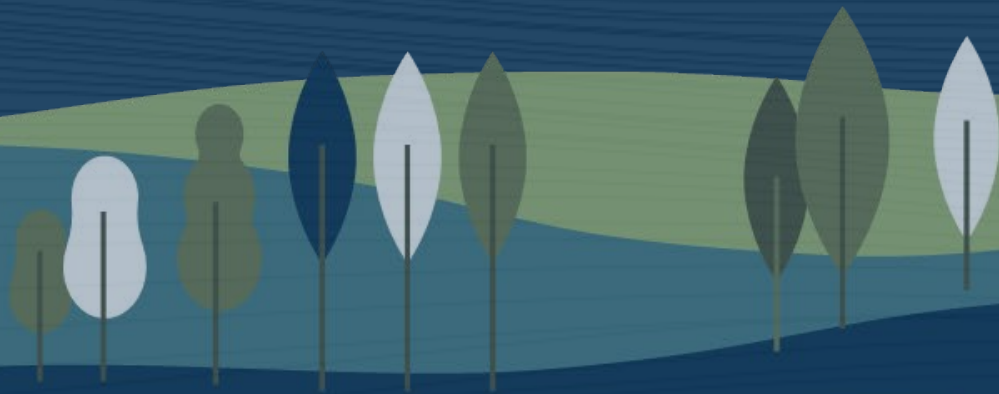
What is the
opportunity?

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What would
a Rainfall
Derived
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Reduction
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Look Like?

Existing Conditions

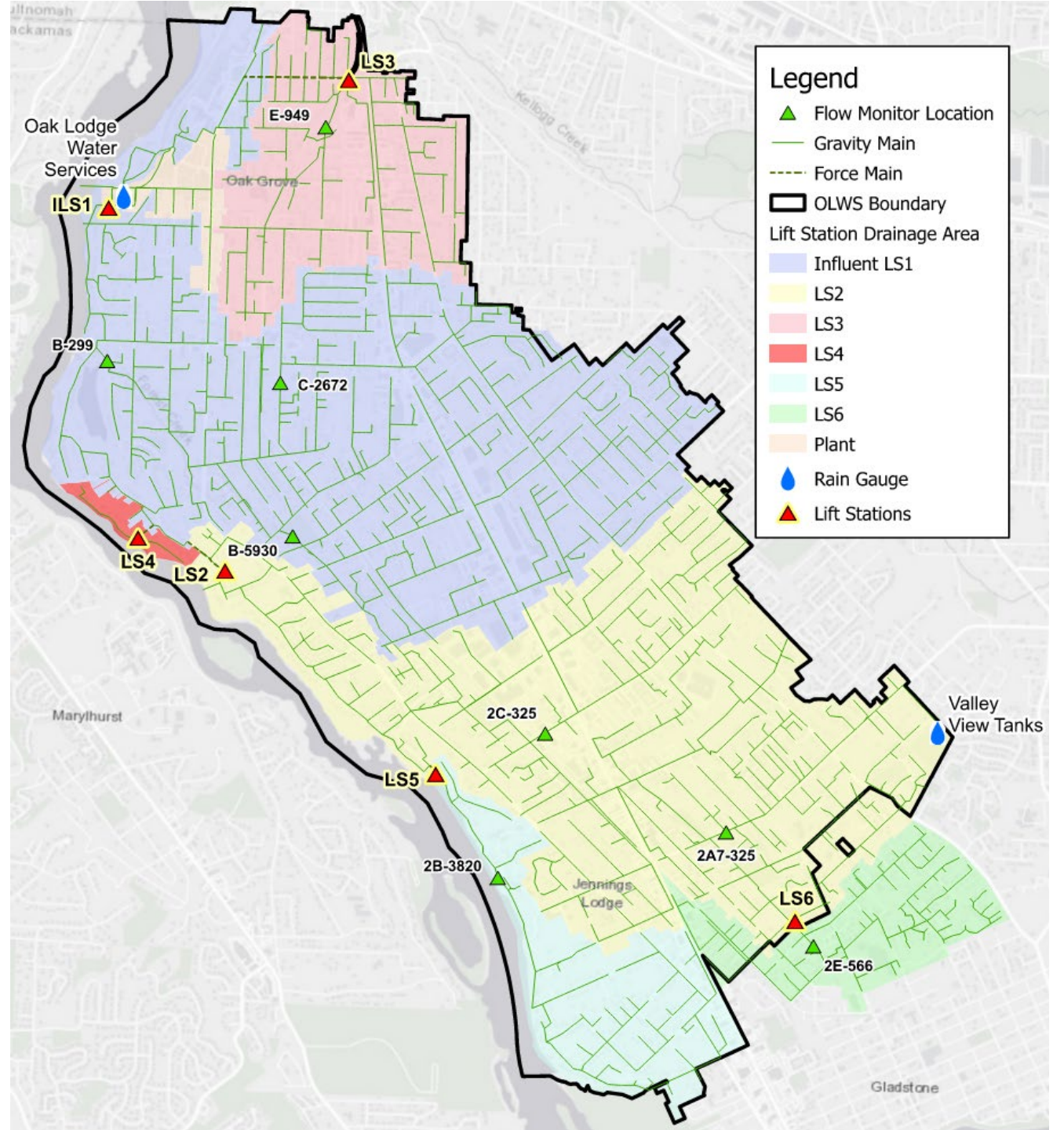
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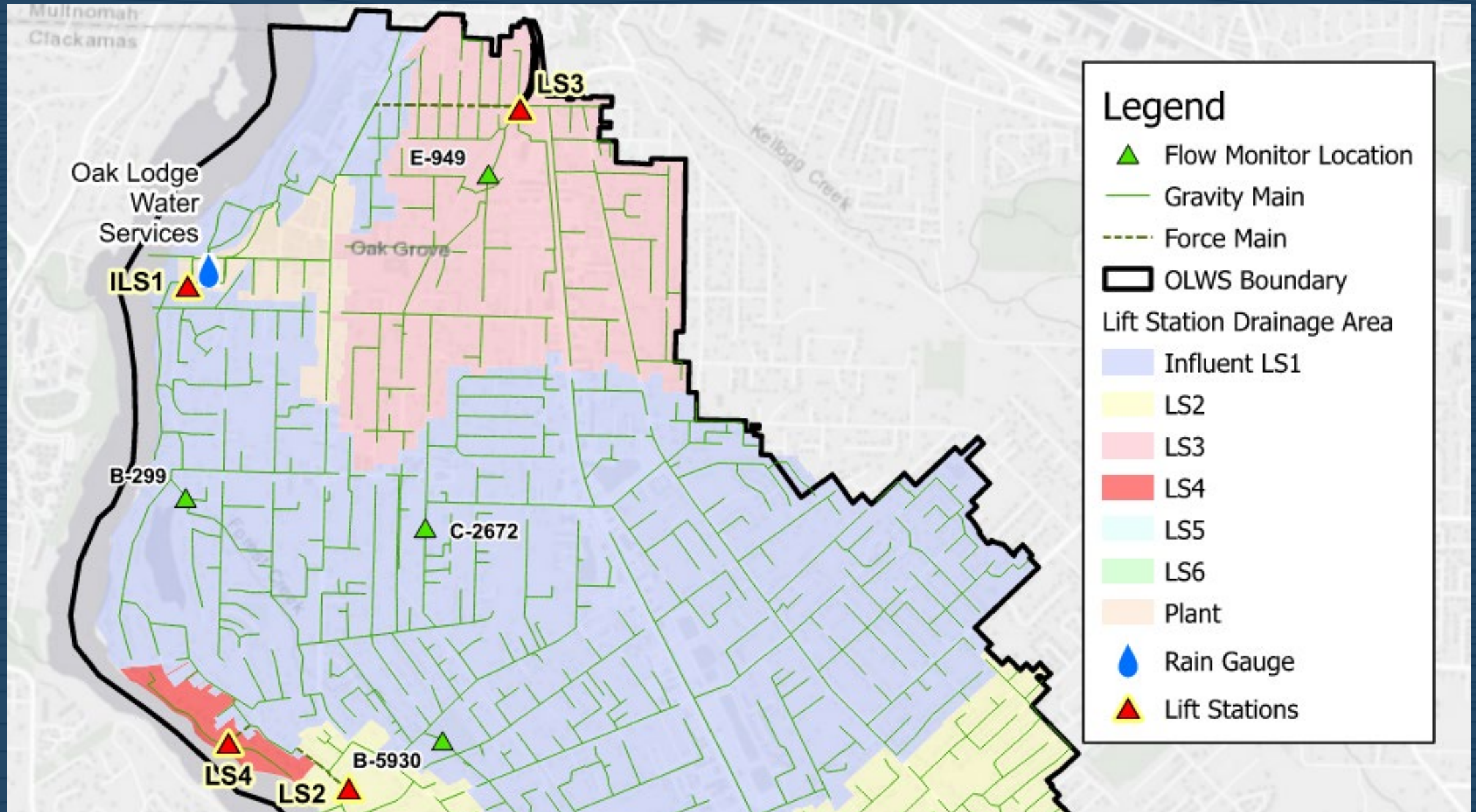
Existing & Future Flows Indicate High I&I

