



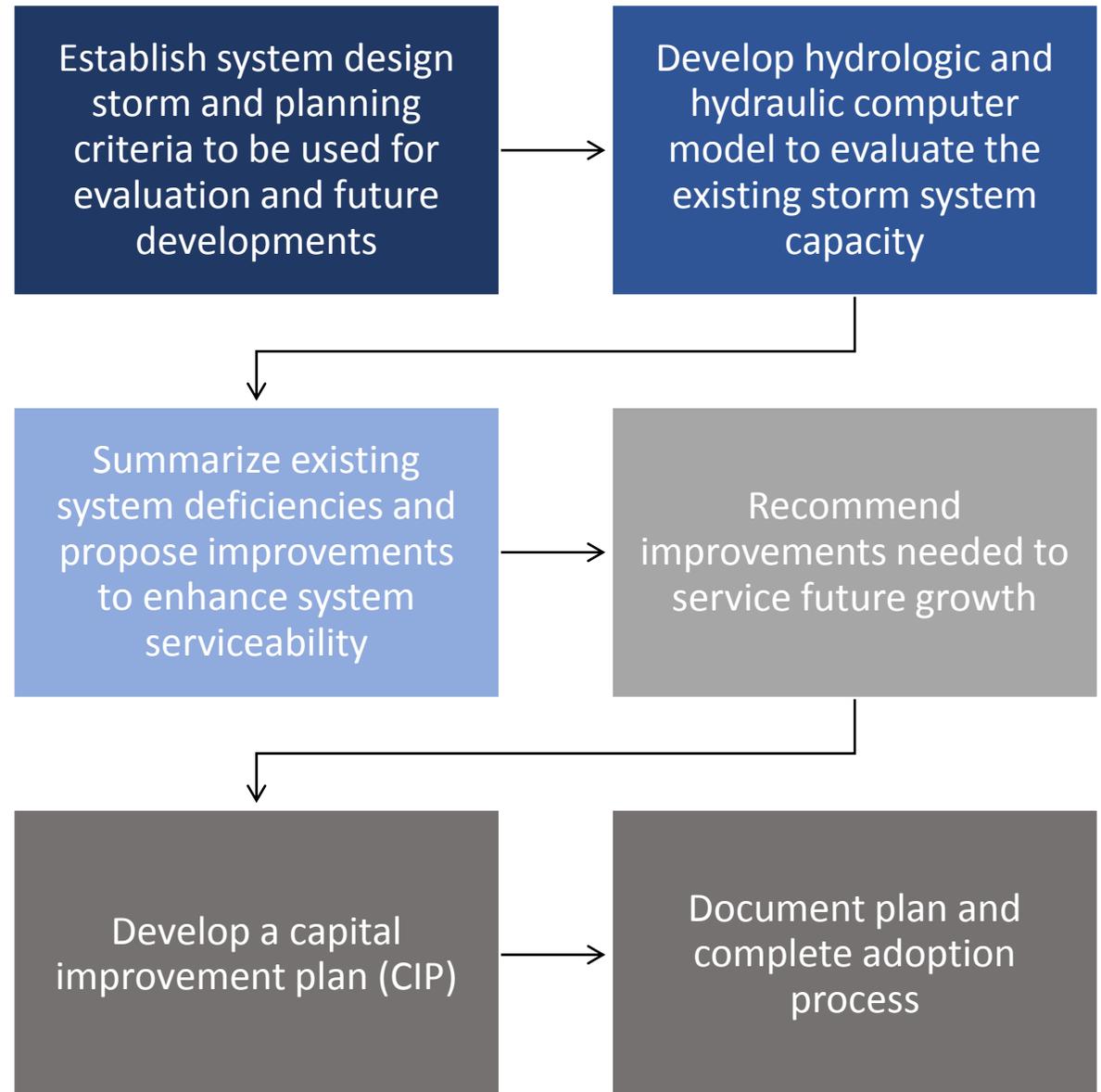
Stormwater Master Plan (SWMP) – City of St. Helens

City Council Work Session

November 3, 2021



Need and Purpose



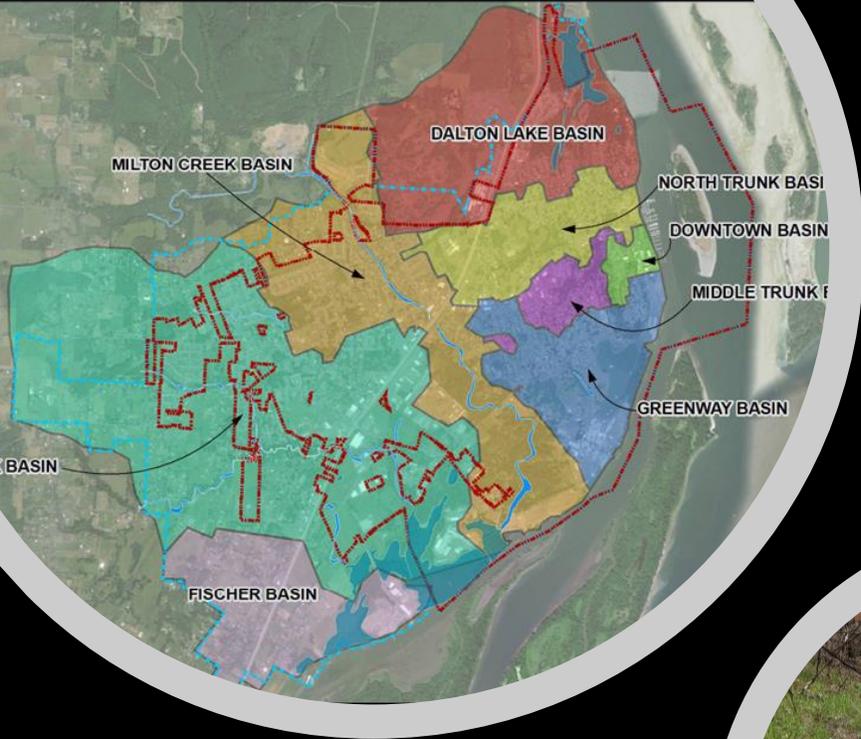
Planning Criteria

Planning Criteria	St. Helens Recommended
Runoff Model Approach	NRCS TR-55
Storm Distribution	NRCS 1A
Min. T_c	5 minutes
24 hr. Storm Precipitation	NOAA
PVC "n" Value	0.013
Min. Pipe Diameter	12"
Minimum Freeboard in Open Channels (ft)	1
Minimum Freeboard in Detention Facility (ft)	1
Surcharging Allowed	To within 0.5 feet of the rim elevation
Design Storm for Conveyance	25-Year
Design Standards for Detention facilities on new developments	25-Year with overflow to bypass 100-Year

Storm Event	Precipitation (in) ¹
2-Year	2.0
10-Year	3.0
25-Year	3.5
100-Year	4.0

1) From NOAA Atlas 2, Volume 10.

