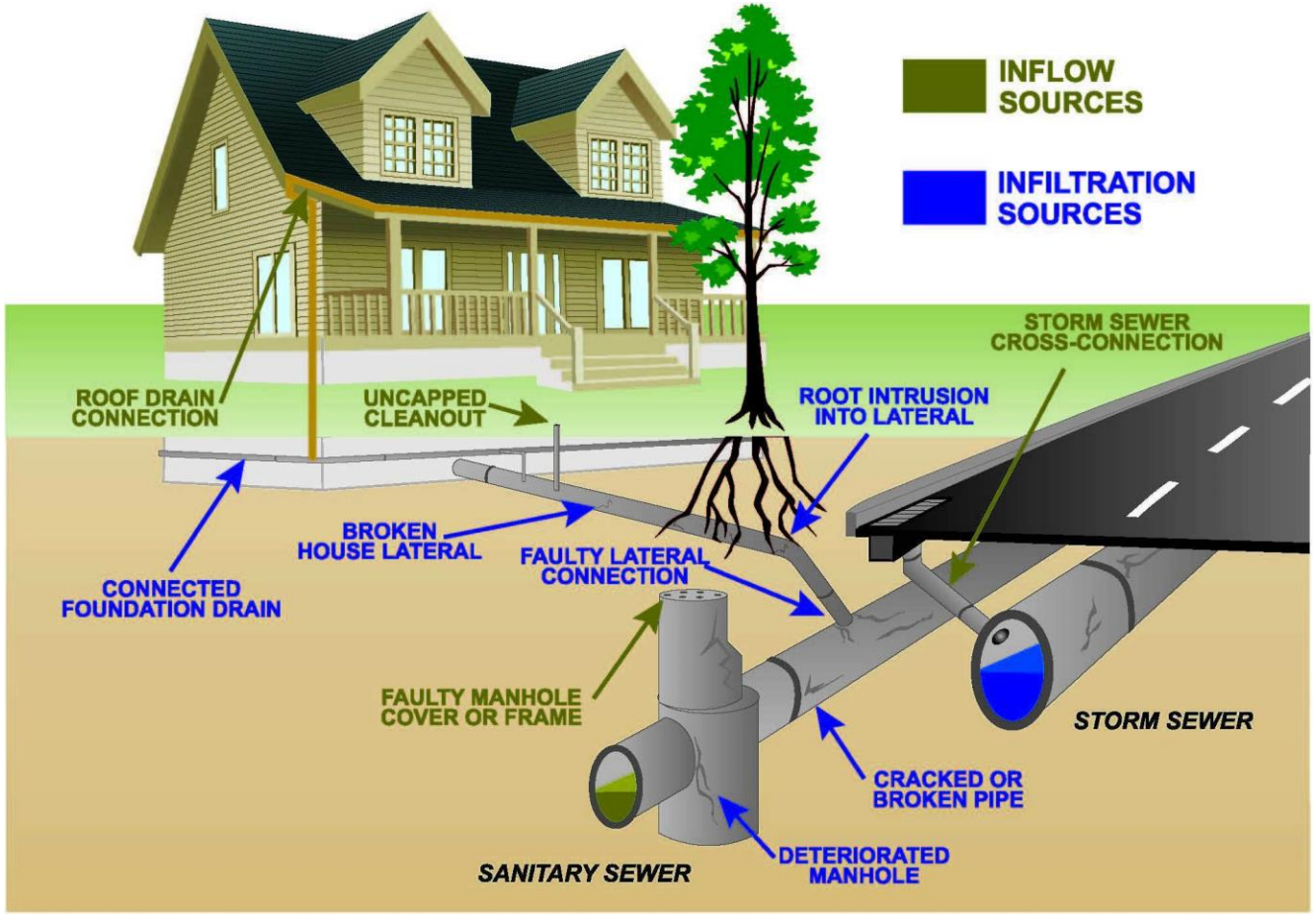
Gladstone City Council Presentation Inflow and Infiltration Reduction Findings and Recommendations

May 23, 2023

Infiltration and Inflow 101

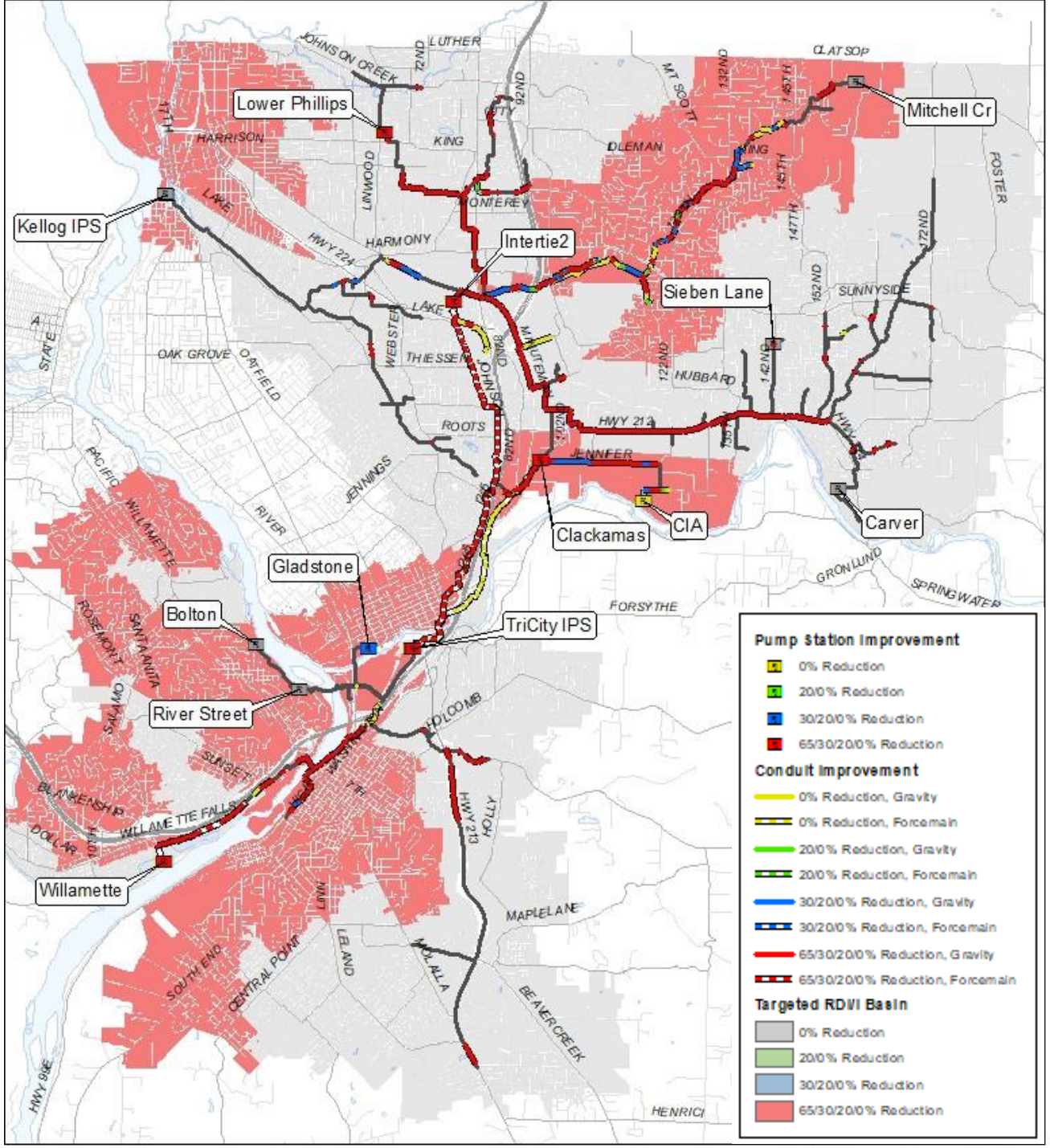
- Infiltration – groundwater that enters sanitary sewers
  - Defects in sewer mains or manholes
  - Defects in private laterals
  - Connected foundation drains or sump pumps

- Inflow – surface water that flows into sanitary sewers
  - Sheet flow or stream flow into manholes
  - Catch basins or area