Flow parameter	2022	2052
Equivalent Dwelling Units (EDU)	14,205	16,787
Minimum Month Flow (mgd) – August	1.85	2.19
Average Dry Weather Flow (mgd) – May through October	2.18	2.52
Annual Average Flow (mgd)	3.15	3.49
Peak Day Flow (mgd)	15.05	15.39
Peak Hour Flow (mgd)	19.07	19.41

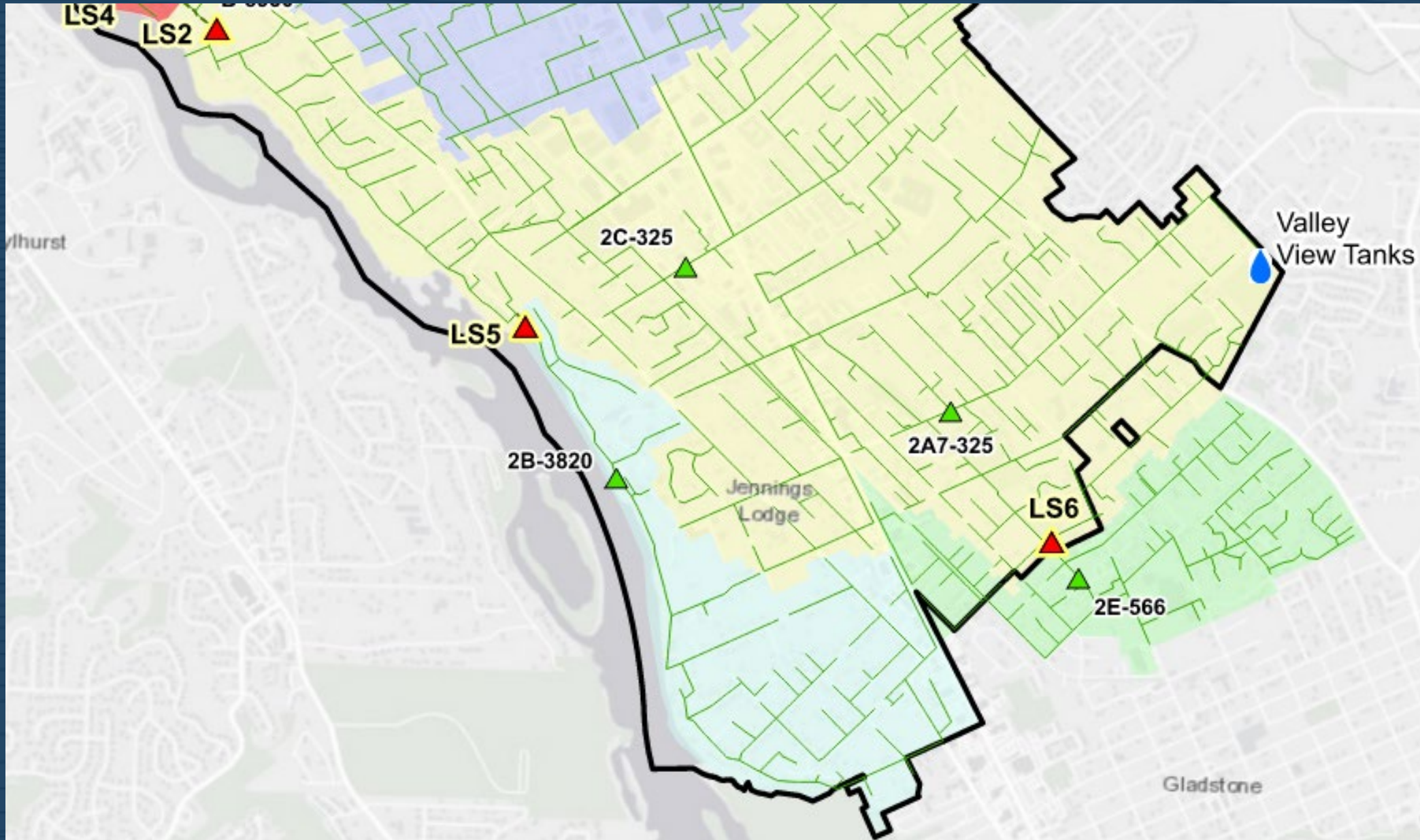
Flow Monitoring of Existing System



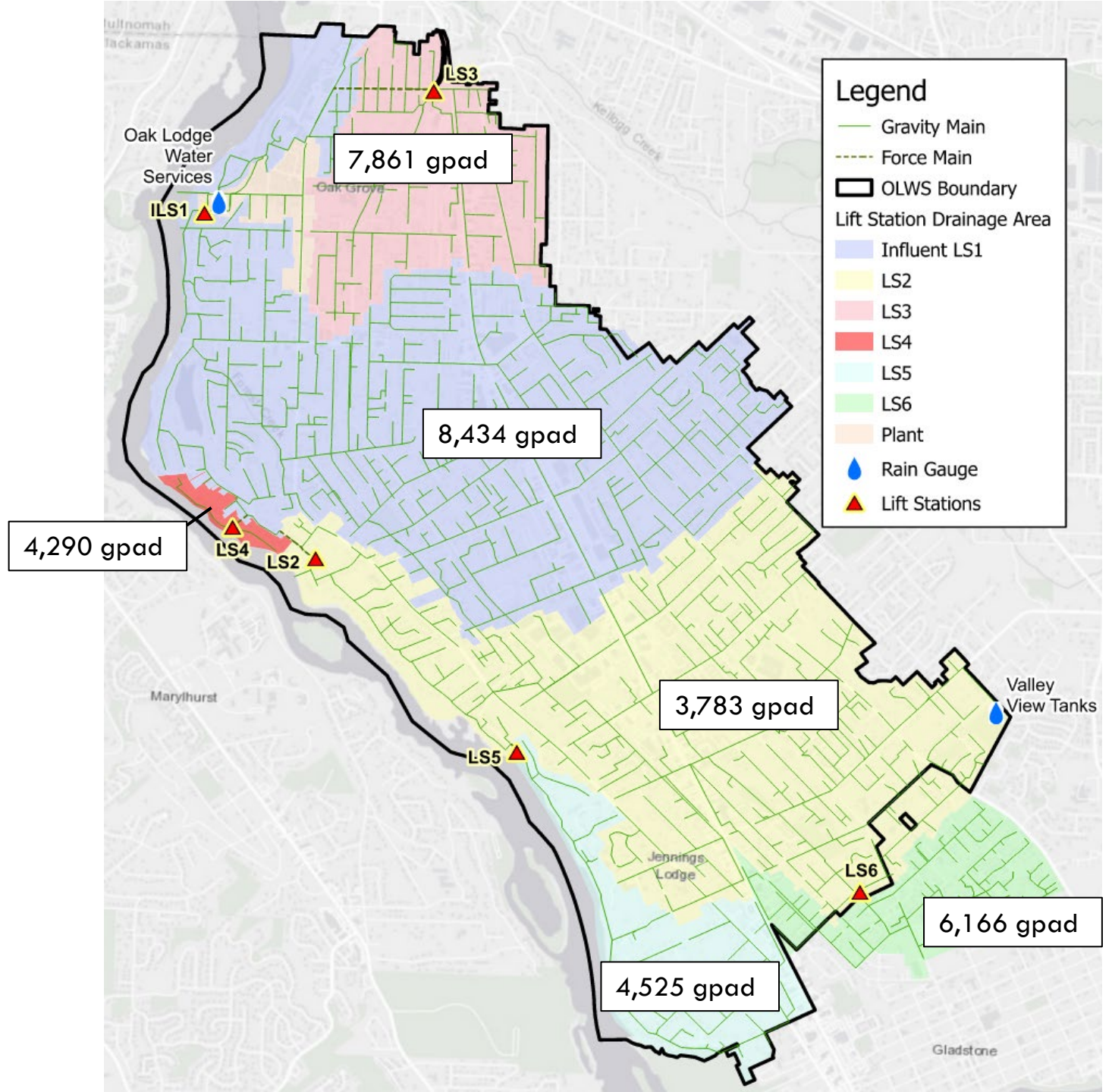
Flow Monitoring of Existing System



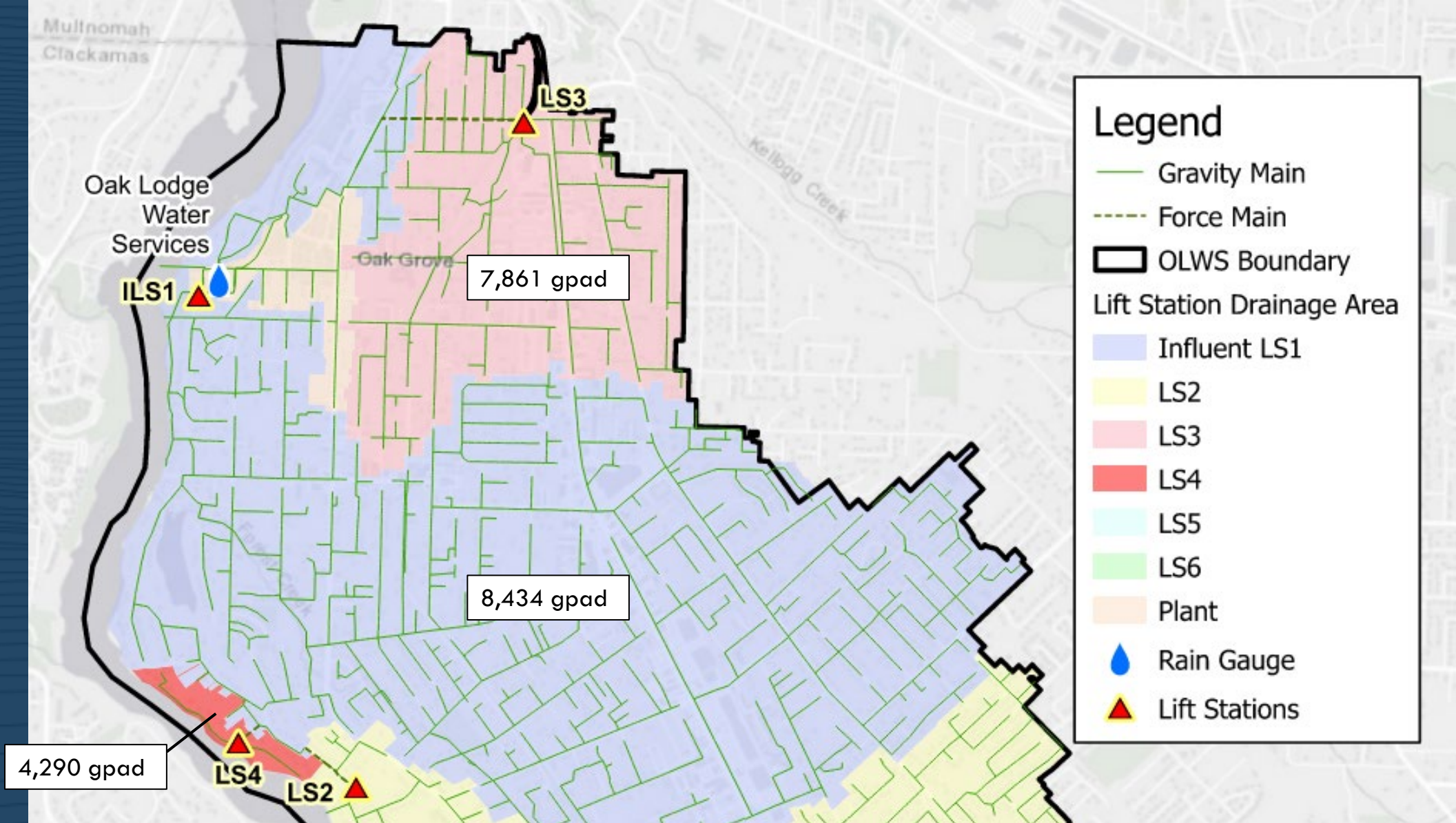
Flow Monitoring of Existing System



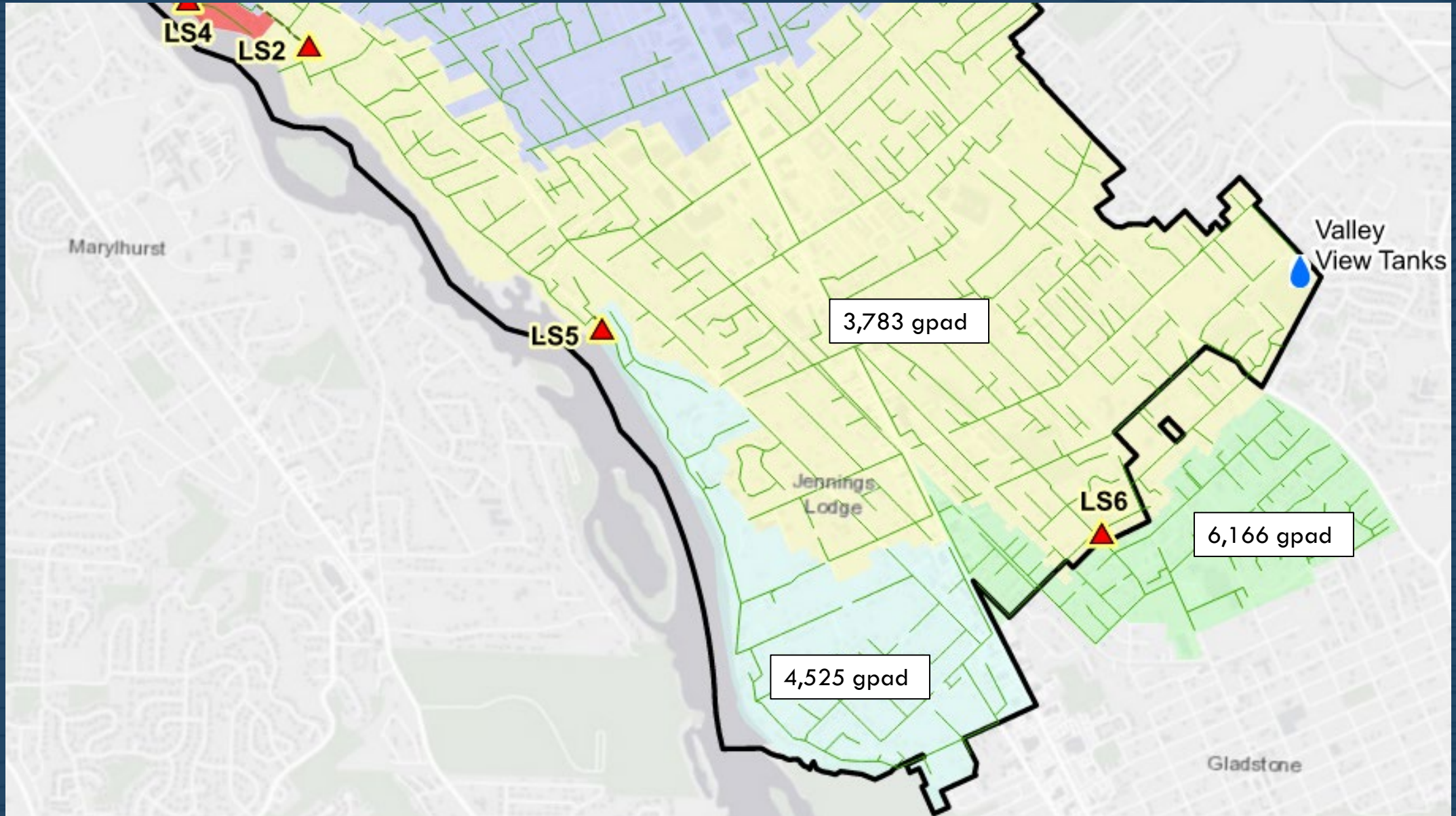
Existing RDII