- 25-Year Storm – Conveyance facilities (i.e. pipes, culverts, open channels)
- 25-Year Storm – Detention facilities
- For 2-, 5-, 10-year storms, post-development = pre-development peak flows
- For 25-year storm, 25-year post-development = 10-year pre-development peak flows



Existing System

45 miles of gravity pipeline

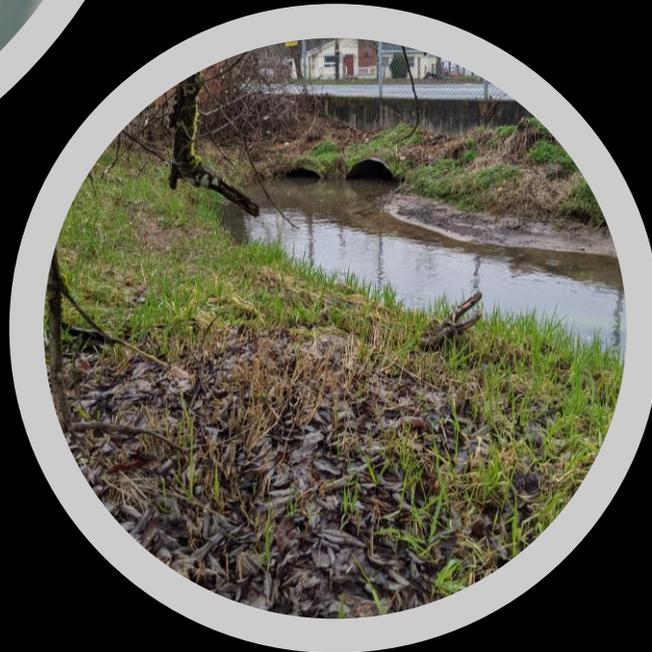
800 manholes

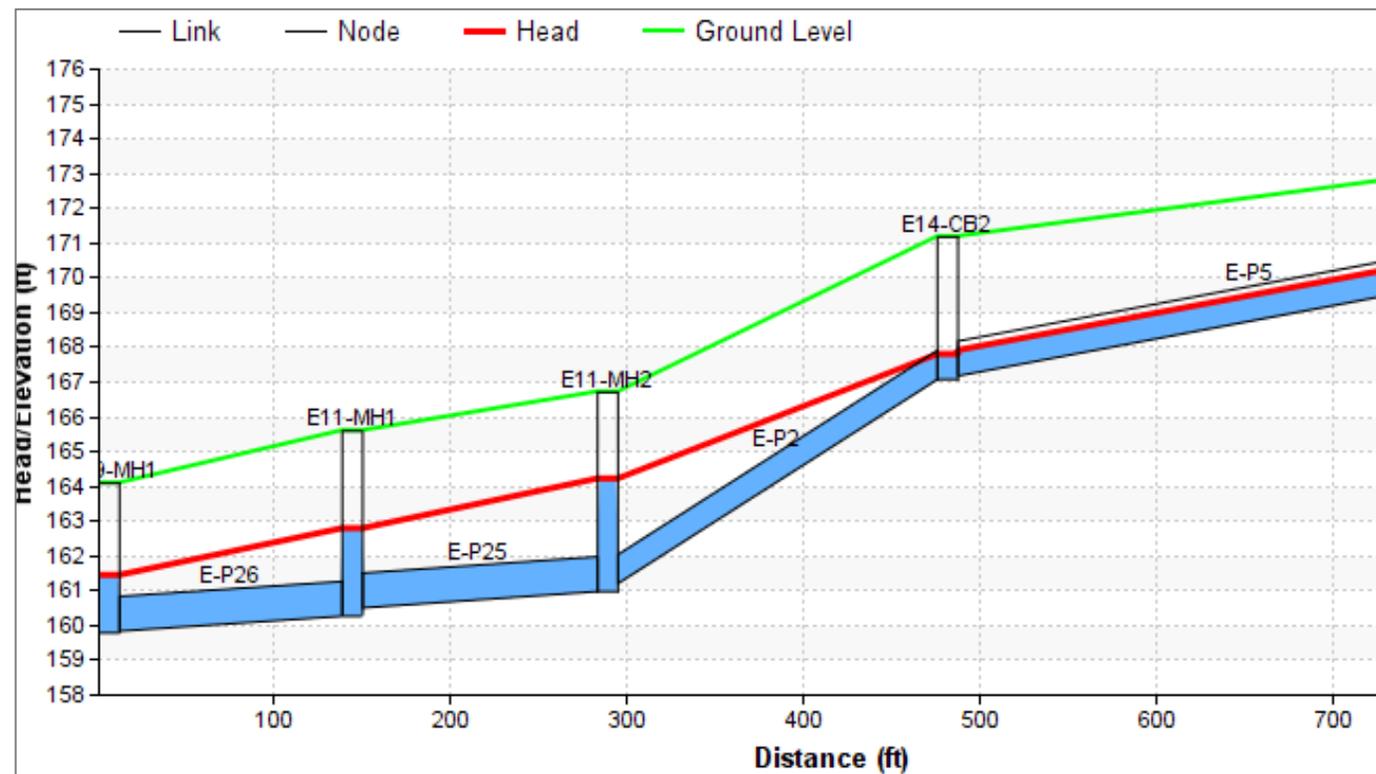
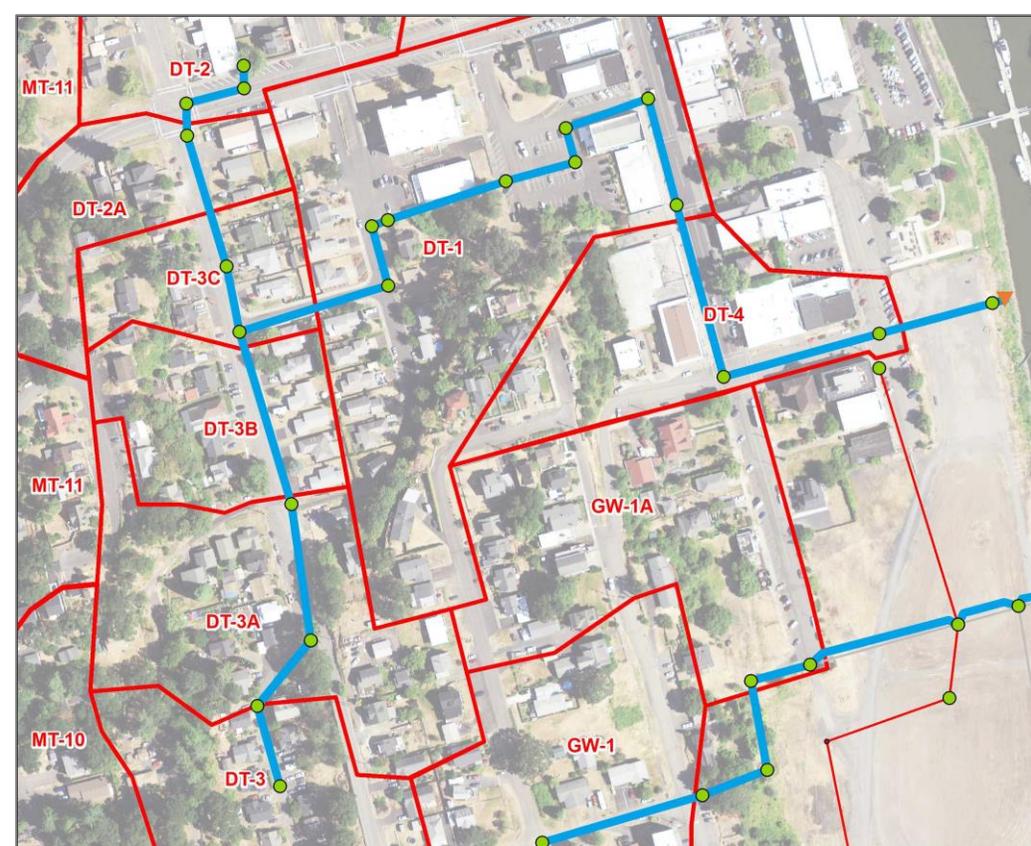
1,500 catch basins