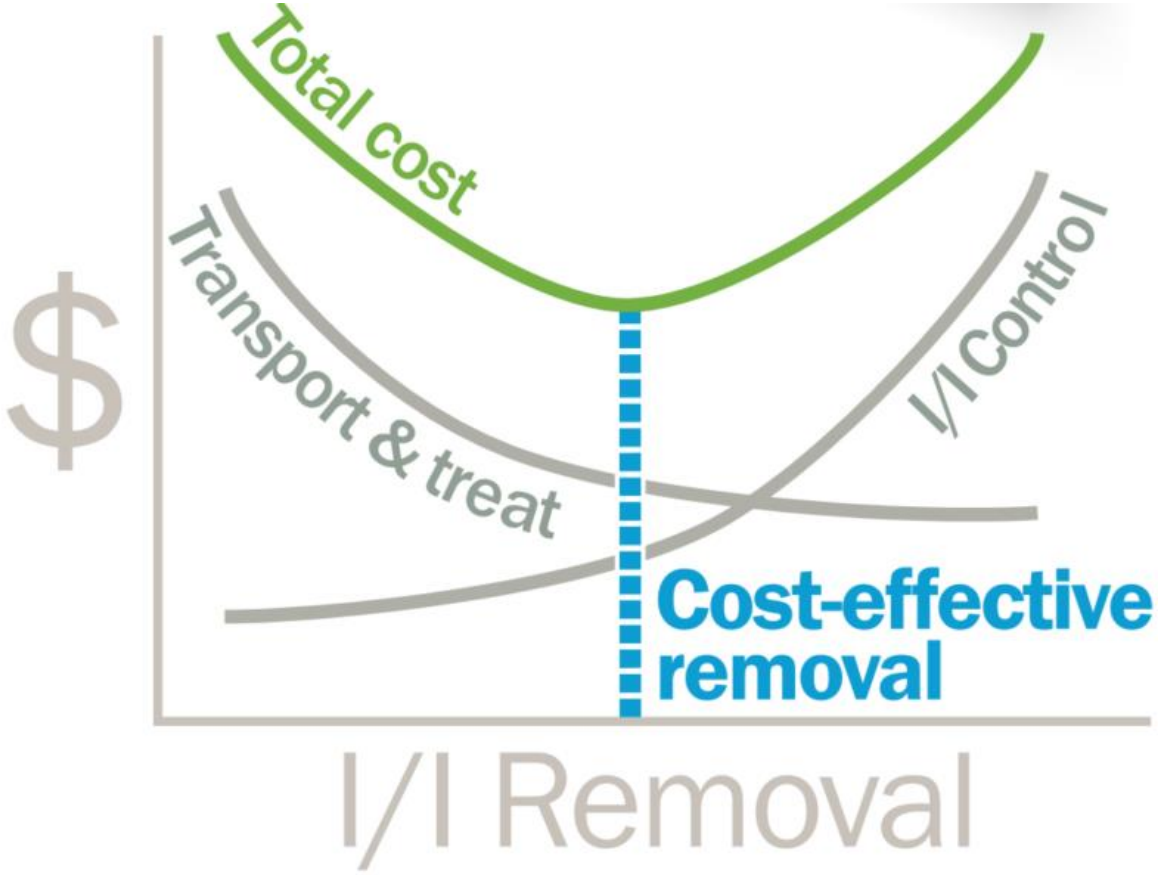


LEEWAY engineering solutions

Regional Issue



Balanced Investments



- Growth, pipe degradation, climate change
- Regulatory requirements increase treatment costs
- Seeking most cost-effective regional solution (e.g., outfall, treatment expansion, etc.)

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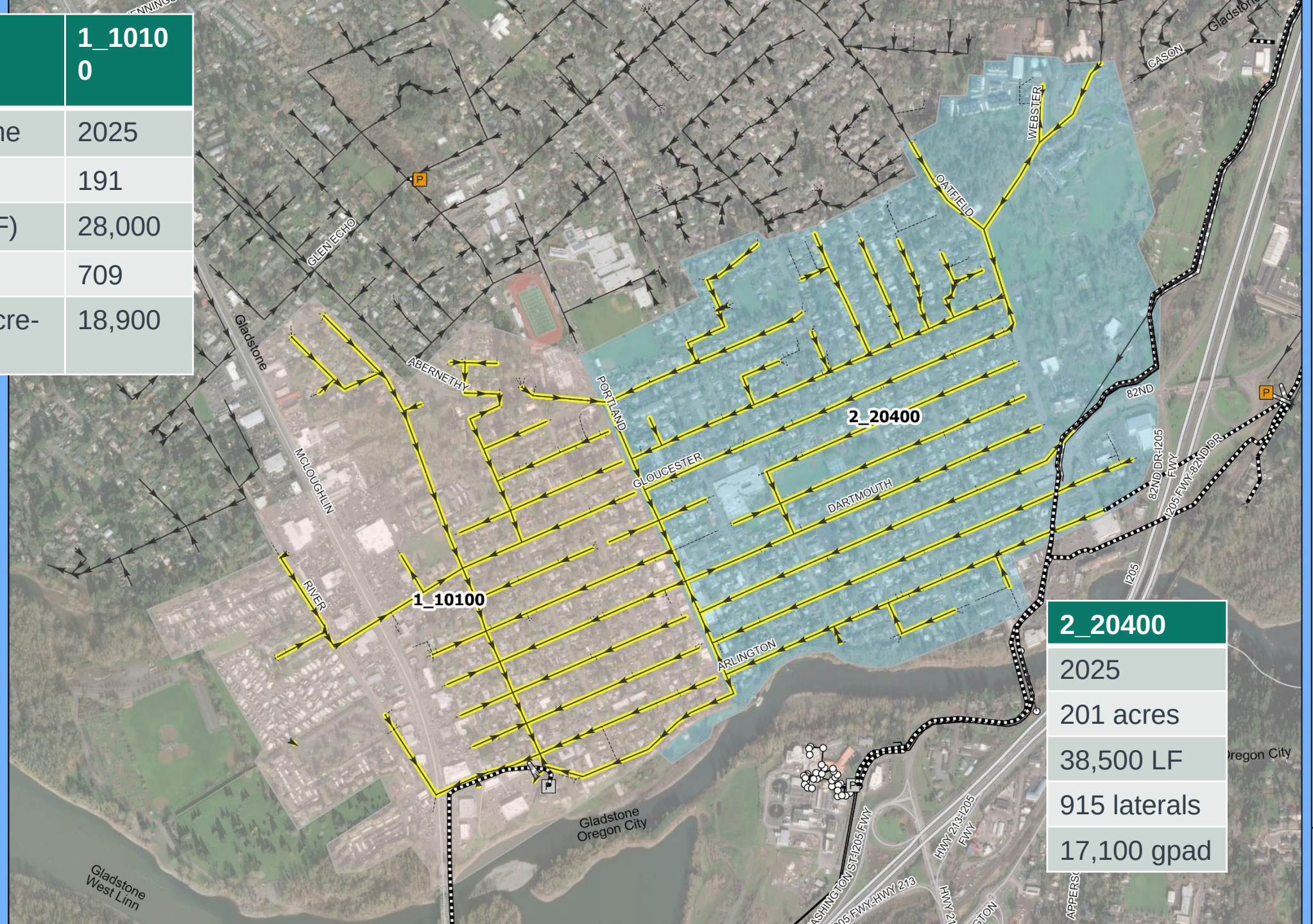
CLACKAMAS WATER ENVIRONMENT SERVICES

Basin Characteristics	1_10100
RDII Reduction Timeframe	2025
Area (acres)	191
Length of sewer main (LF)	28,000
Number of laterals	709
RDII Rate (gallons per acre-day)	18,900