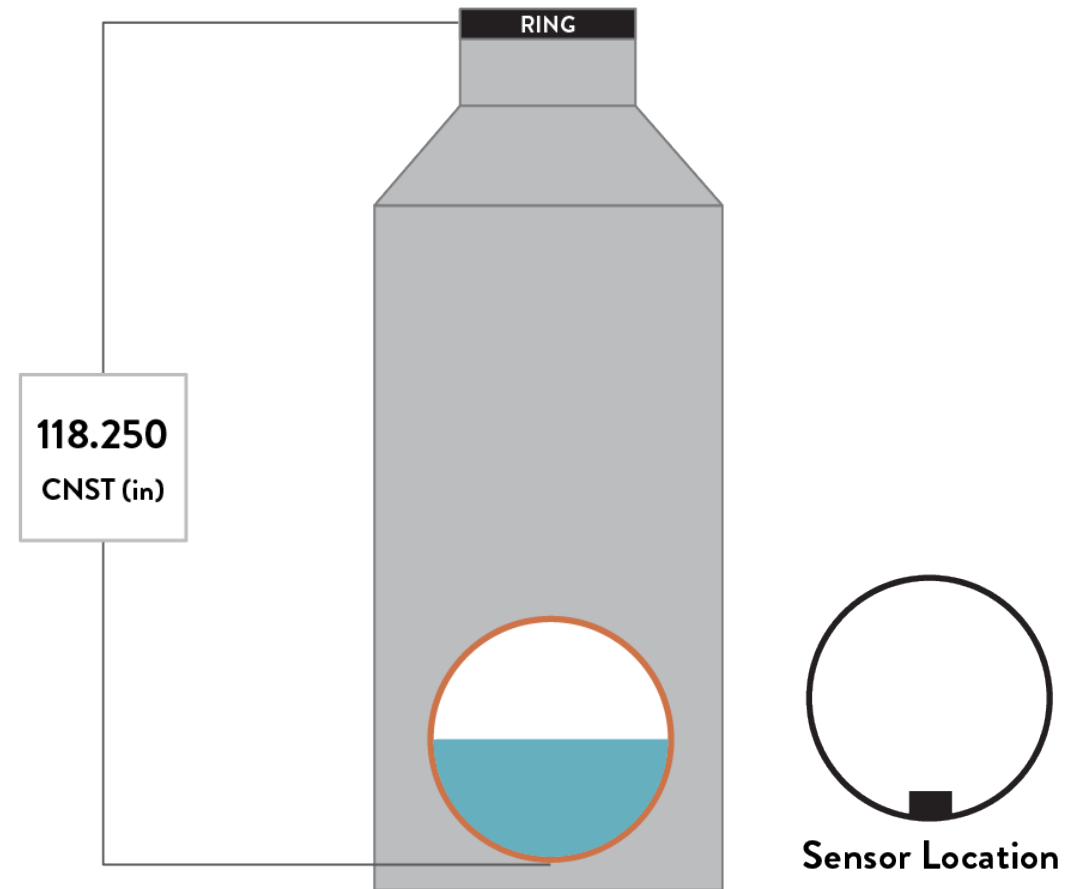
Existing RDII



Existing RDII



Flow Monitoring Equipment Installation

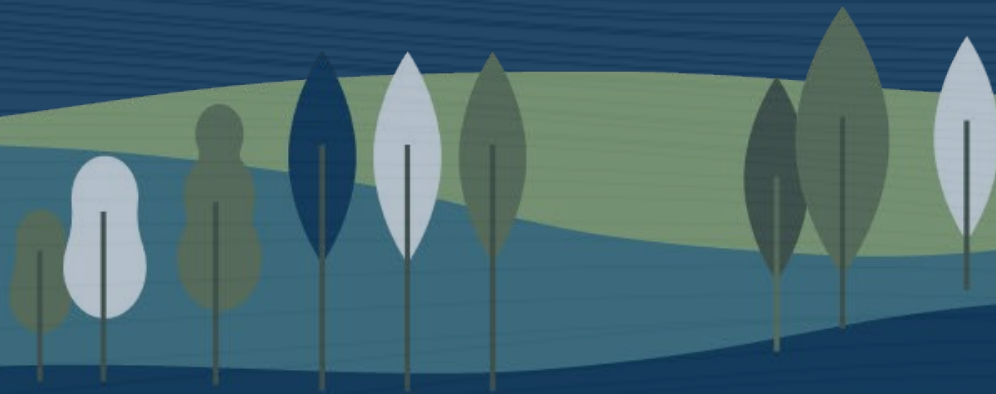


Smoke Testing Locations

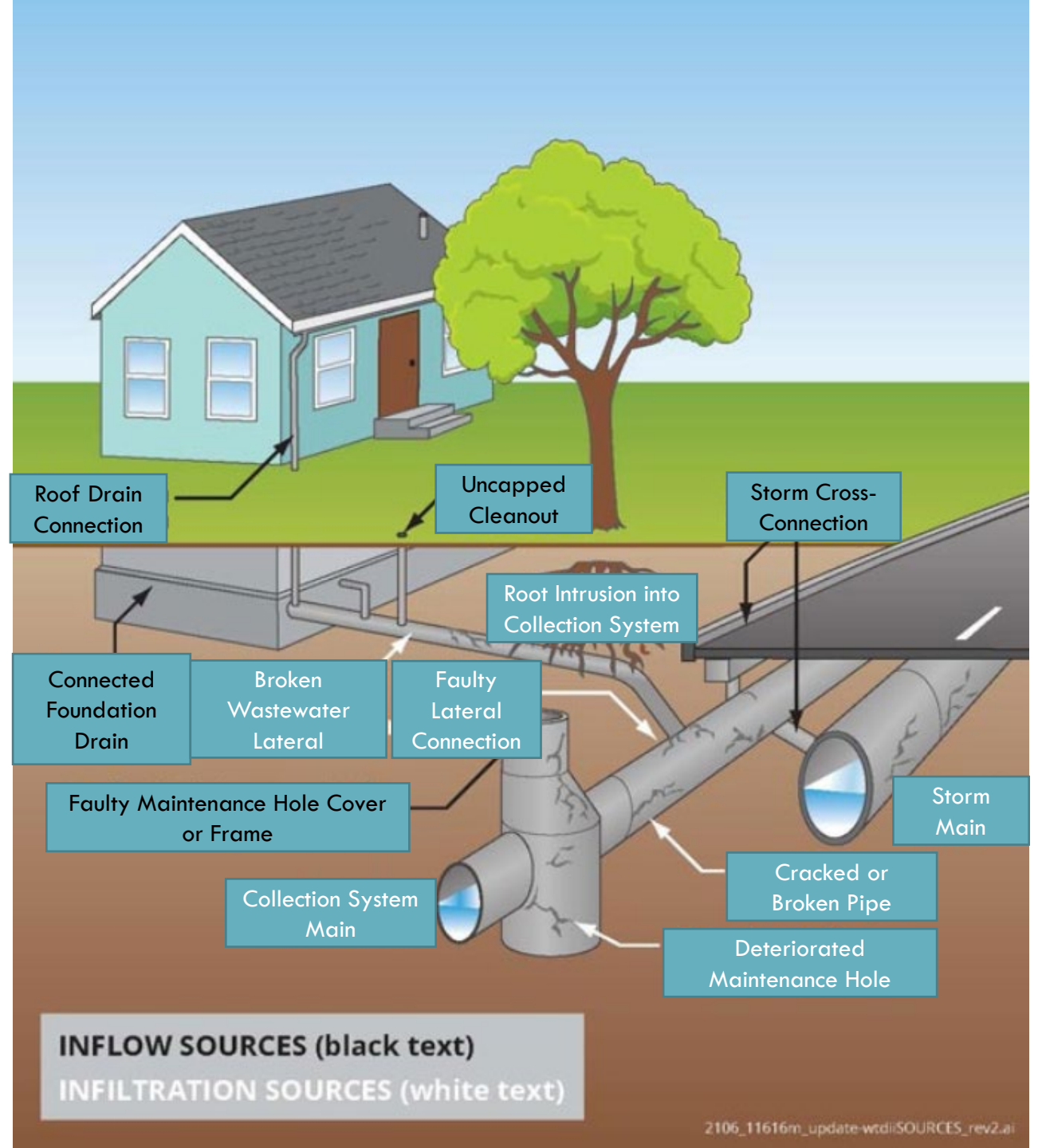


Why is Rainfall Derived Infiltration & Inflow a Problem?