10 detention ponds

36 Outfalls

220 Sub-basins

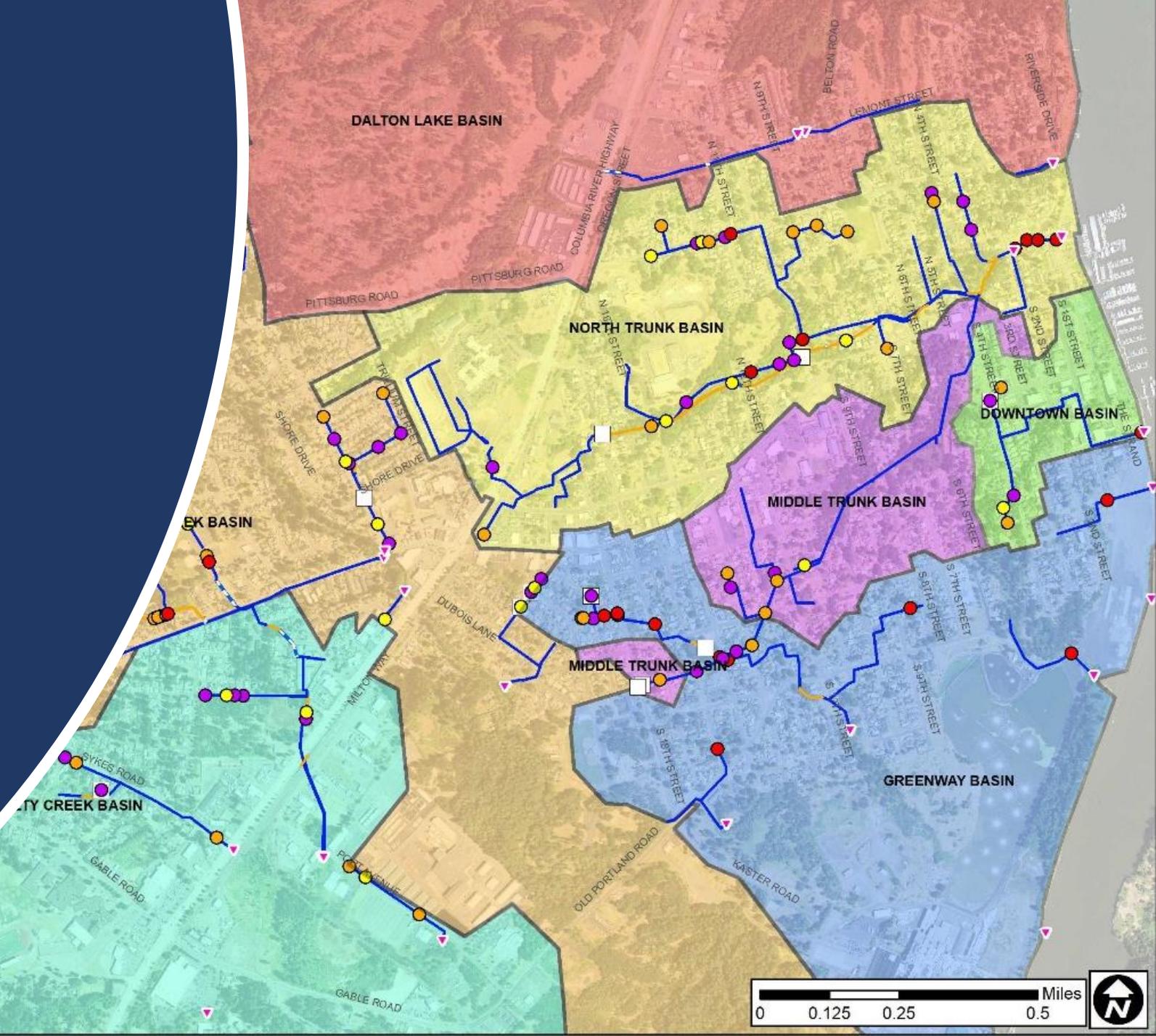




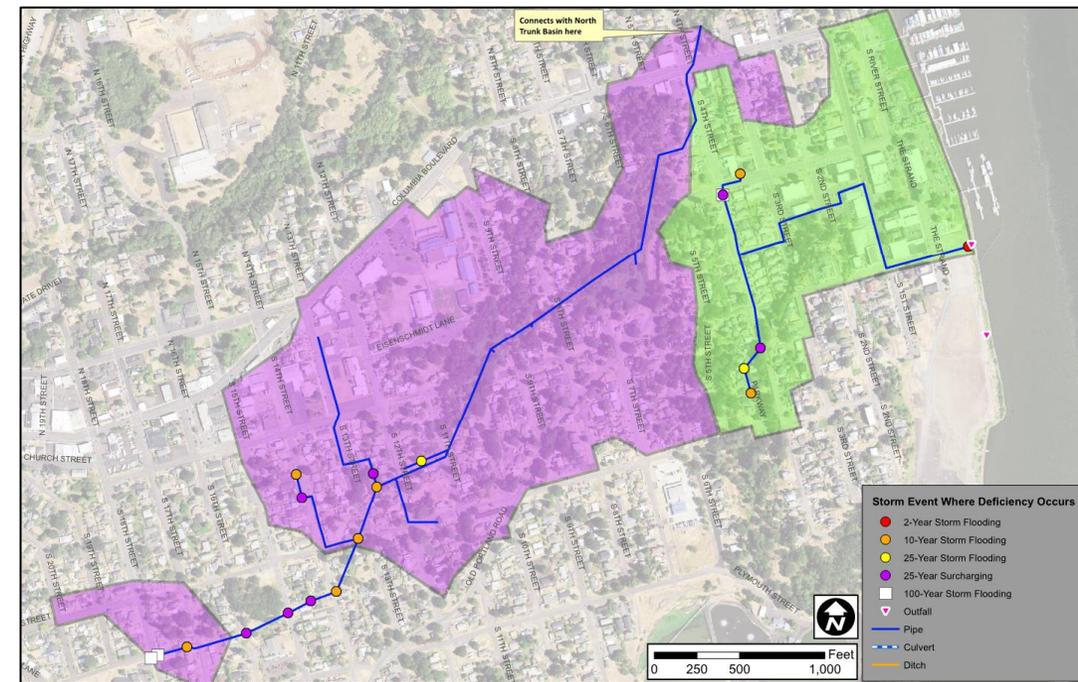
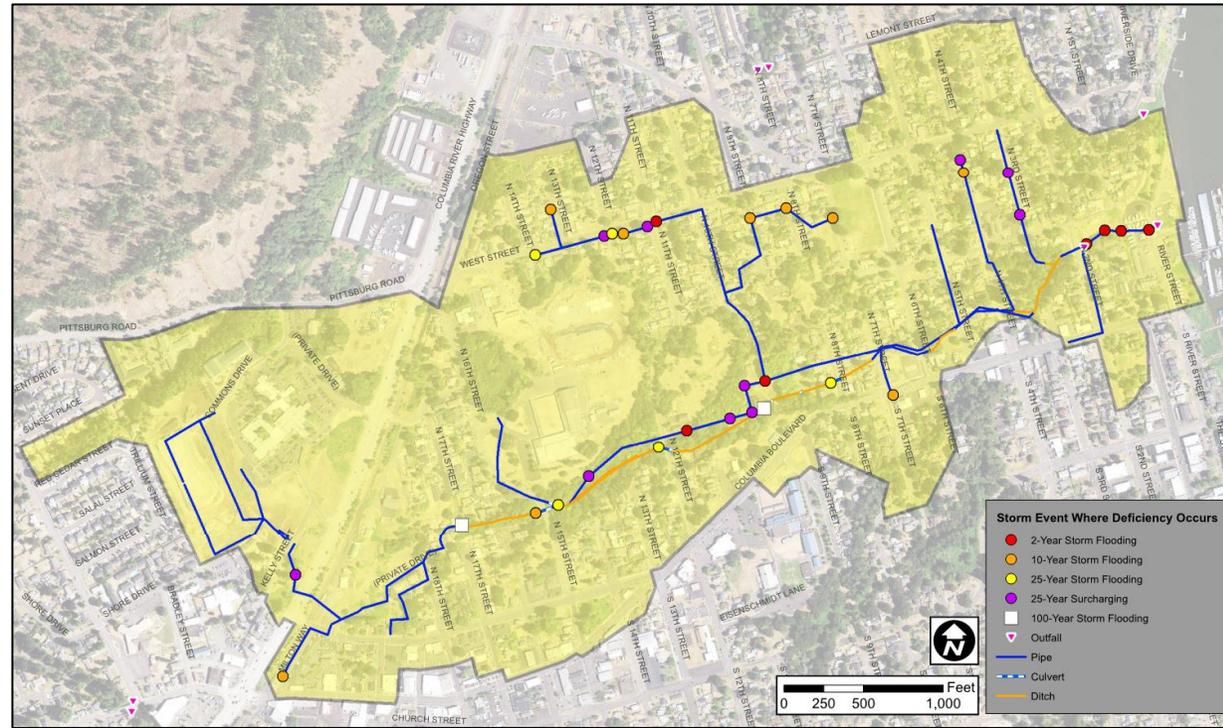
Model Development