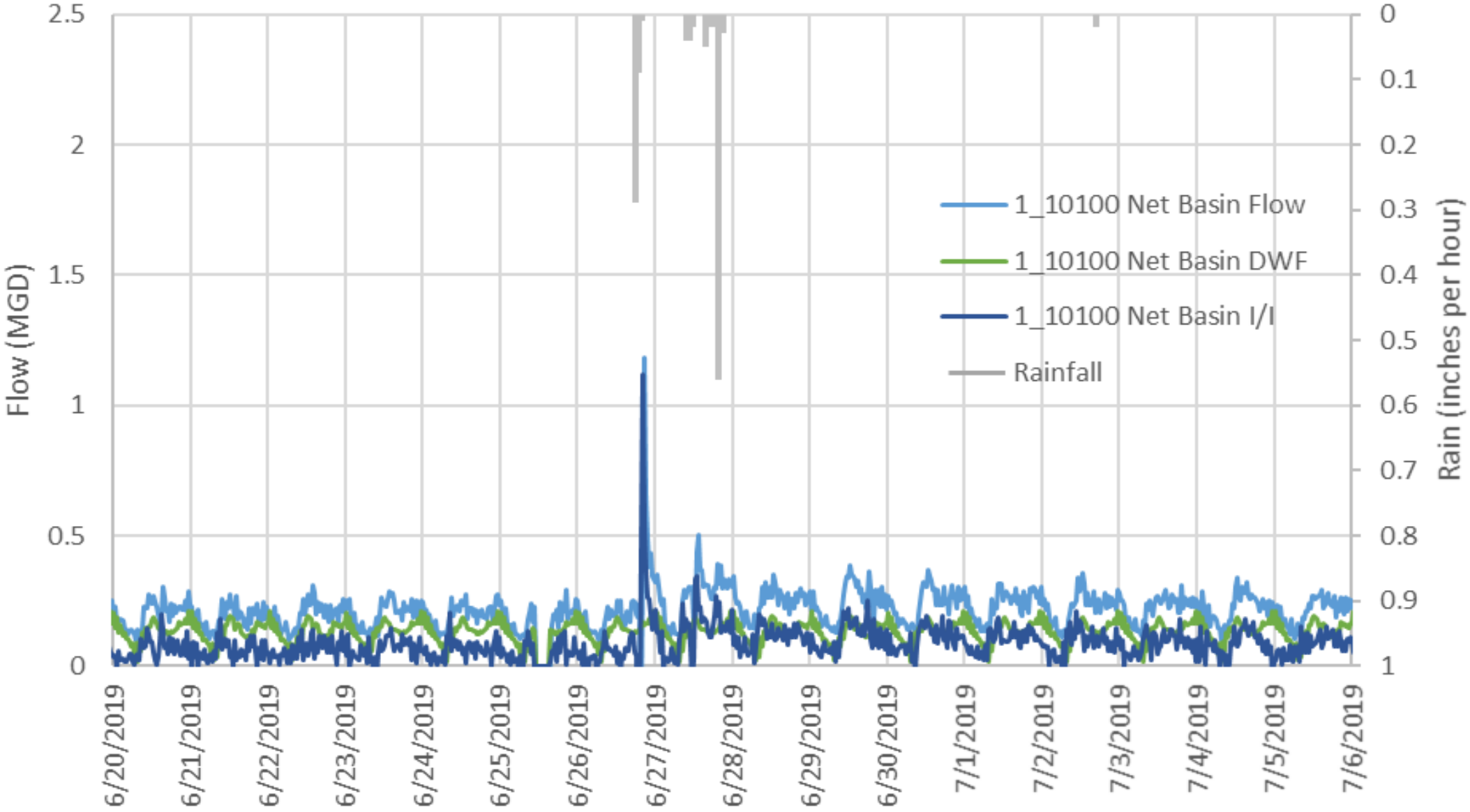


2_20400
2025
201 acres
38,500 LF
915 laterals
17,100 gpad

Gladstone's system – how bad is it?

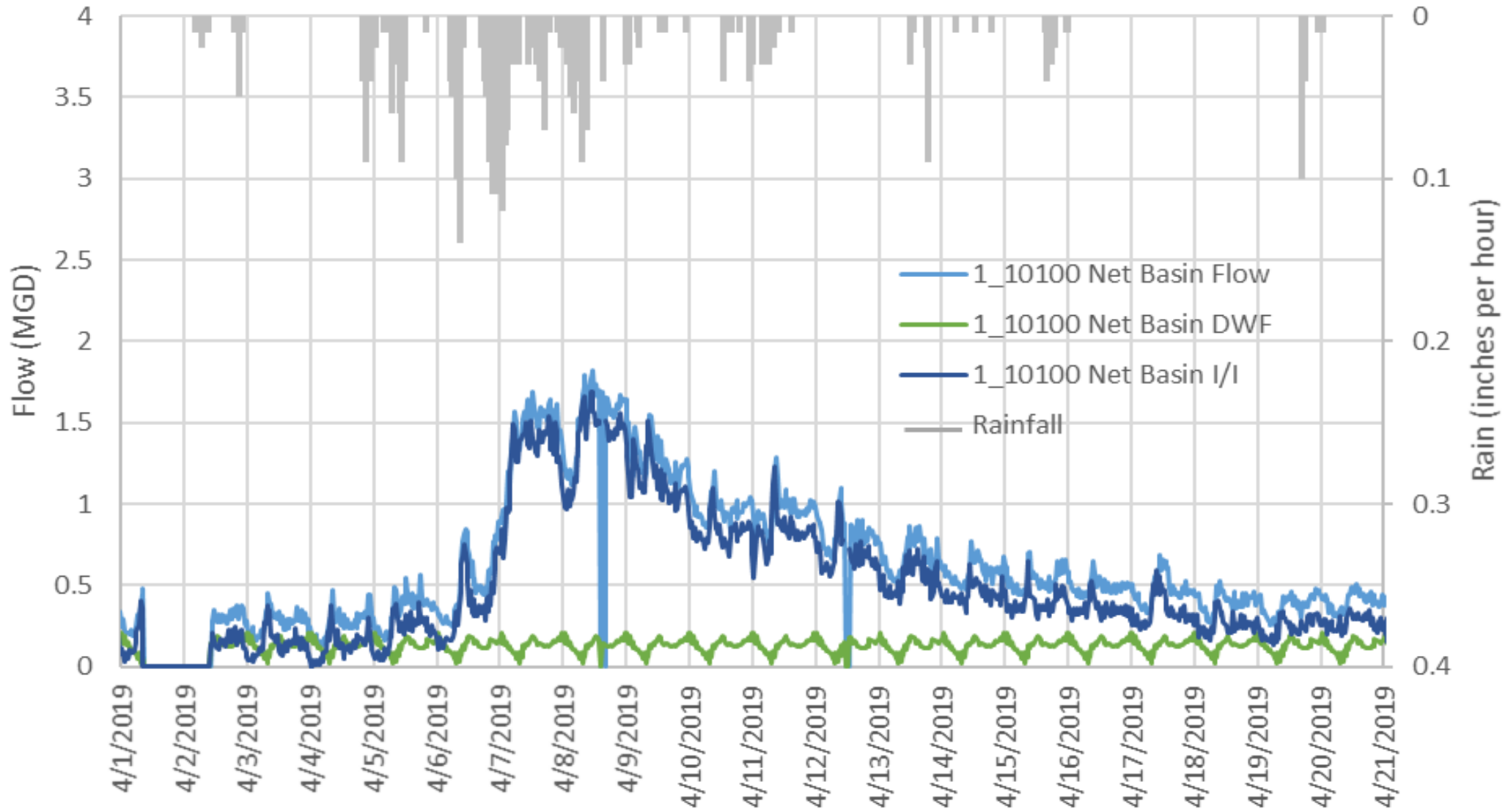
West Basin: June 26, 2019 "Flashy"

RDII: 1.1 MGD
PF: 8.3
Rate: 18,000 gpd/in-m



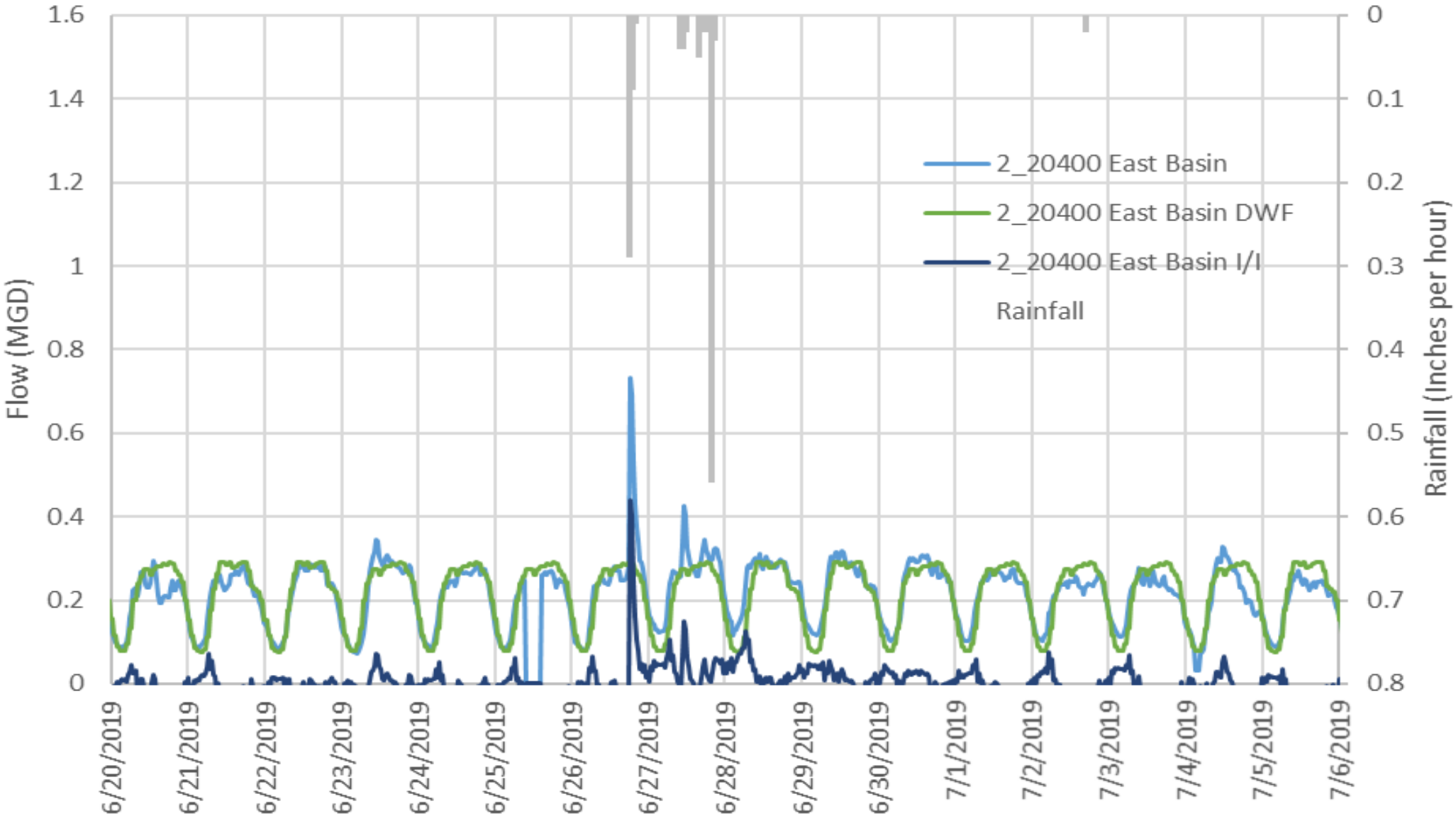
West Basin: April 6, 2019 "Soaker"