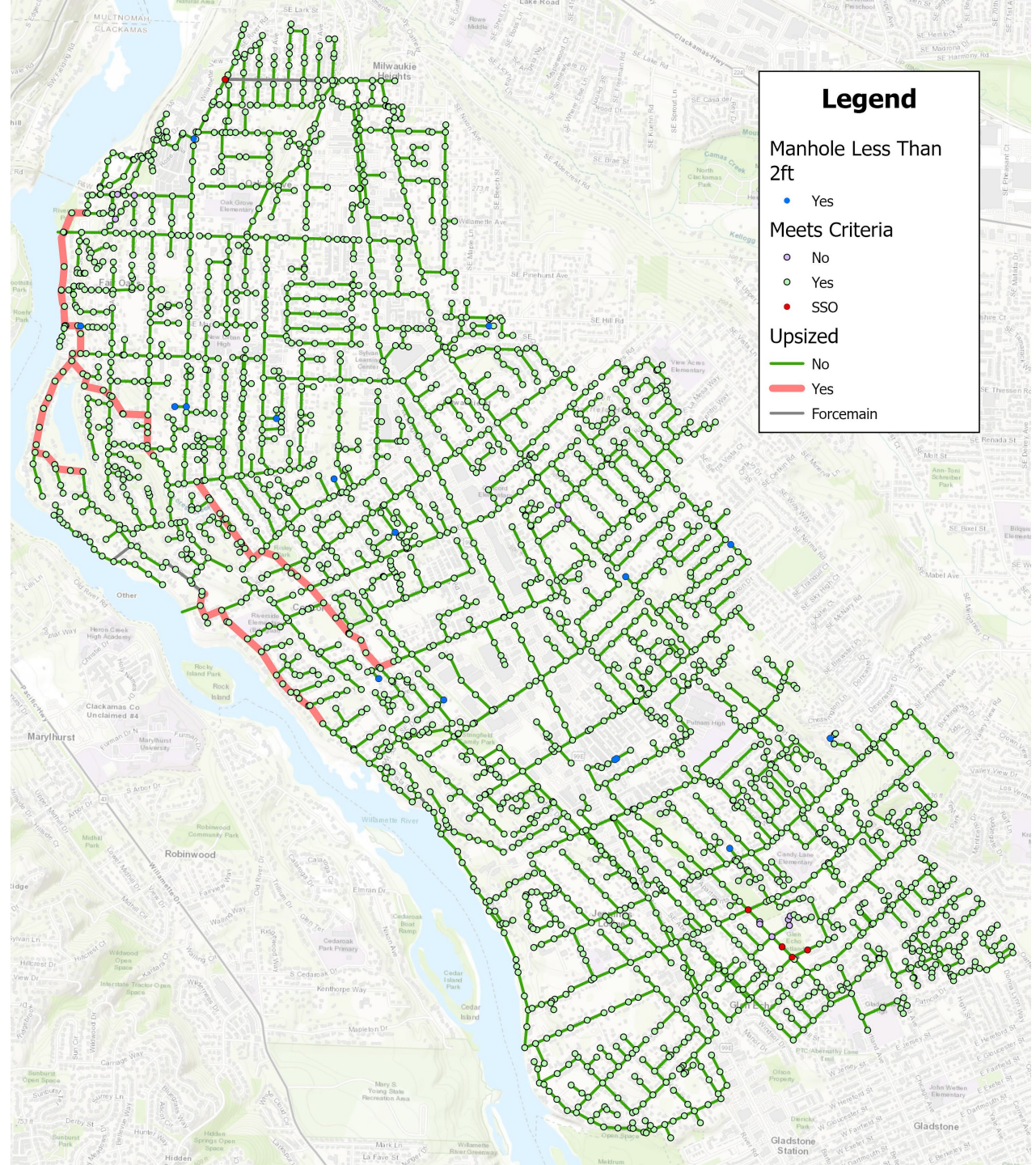
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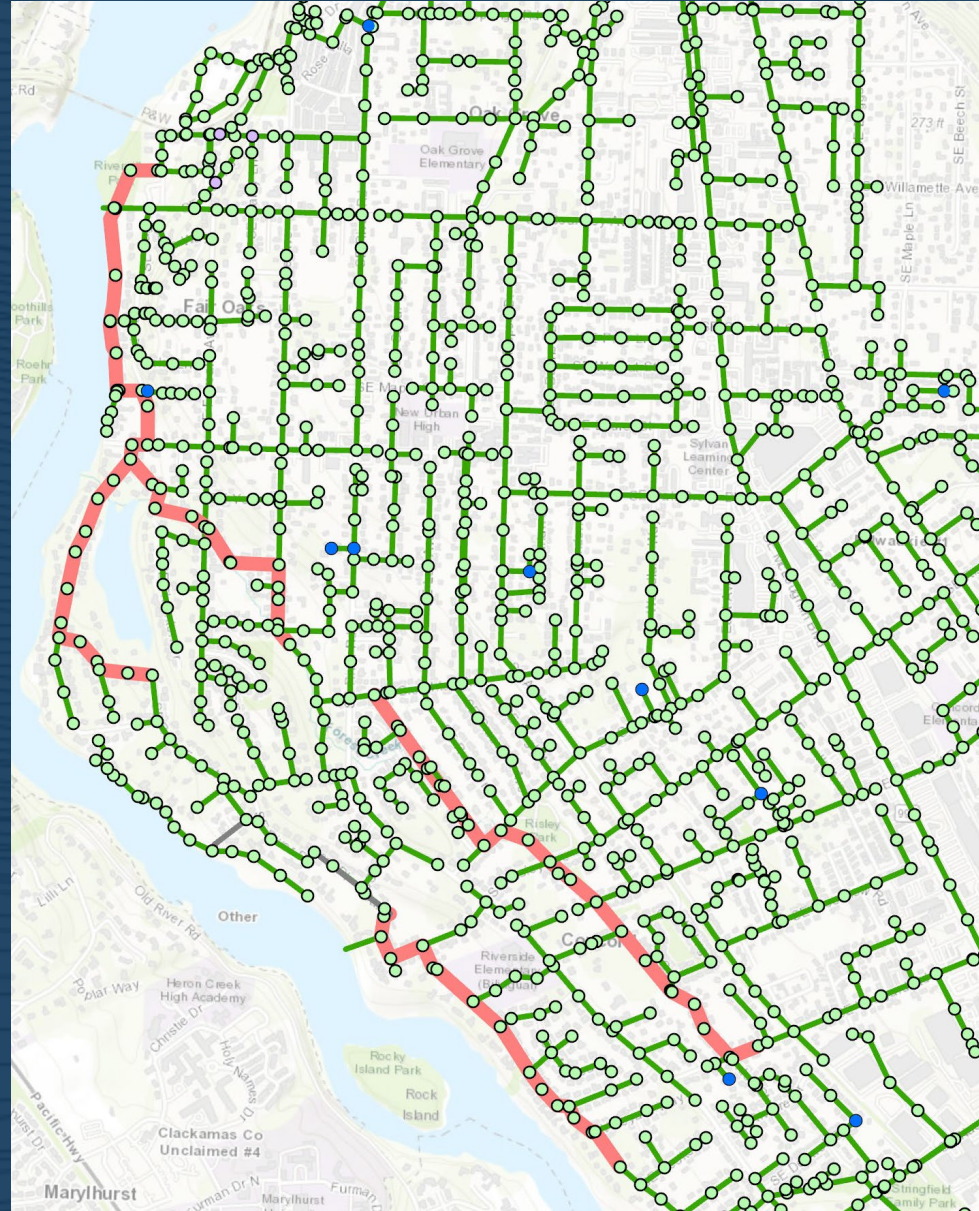
What is Rainfall Derived Infiltration & Inflow?