- NRCS TR-55 Hydrologic Methodology (typical for stormwater evaluations in western Oregon)
- Hydraulic model to evaluate existing capacities
- Flow monitoring completed for calibration process

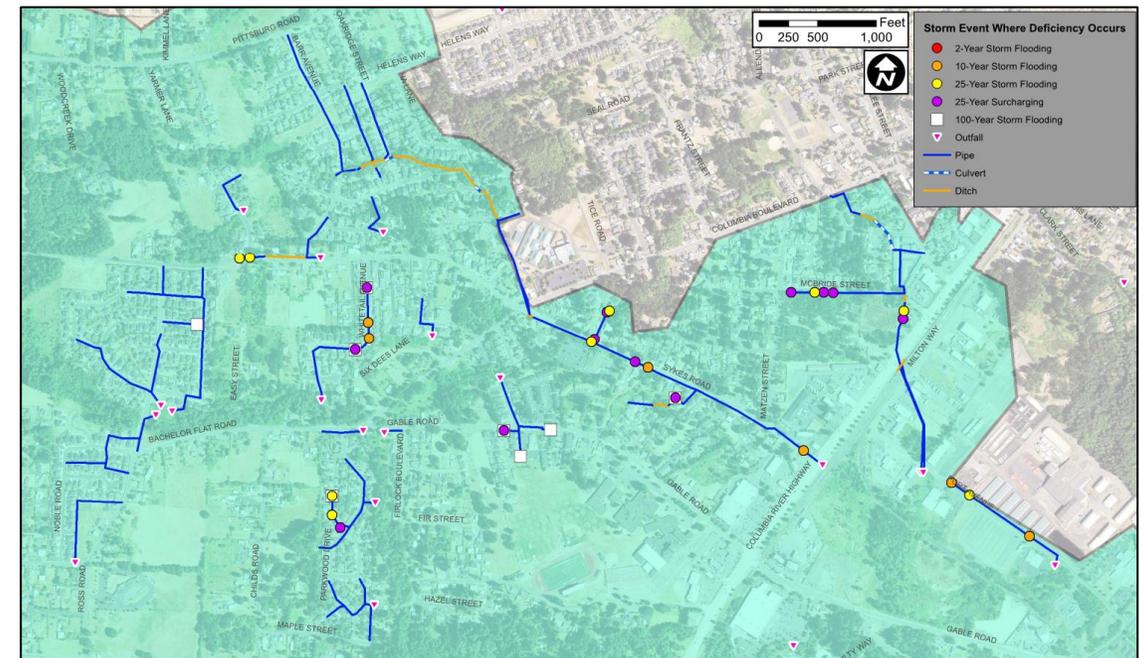
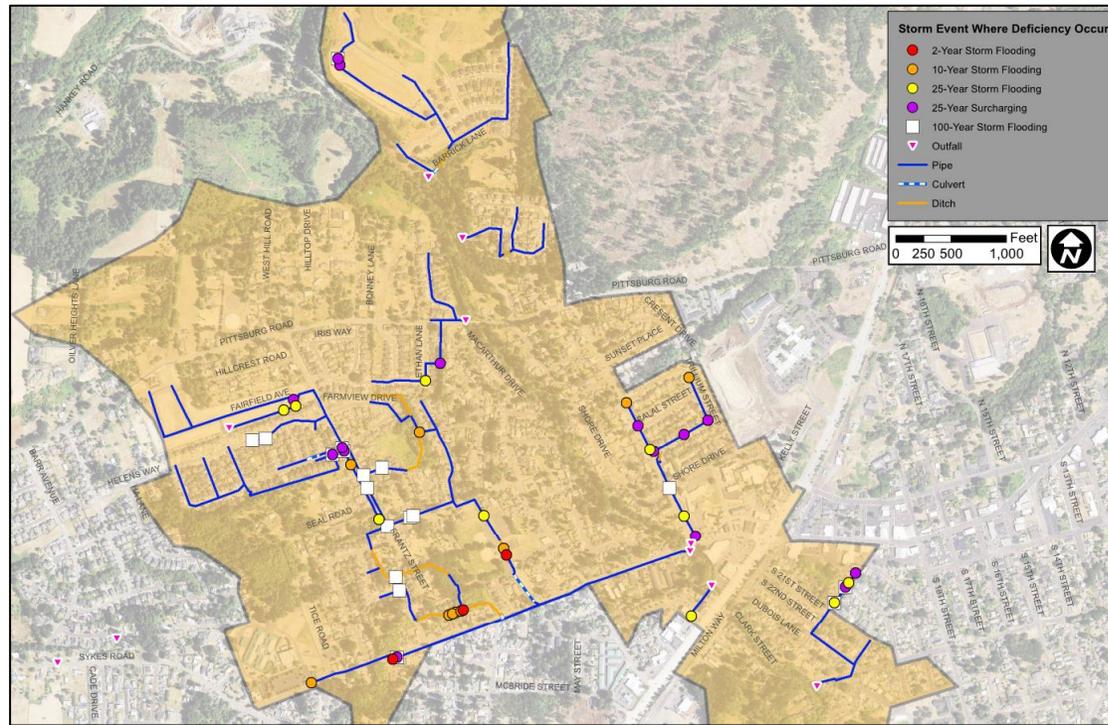
Existing Capacity Evaluation