RDII: 1.7 MGD
PF: 12.5
Rate: 27,000 gpd/in-mi



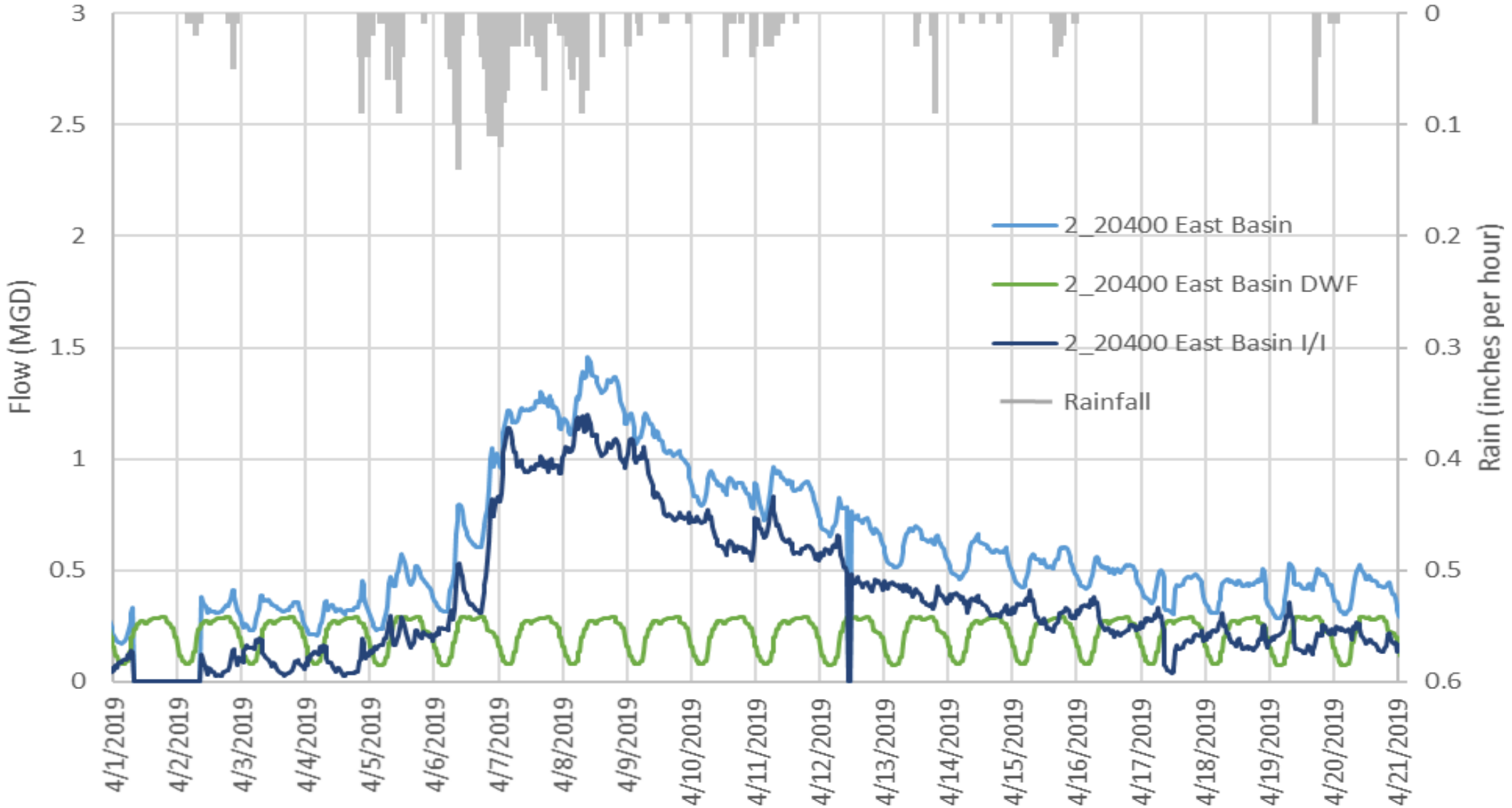
East Basin: June 26, 2019 "Flashy"

RDII: 0.4 MGD
PF: 2.0
Rate: 4,000 gpd/in-mi



East Basin: April 6, 2019 "Soaker"

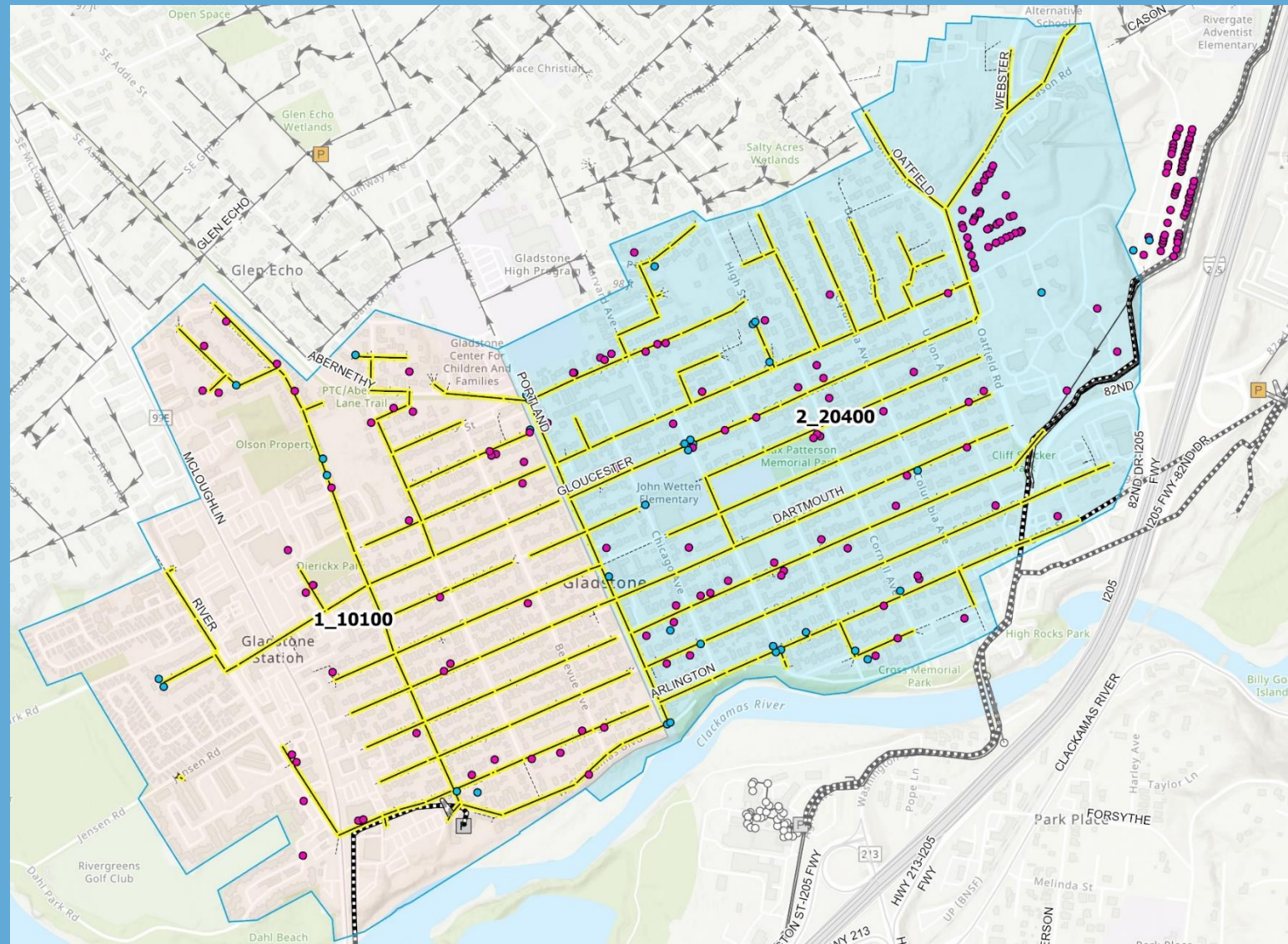
RDII: 1.2 MGD
PF: 5.5
Rate: 11,000 gpd/in-mi