Existing Wastewater Collection System Deficiencies



Existing Wastewater Collection System Deficiencies

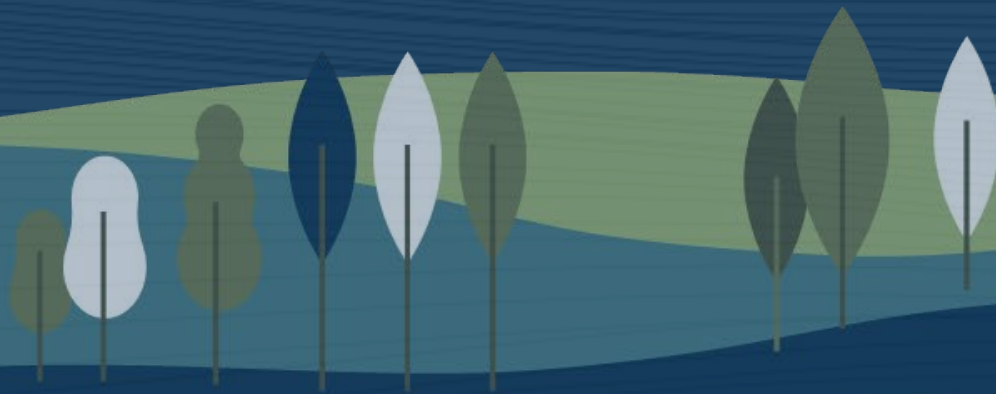


Impacts of RDII on Oak Lodge System

- Takes up majority of capacity in trunk lines
- Requires increases in sizing and operational costs for lift stations
- Increases treatment costs (chemicals, power, etc.)
- Contributes to Sanitary Sewer Overflows (SSO)
- SSOs will likely increase without mitigative action

Typical RDII Reduction Program Elements

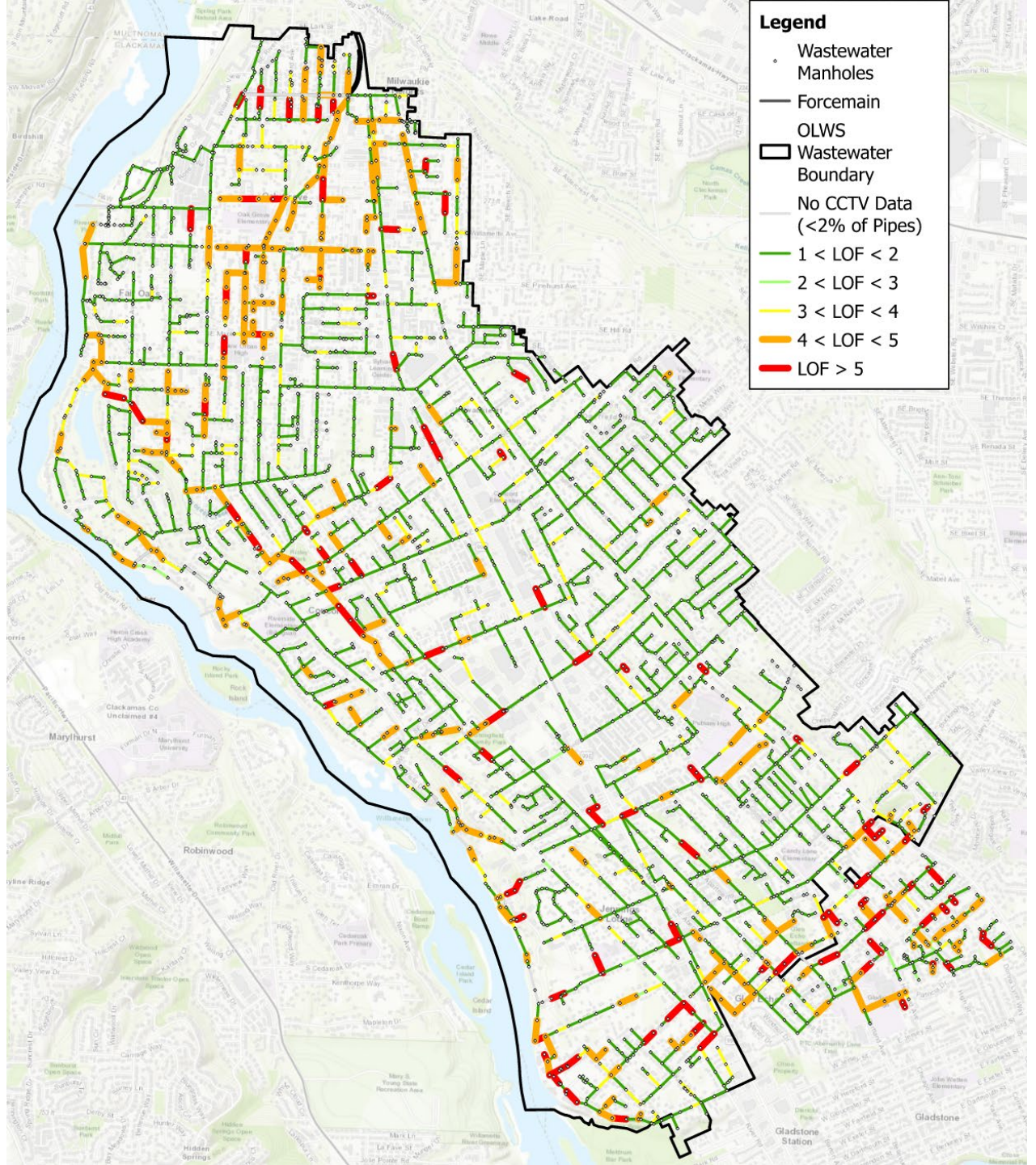
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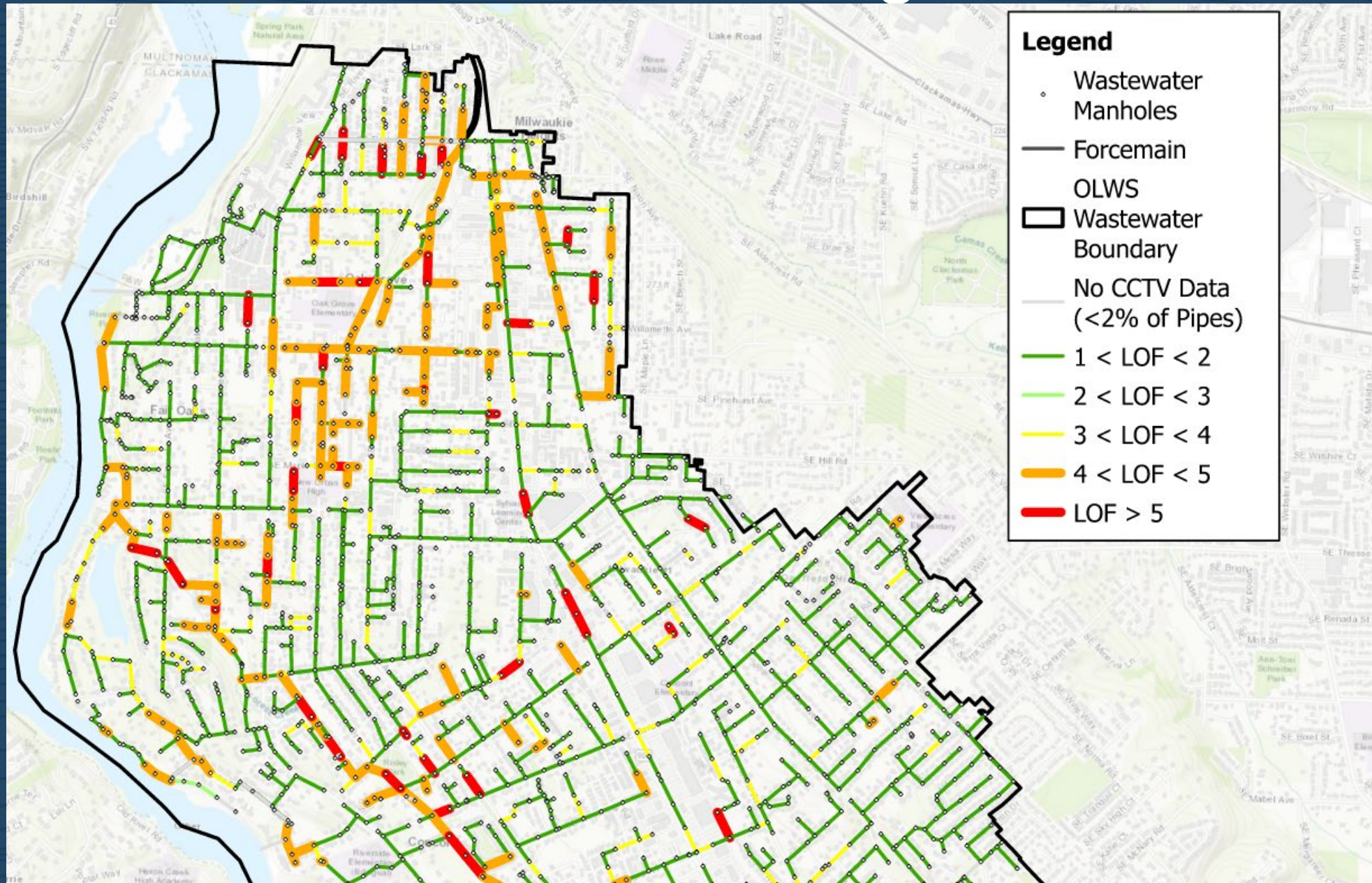
RDII Reduction Program Elements