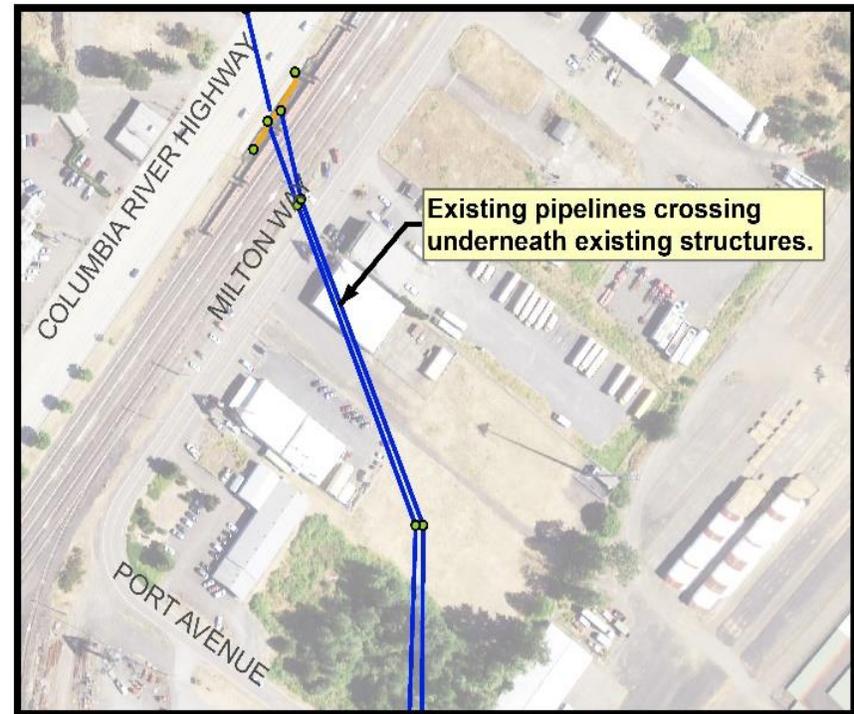
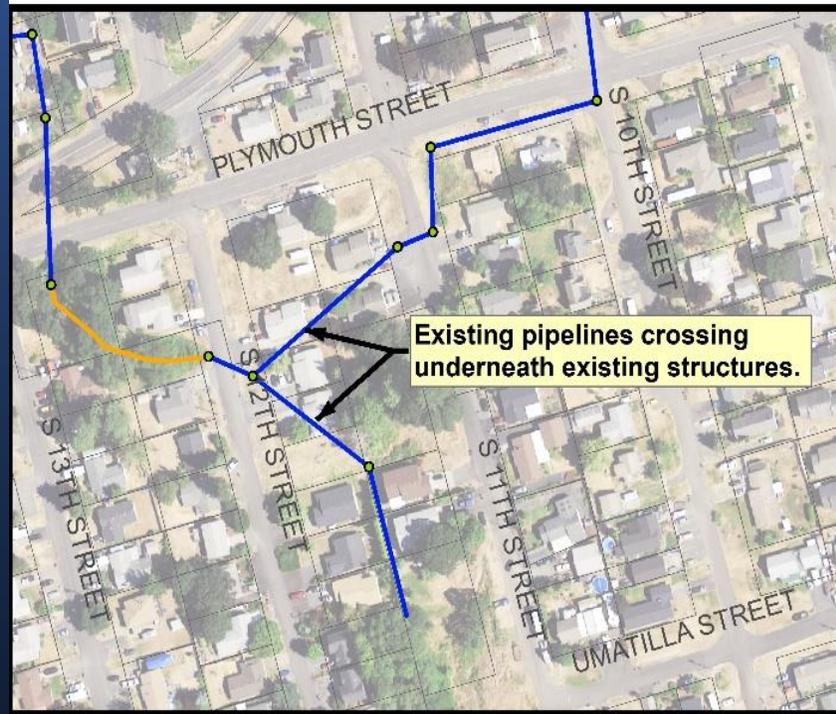
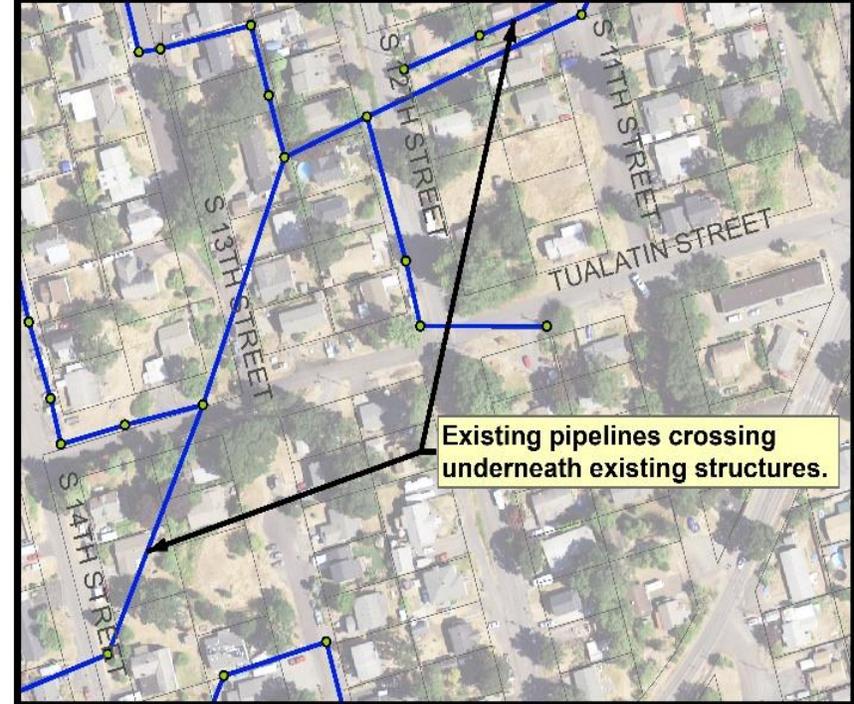
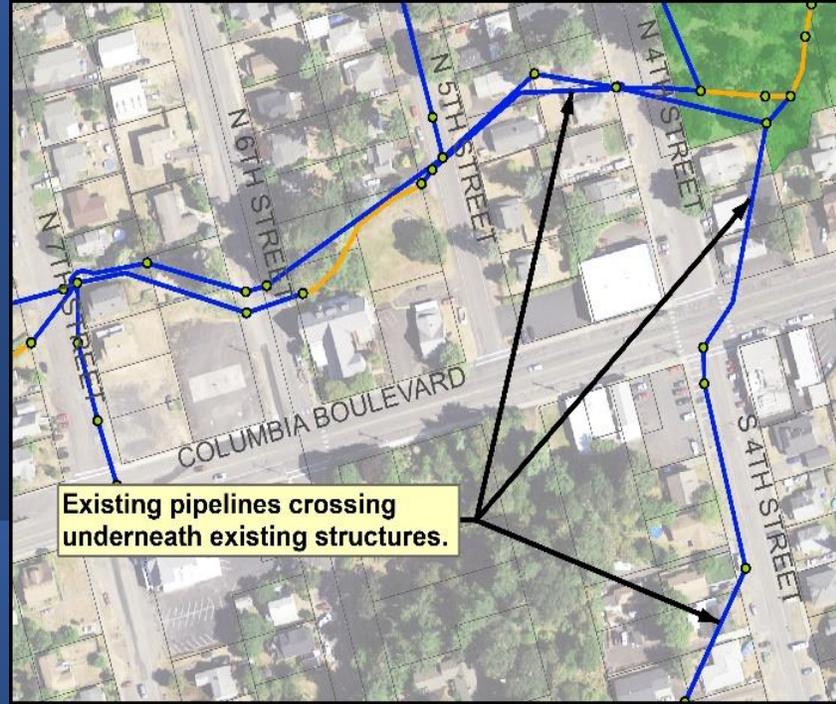
North Trunk, Middle Trunk, and Downtown Basins