Gladstone Smoke-Testing

- 68,000 LF tested
- 86 Runs
- 239 “incidents”

  (~3x more than average)



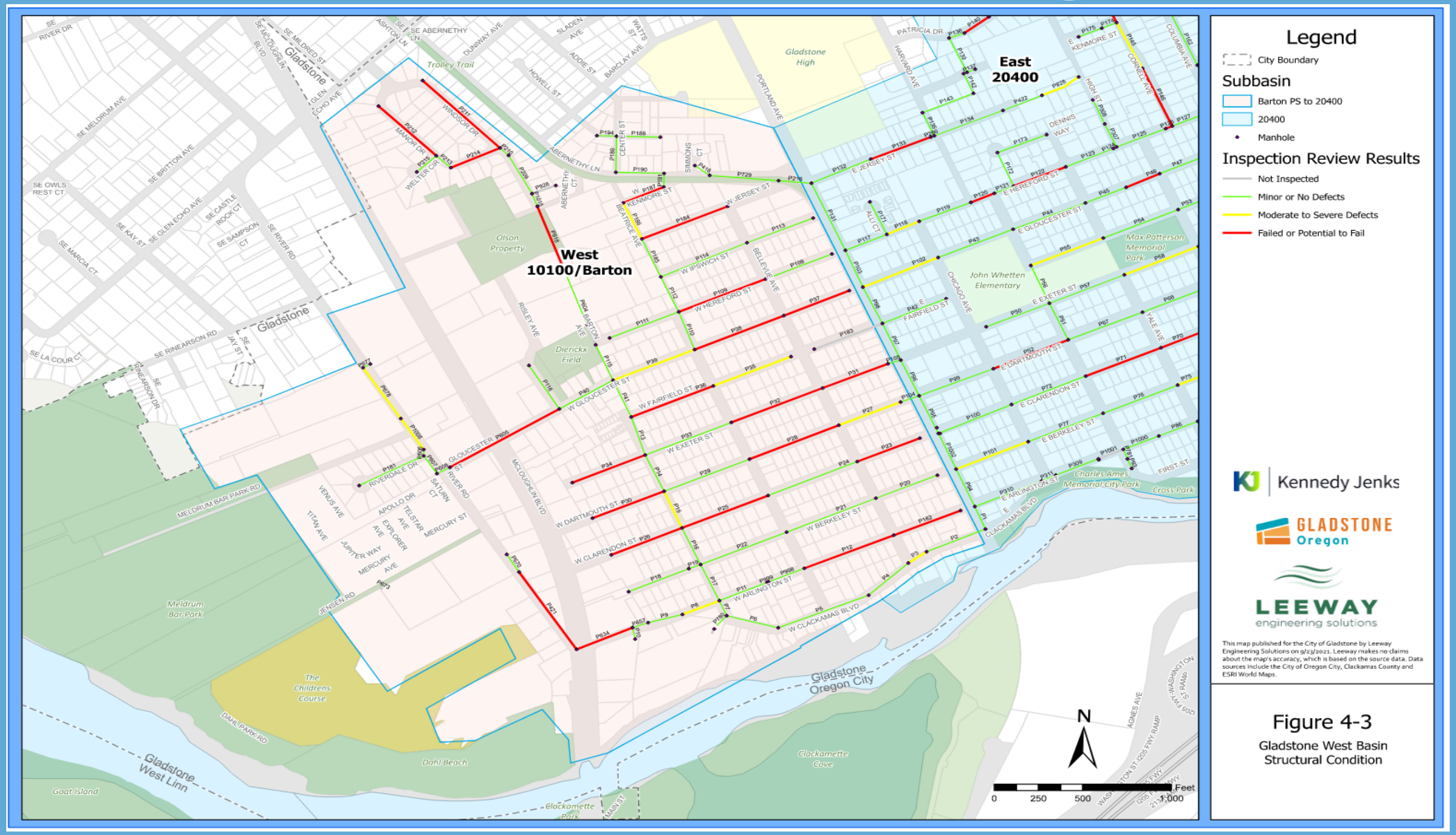
Gladstone Smoke-Testing Emissions

Gladstone Sewer Condition

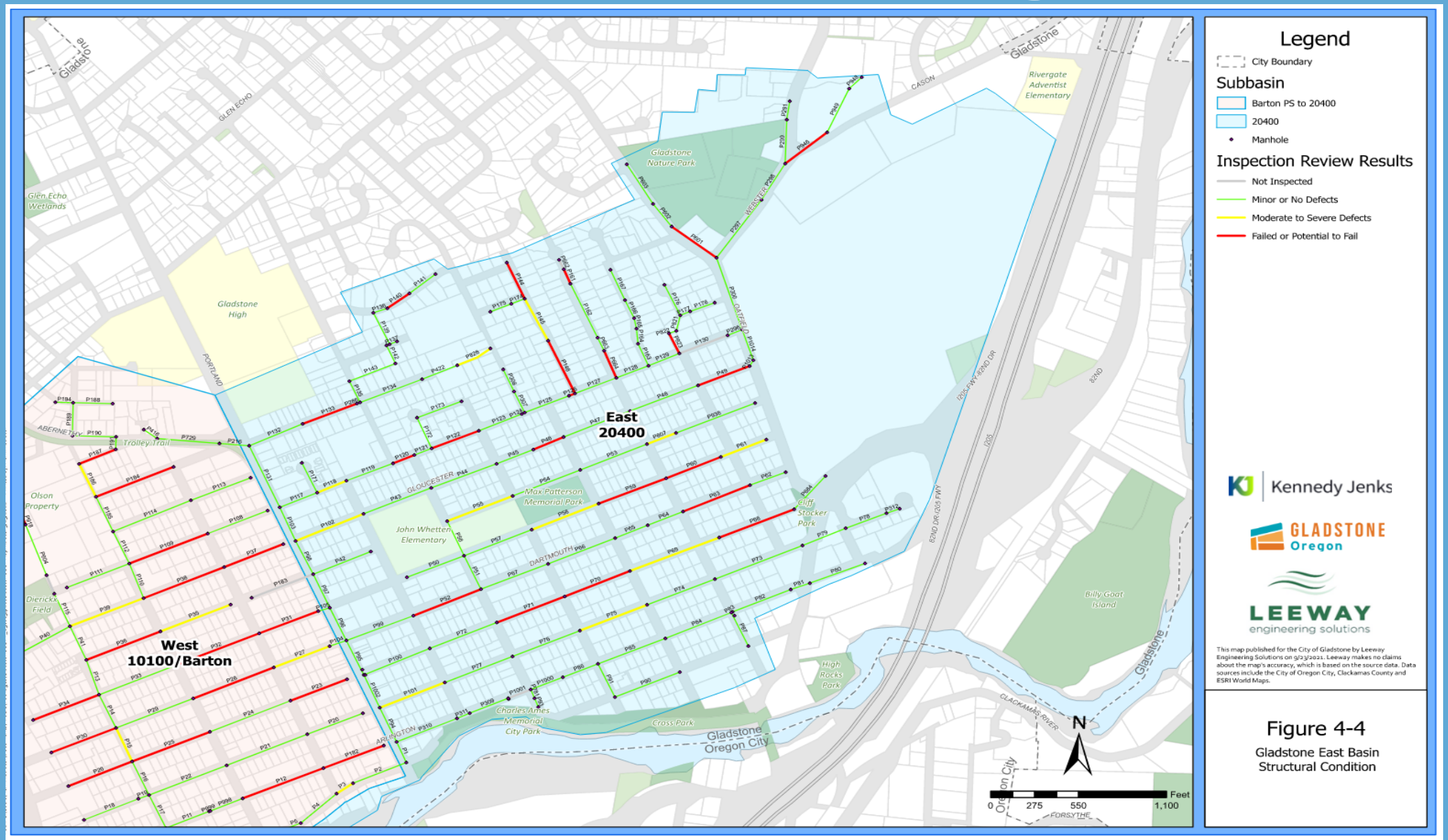
- 234 pipes cleaned and inspected
- 79 videos had grade 4 or 5 defects (34%)
  - Longitudinal cracks
  - Broken pipe
  - Roots

Gladstone Sewer Condition

West Basin CCTV Findings



East Basin CCTV Findings



Gladstone I/I Reduction Plan

Recommended Projects

1. Disconnection of inflow sources
   - Satisfies DEQ Mutual Agreement and Order
2. Holistic rehab of West Basin system
3. Holistic rehab of East Basin system