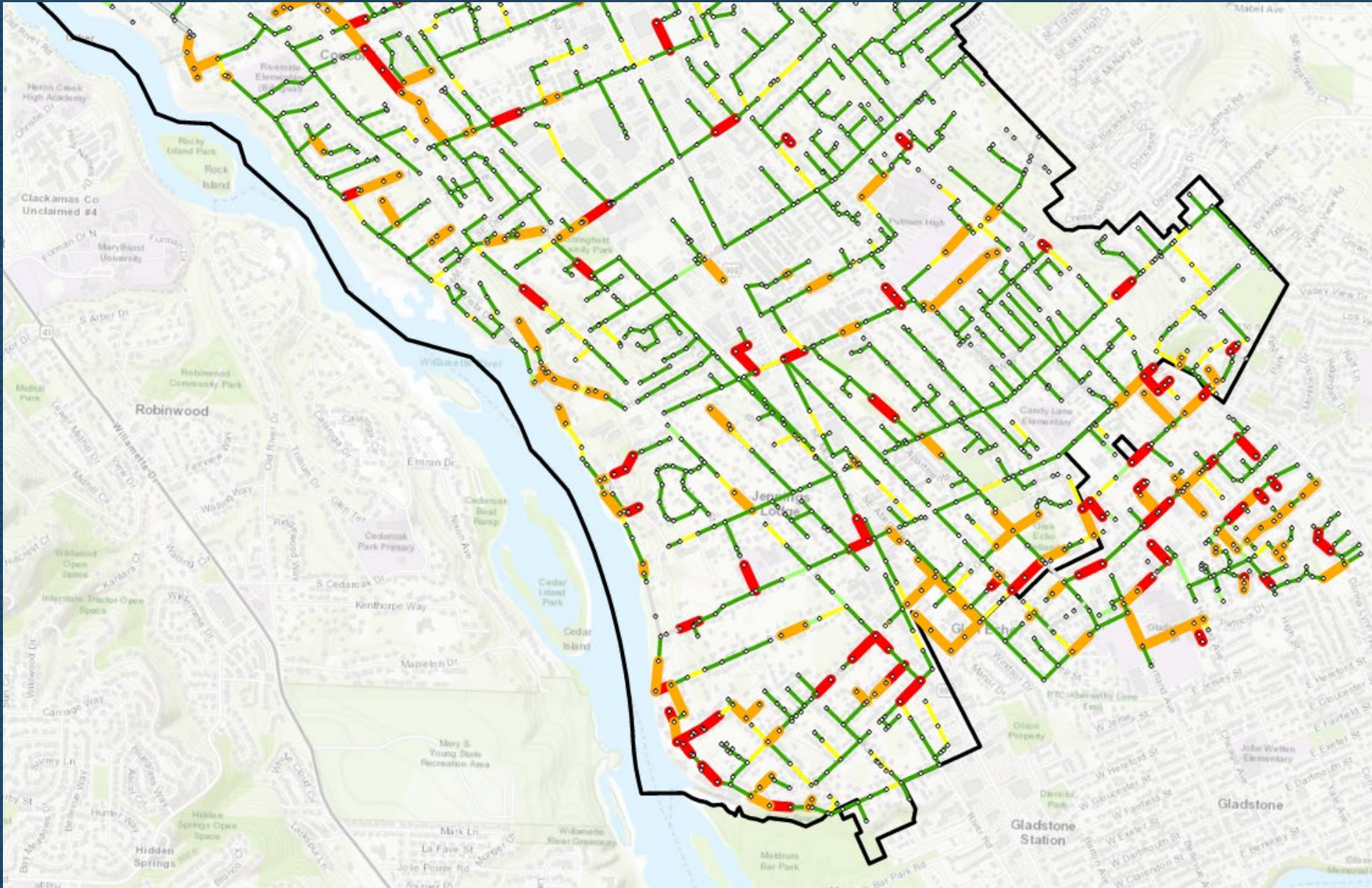
Condition Findings



Condition Findings

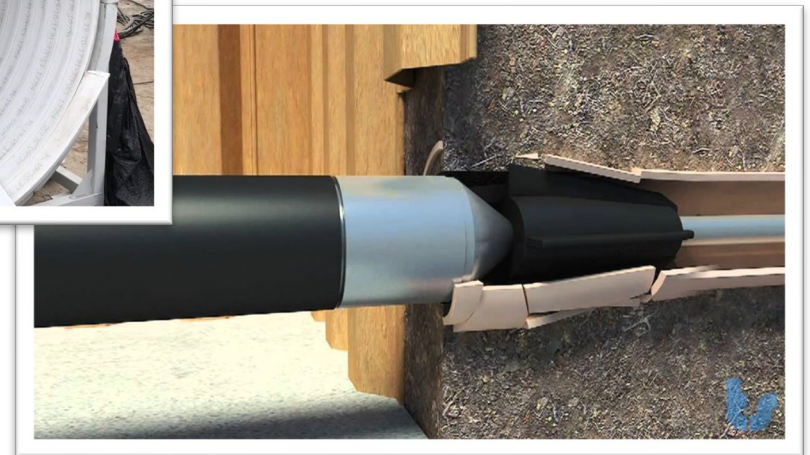


Condition Findings



Methods of Rehabilitation

- CIPP Lining (Felt Liner)
- UV-Cured CIPP Lining (Fiberglass Liner)
- Spiralwound PVC Lining
- Pipe Bursting
- Remove and Replace
- Manhole Repairs
- Lateral Repairs

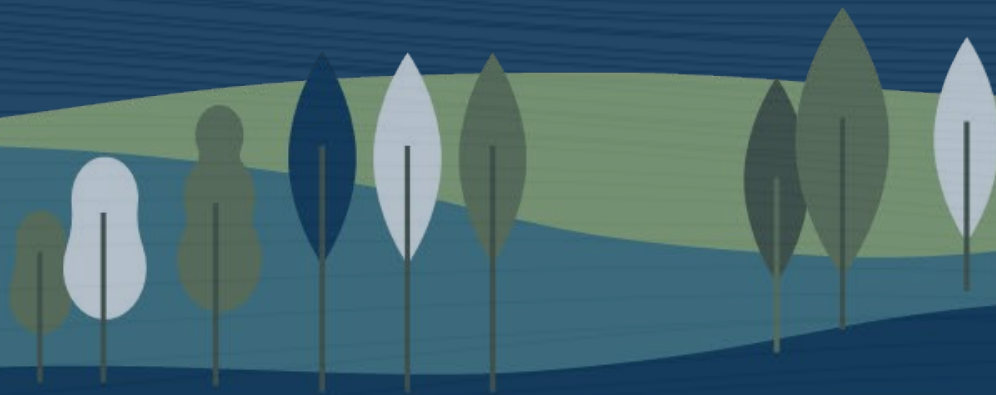


What Level of Reduction is Possible?