Milton Creek and McNulty Creek Basin



Identified Potential Pipes under Structures

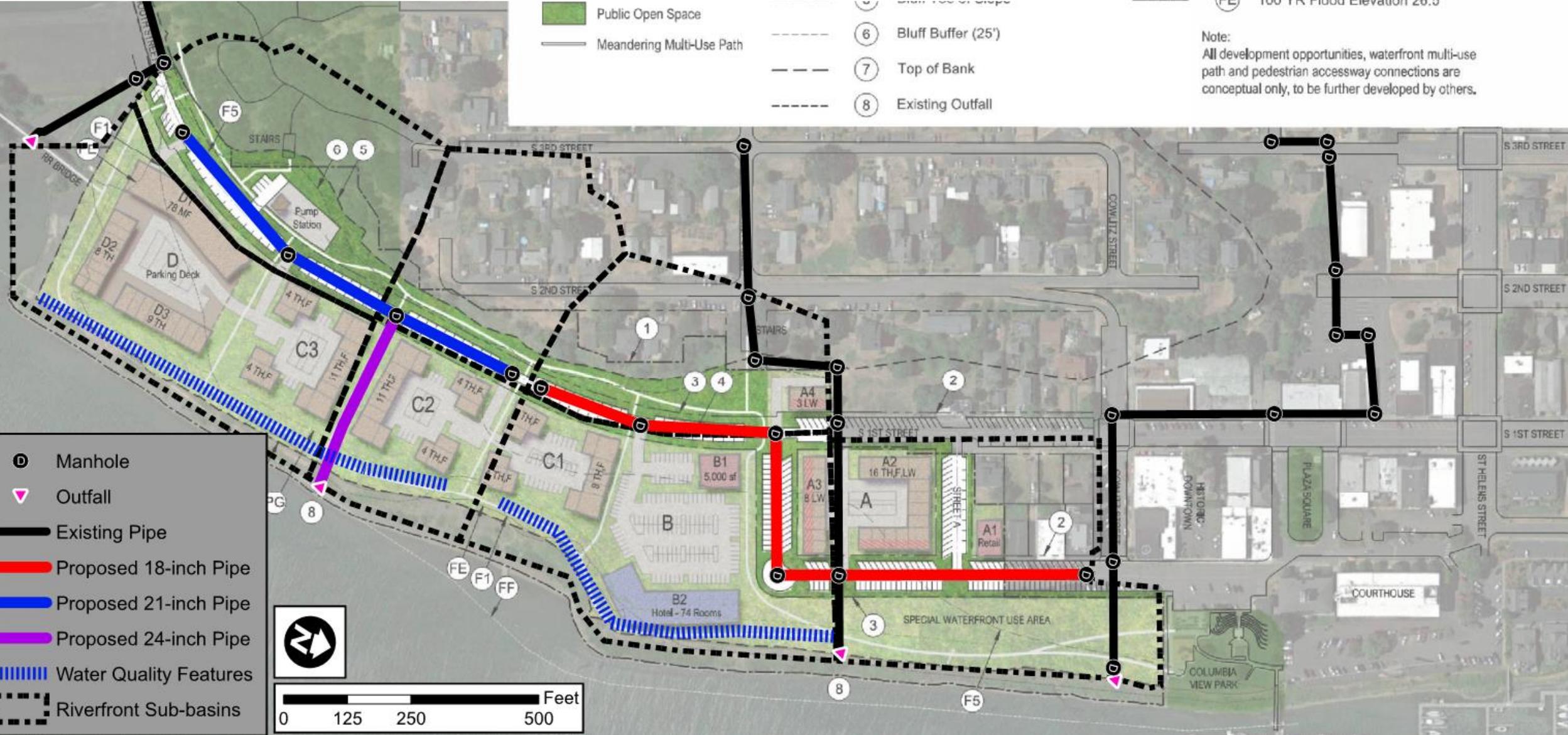


Riverfront Development

	1 Project Boundary
	2 Existing Right-of-Way
	3 Proposed Right-of-Way
	4 Road Centerline
	5 Bluff Top of Slope
	6 Bluff Buffer (25')
	7 Top of Bank
	8 Existing Outfall

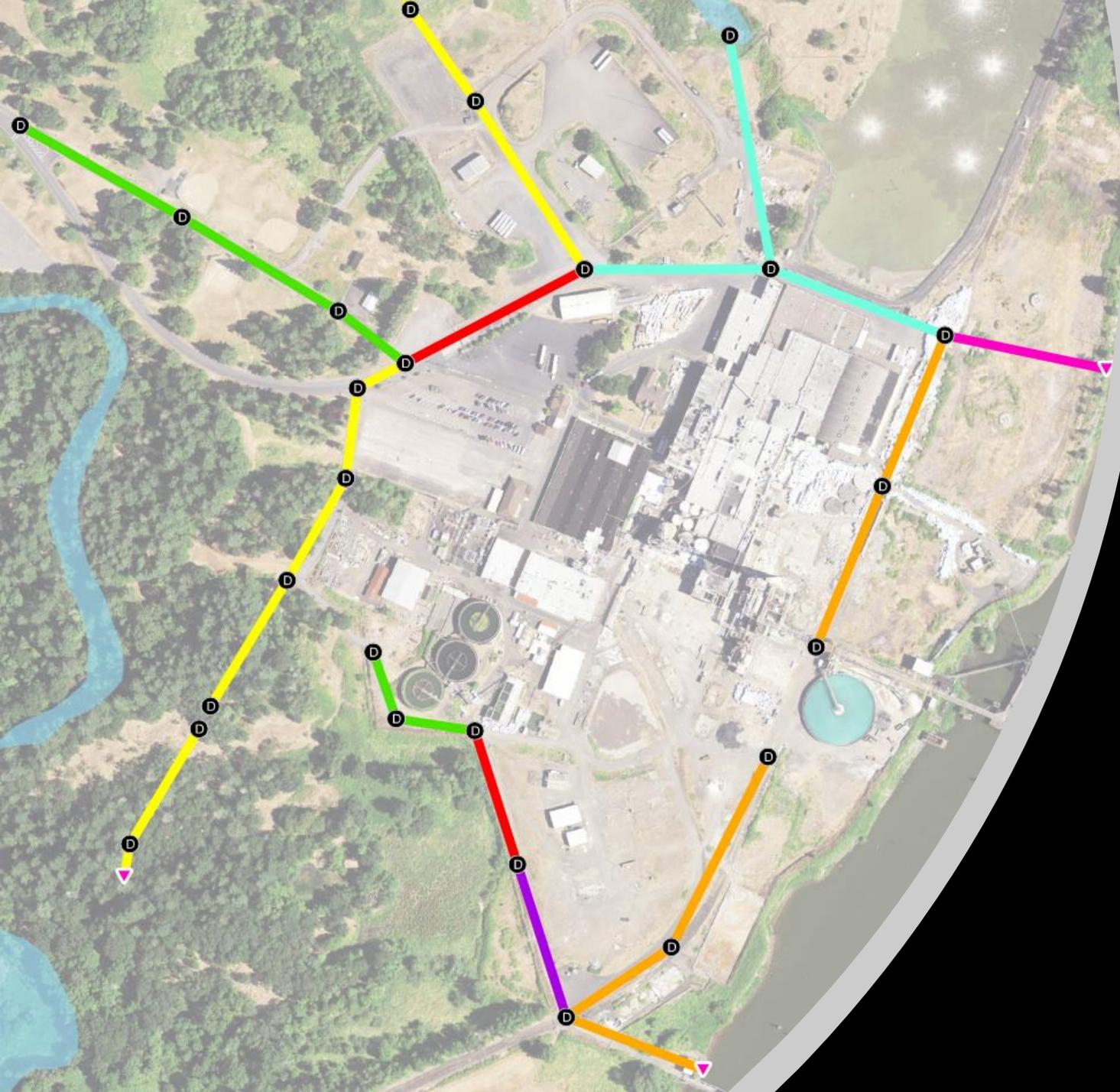
	(PG) Public Greenway (50' wide typ.)
	(FF) FEMA Floodway
	(F1) FEMA 100 YR Floodplain
	(F5) FEMA 500 YR Floodplain
	(FE) 100 YR Flood Elevation 26.5'

Note:
All development opportunities, waterfront multi-use path and pedestrian accessway connections are conceptual only, to be further developed by others.