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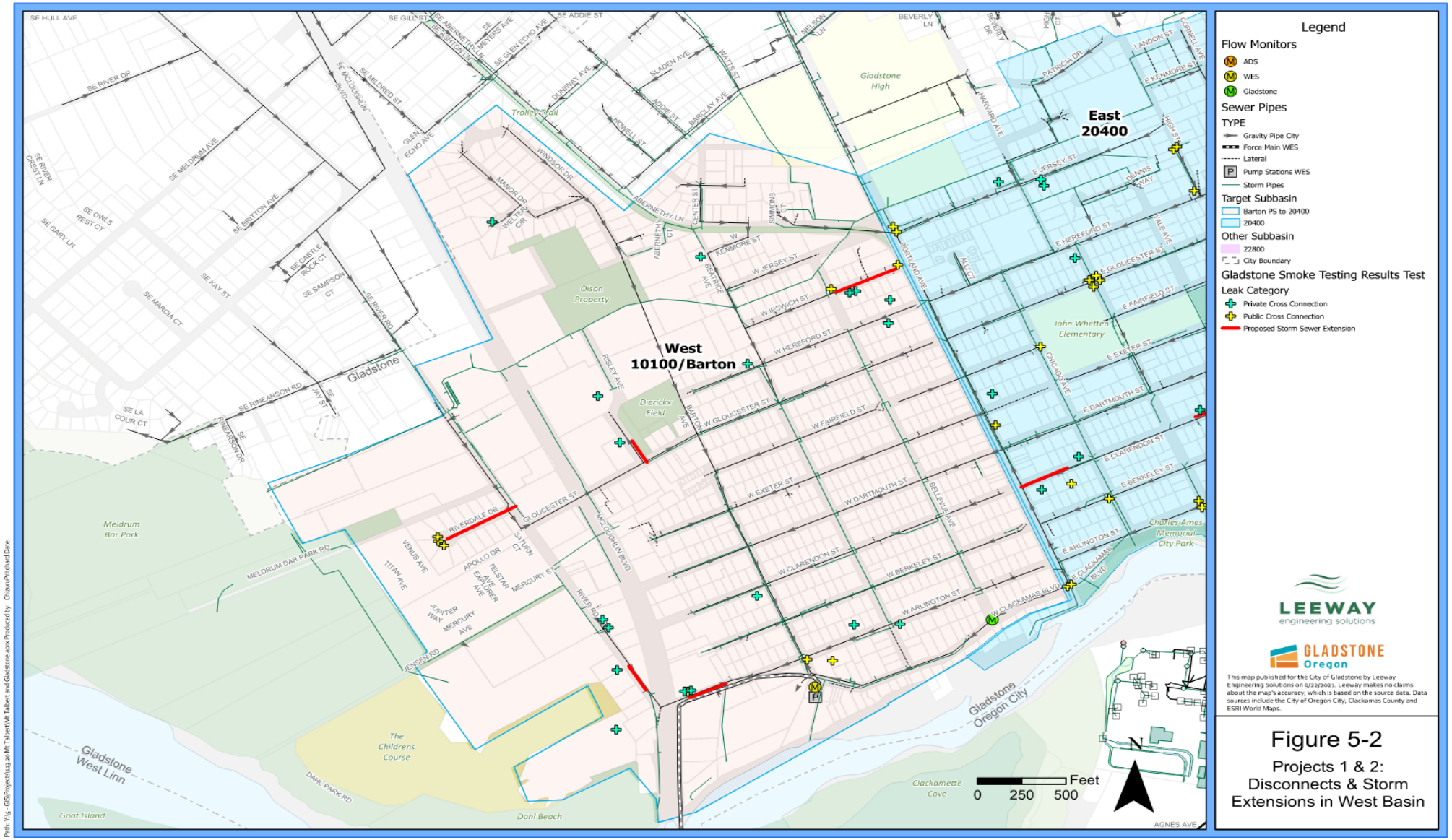
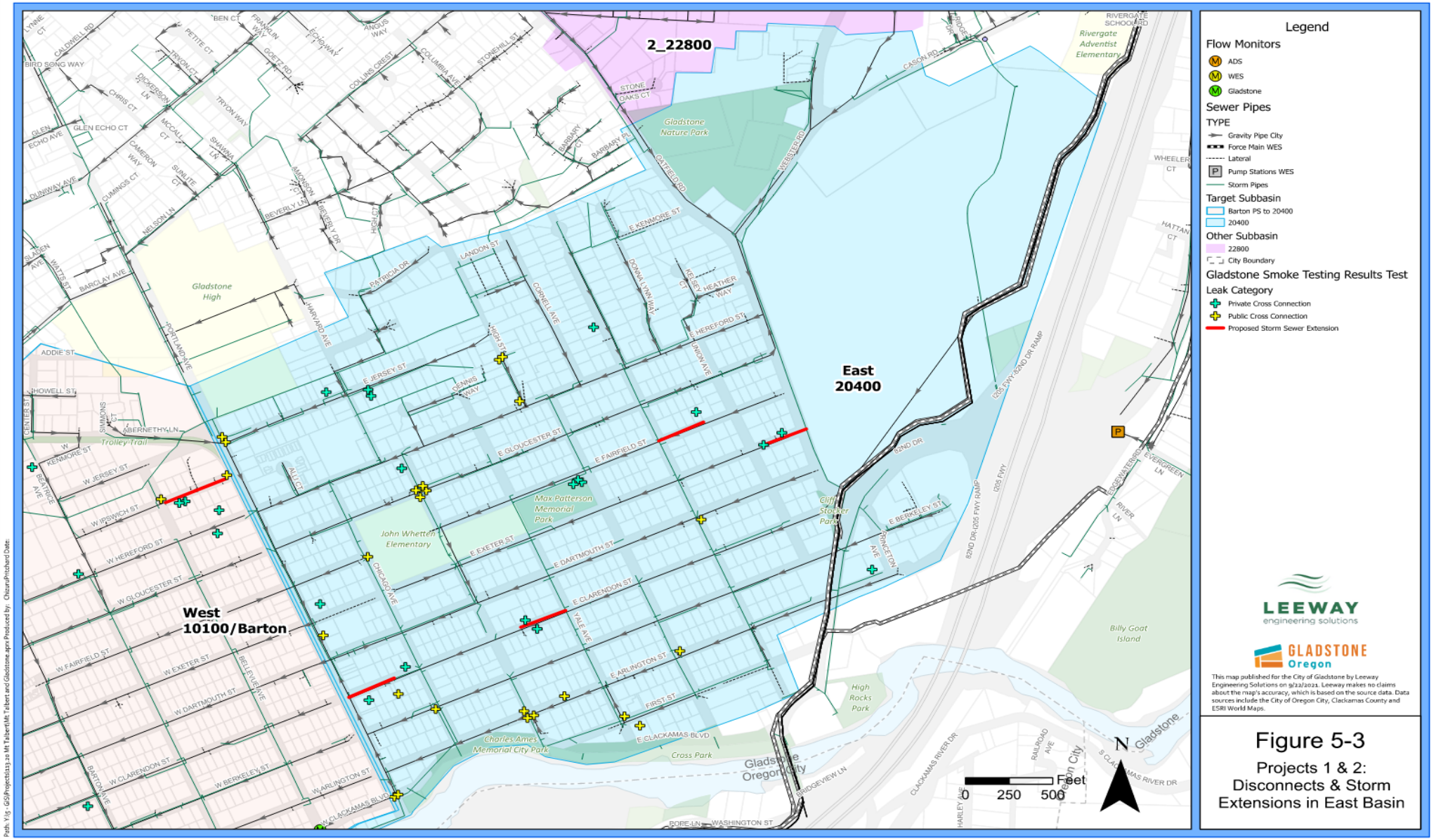
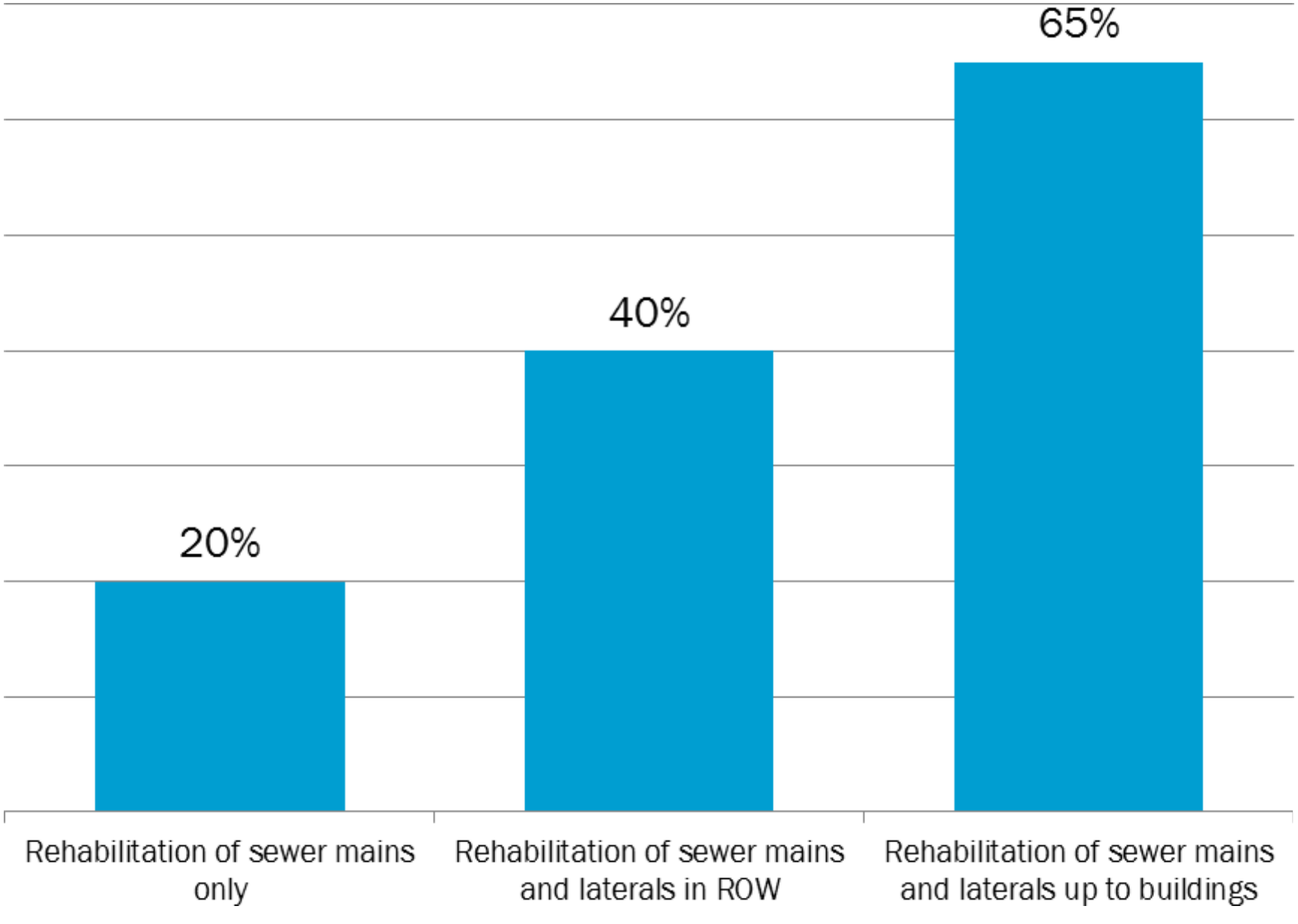
Inflow Disconnection: West