Level of RDII Reduction	Method	Conceptual Cost per Gallon of RDII reduction
20%	Lining of collection system main using trenchless methods	\$30.30
30%	Lining of collection system main and wastewater lateral from collections main to right-of-way	\$26.76
65%	Lining of collection system main and complete lining of wastewater lateral	\$14.08

RDII Reduction Program Potential for Oak Lodge

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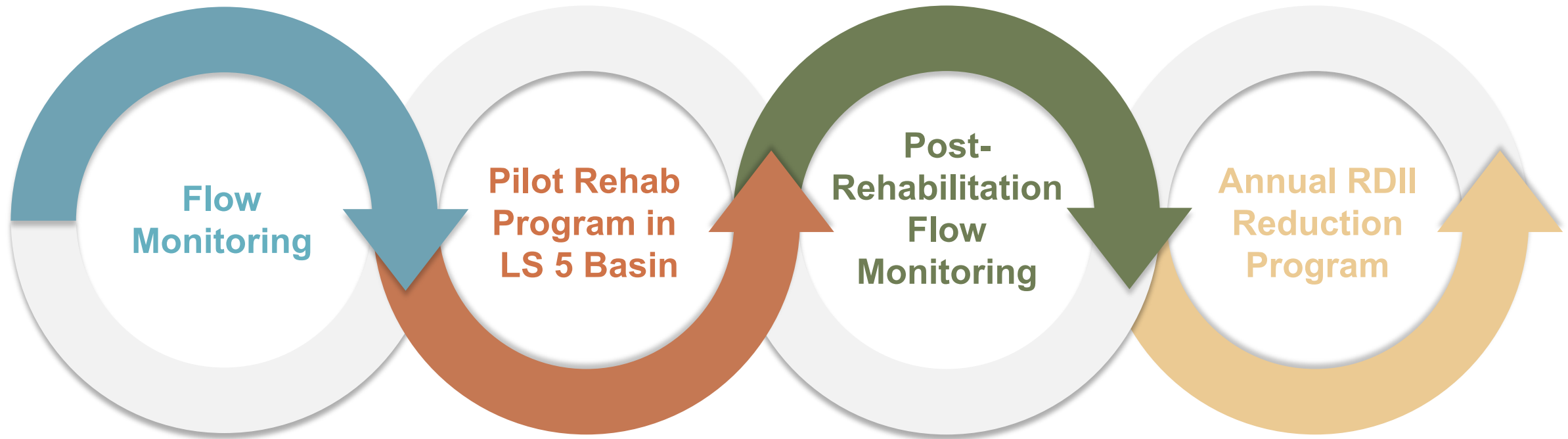


Potential for RDII Reduction System-wide

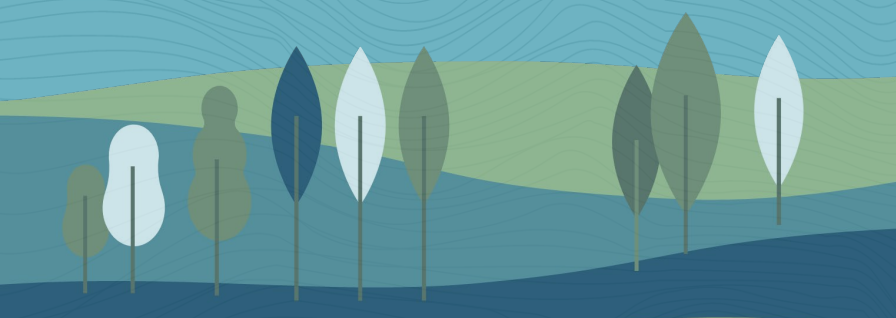
Desired Result	Reduction in Peak Wet Weather Flow	Conceptual Cost
2-ft Freeboard in MH 5557	1.6 mgd	\$14-23M
No overflow at WRF Overflow on Bluff Rd	5.1 mgd	\$36-72M
No surcharging in Trunk A	11.7 mgd	\$83-165M

Assumes rehabilitation costs for collections mains and laterals up to the home to achieve 65% reduction in RDII

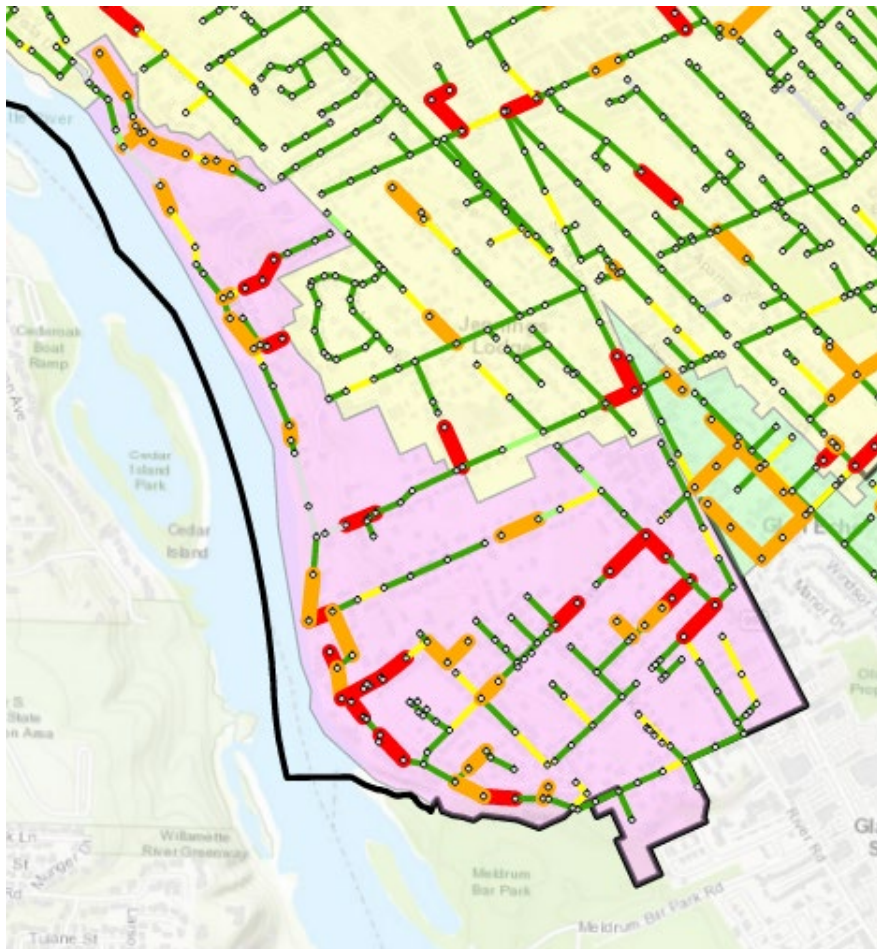
RDII Reduction Program



Pre-Rehabilitation Flow Monitoring



Lift Station 5 Basin



Pipe Diameter (in)	Grade 5 Length (LF)	Grade 4 Length (LF)	Total Length (LF)
6	0	173	173
8	2,994	2,846	5,840
10	877	1,679	2,556
12	0	215	215
Total	3,871	4,913	8,784
Rehab Cost	\$912,000		

Laterals in LS 5 Basin	Cost for Lateral Rehab to ROW	Cost for Full Lateral Rehab
525	\$1,837,500	\$2,887,500

First Phase of RDII Program 2022-2024

- Flow Monitoring (Winter 2022-23)
 - Estimate potential flow reduction associated with Trunk A rehab
 - Refine estimates for RDII reduction in collection system downstream of Lift Station 2
- Rehabilitate all Grade 4-5 pipes in Lift Station 5 Basin (Summer 2023)
- Post rehab monitoring to assess RDII reduction effectiveness
- Identify pipe rehabilitation (Summer 2024)



Questions?

WASC