	Manhole
	Outfall
	Existing Pipe
	Proposed 18-inch Pipe
	Proposed 21-inch Pipe
	Proposed 24-inch Pipe
	Water Quality Features
	Riverfront Sub-basins

0 125 250 500 Feet



- Ⓧ Manhole
- ▽ Outfall

Diameter (in)

- 12
- 15
- 18
- 24
- 30
- 36
- 48

Streams

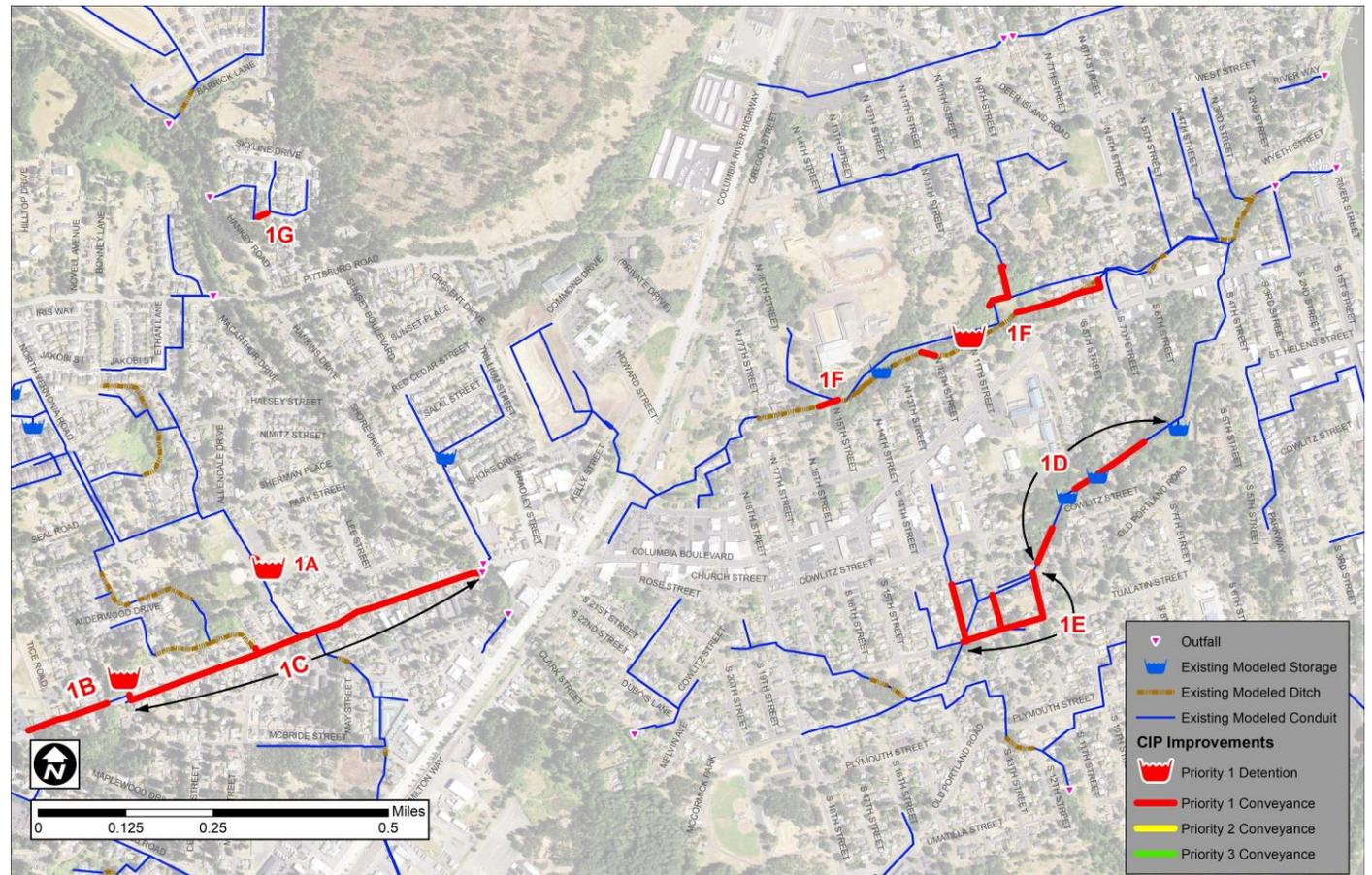
Industrial Business Park

Design Standards, Code, and Comprehensive Plan

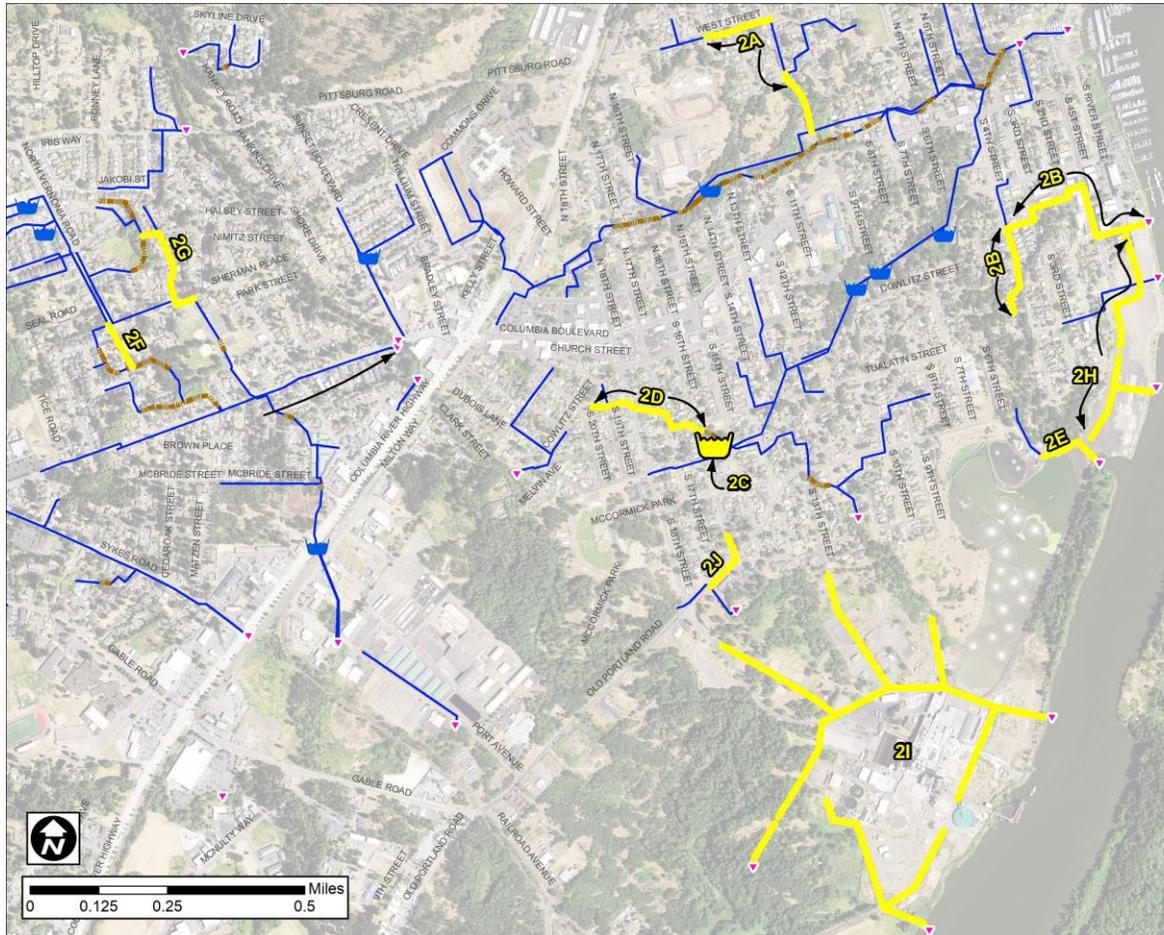
- Clear triggers and requirements for water quality
- Promote BMPs and LIDs
- Specifics of drainage reports, engineering review, and approval of plans
- Detention facility requirements
- Hydrologic analysis requirements