Inflow Disconnection: East



Cost-Effectiveness of Holistic Rehab

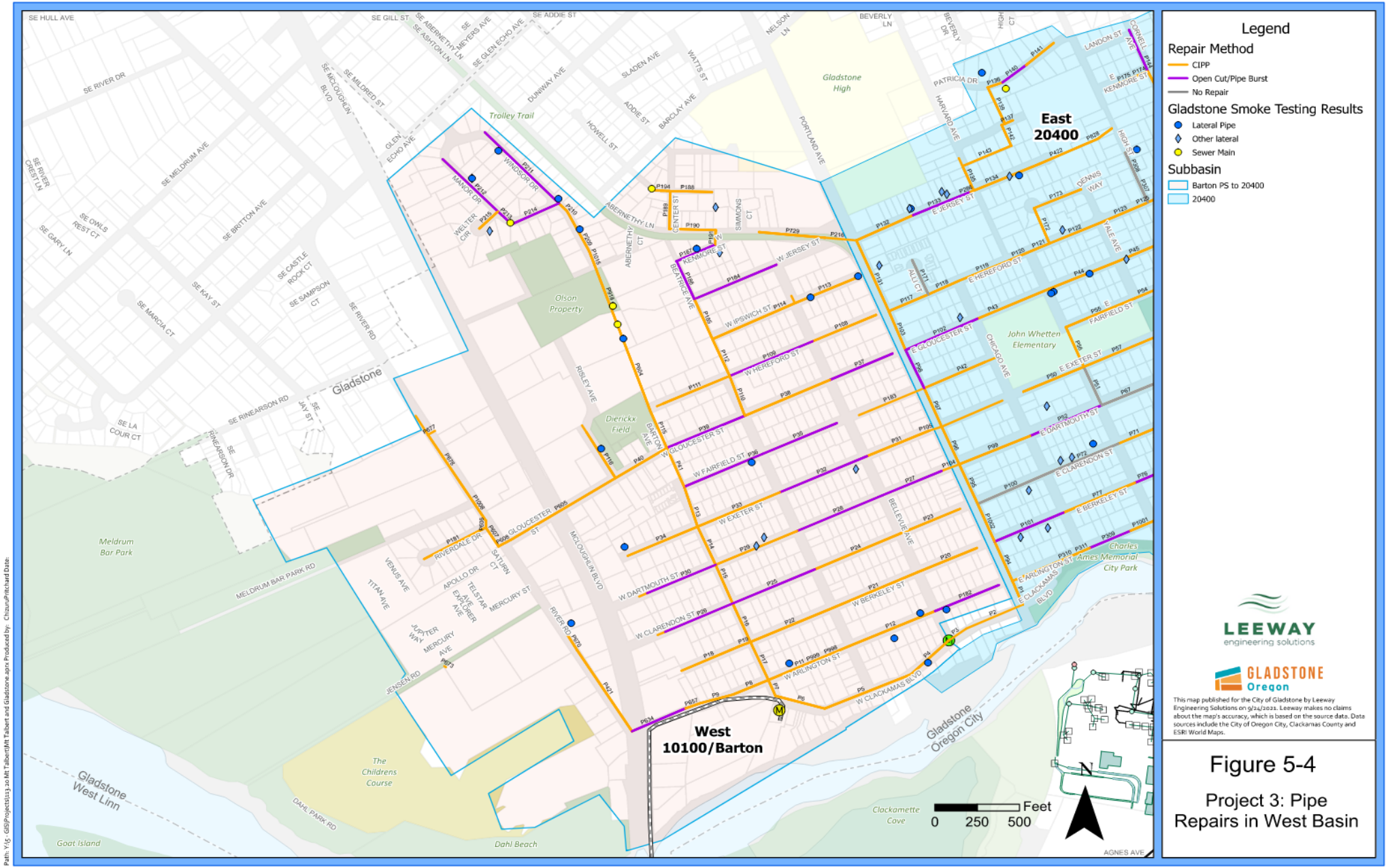


Cost-Effectiveness of Holistic Rehab

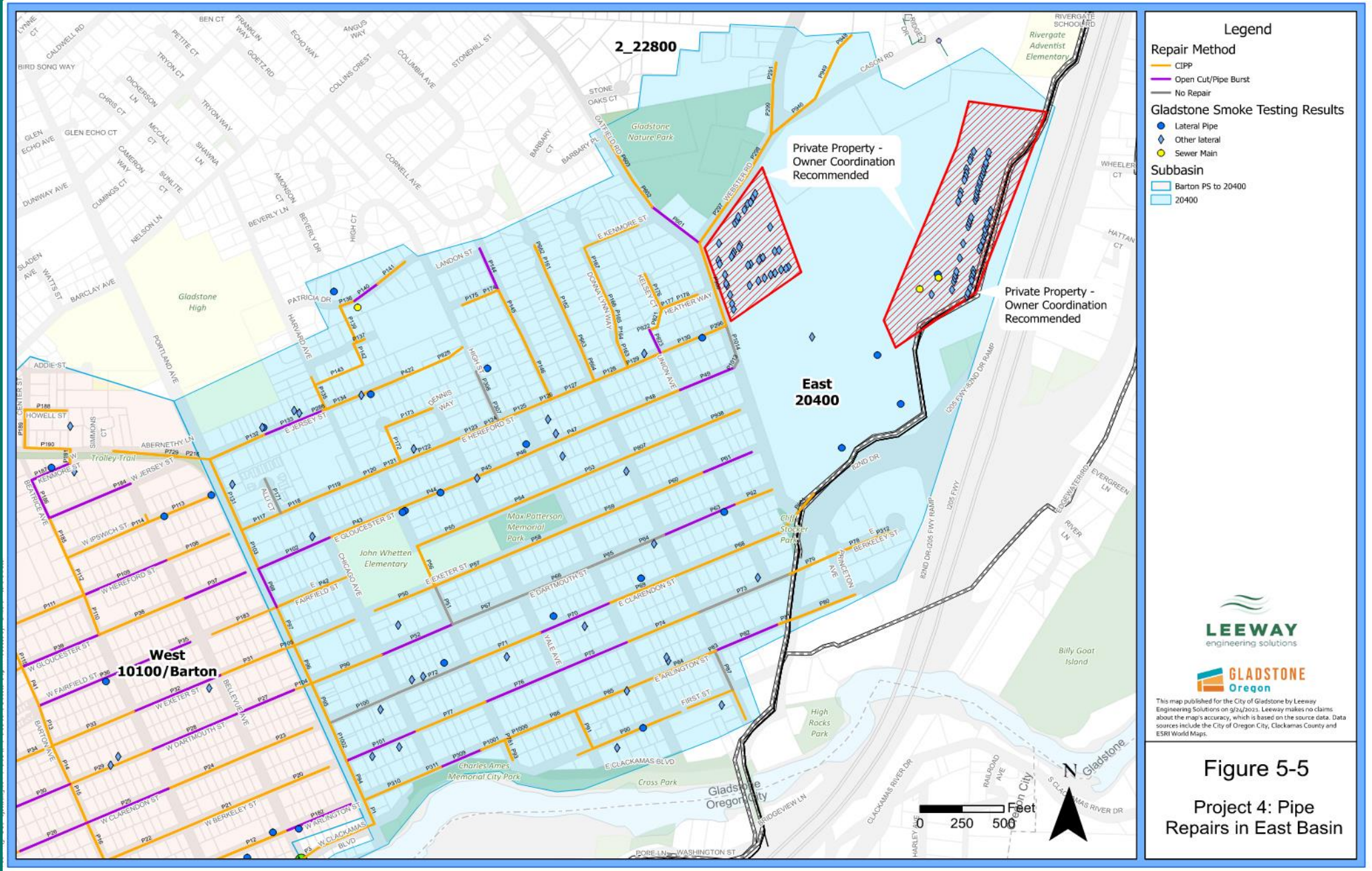
West Basin Project Alternatives	Cost ($)	5-Year 24-Hour Peak RDII Removed (MGD)	$ Per Gallon of I/I removed ($/gallon removed)
West Basin Sewer Mains and Manholes Only (20% removal)	$8,400,000	1.30	$6.46/gal
West Basin Sewer Mains, Manholes, Laterals in the ROW (40% removal)	$13,400,000	2.59	$5.16/gal
West Basin Sewer Mains, Manholes, Laterals to Private Buildings (65% removal)	$16,000,000	4.21	$3.78/gal

East Basin Project Alternatives	Cost ($)	5-Year 24-Hour Peak RDII Removed (MGD)	$ Per Gallon of I/I removed ($/gallon removed)
East Basin Sewer Mains and Manholes Only (20% removal)	$8,750,000	1.41	$6.18/gal
East Basin Sewer Mains, Manholes, Laterals in the ROW (40% removal)	$15,000,000	2.82	$5.30/gal
East Basin Sewer Mains, Manholes, Laterals to Private Buildings (65% removal)	$18,150,000	4.59	$3.95/gal

West Basin Holistic Rehab



East Basin Holistic Rehab



Recommended Plan

Project	Description	Project Cost	Schedule
Project 1: Inflow Disconnection	Disconnection of inflow sources on private property or in close proximity to storm sewers	$790,000	Design: 2022 Construction: 2023
Project 2: Storm Sewer extensions	Disconnection of inflow sources that require storm sewer extensions	$1,310,000	Design: 2022 Construction: 2023
Assessment 1: Post-Inflow Assessment	Post-Rehabilitation Monitoring and Modeling	$100,000	Winter 2023/2024
Project 3: Rehabilitation of West Basin (10100) sewers	Holistic rehabilitation of sewer main, manholes, and laterals (as close as possible to the building foundation)	$16,000,000	Design: 2024 Construction: 2025
Assessment 2: Post-West Basin Rehabilitation Assessment	Post-Rehabilitation Monitoring and Modeling	$100,000	Winter 2025/2026
Project 4: Rehabilitation of East Basin (20400) sewers	Holistic rehabilitation of sewer main, manholes, and laterals (as close as possible to the building foundation)	$18,100,000	Design: 2025 Construction: 2026
Assessment 3: Post-East Basin Rehabilitation Assessment	Post-Rehabilitation Monitoring and Modeling	$100,000	Winter 2026/2027

Key Initial Steps

- Project funding
- Private I/I source policy and funding
  - City Code prohibits groundwater/stormwater
  - Numerous models for private source I/I
- Large private contributors
  - East Basin Private Property
  - Manufactured Home Properties in West Basin

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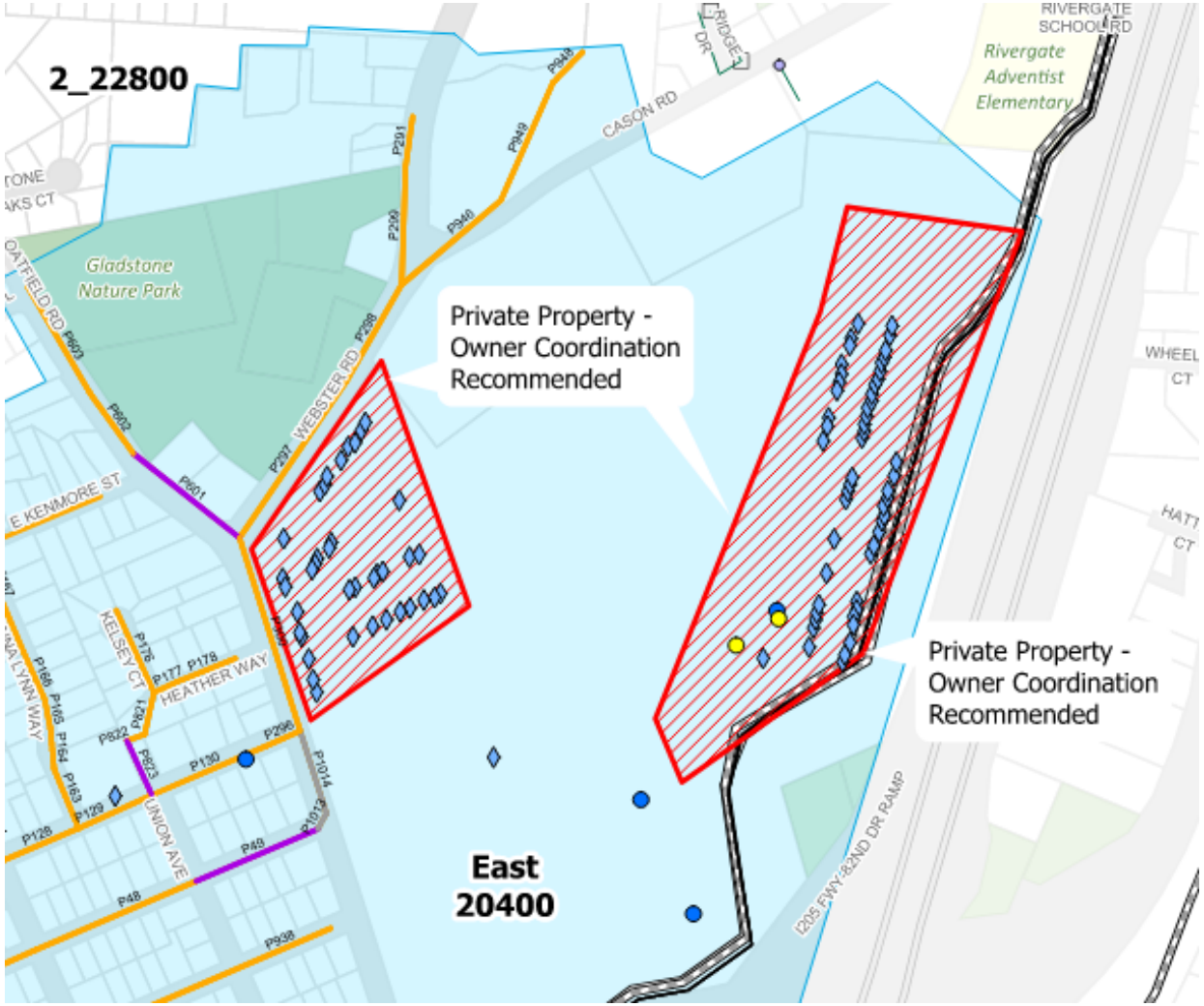
East Basin Private Property



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Questions?

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85
GLADSTONE
10/21/20
86
237
N/A
N/A
45. 38878
-122. 58449
Eastern
1519
Camp Space 85 on Oak St
caps broken
cap below grade
2020/10/21

Gladstone

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GLADSTONE
SEP 23
RUN
11
LEAK
29
DISTANCE FROM MAIN
0
DIRECTION FROM MAIN
N/A
GPS
LATITUDE
45. 38282
LONGITUDE
122. 60255
BASIN
Western
TIME
1450
ADDRESS
1055 SE Risley Ave
(E. corner)
DESCRIPTION OF INCIDENT
leak @ creek crossing
SFE GLOBAL
2020/09/23

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Gladstone Defects