Capital Improvement Plan – Priority 1

Priority	Project Description	Estimated Cost	SDC Eligibility	SDC Improvement Amount	City Amount
1A	Campbell Park Detention Pond (Milton Creek)	\$300,000	0%	\$0	\$300,000
1B	Columbia Boulevard Detention Pond (Milton Creek)	\$1,100,000	66%	\$727,000	\$373,000
1C	Columbia Boulevard Upsize (Milton Creek)	\$2,800,000	14%	\$392,000	\$2,408,000
1D	Middle Trunk Detention Ponds and Piping	\$2,000,000	5%	\$103,000	\$1,897,000
1E	Upsize and Realign Tualatin Street (Middle Trunk)	\$5,000,000	14%	\$677,000	\$4,323,000
1F	Detention Pond and Piping Between N 12th and N 7th Street (North Trunk)	\$1,600,000	17%	\$269,000	\$1,331,000
1G	Steinke Drive Pipe Installation	\$60,000	0%	\$0	\$60,000
Total Priority 1 Improvement Costs		\$12,900,000	-	\$2,200,000	\$10,700,000



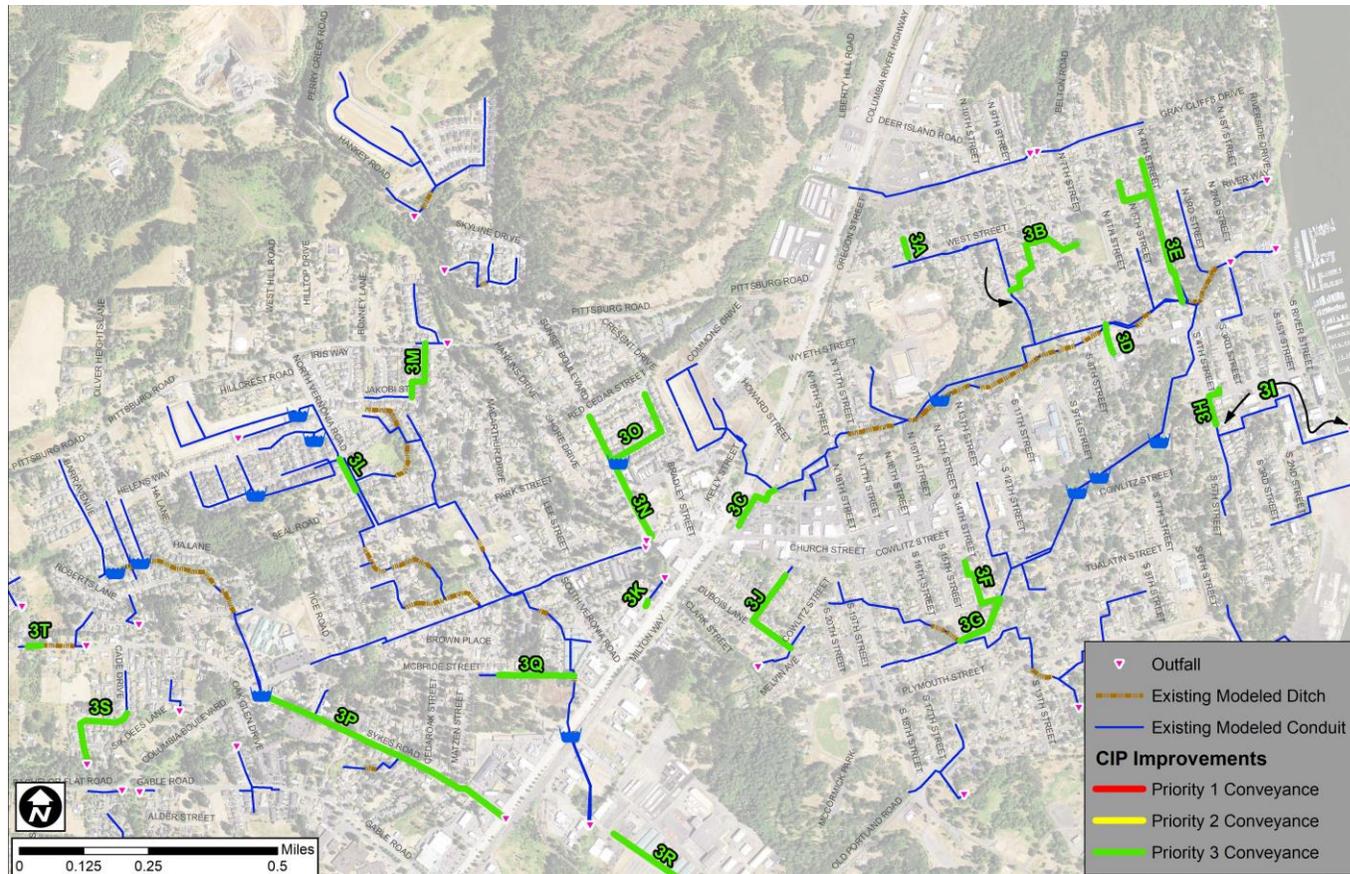
Capital Improvement Plan – Priority 2



Priority	Project Description	Estimated Cost	SDC Eligibility	SDC Improvement Amount	City Amount
2A	Upsize Pipes along West Street and N 10th Street (North Trunk)	\$1,400,000	0%	\$0	\$1,400,000
2B	S 4th Street to Outfall CCTV Inspection (Downtown)	\$20,000	0%	\$0	\$20,000
2C	Heinie Huemann Park Detention Pond (Greenway)	\$200,000	26%	\$52,000	\$148,000
2D	Upsize from S 20th Street to Heinie Huemann Park (Greenway)	\$1,100,000	29%	\$318,000	\$782,000
2E	Nob Hill Park CIP lining (Greenway)	\$400,000	0%	\$0	\$400,000
2F	Franz Street (Milton Creek)	\$400,000	0%	\$0	\$400,000
2G	Mayfair Drive CIP lining and Upsize (Milton Creek)	\$400,000	0%	\$0	\$400,000
2H	Riverfront Development Stormwater Infrastructure	\$3,300,000	100%	\$3,300,000	\$0
2I	Industrial Business Park Stormwater Infrastructure	\$8,600,000	100%	\$8,600,000	\$0
2J	S 16th Street to Old Portland Road Upsize (Greenway)	\$500,000	0%	\$0	\$500,000
2K	Stormwater Master Plan Update	\$200,000	0%	\$0	\$0
Total Priority 2 Improvement Costs		\$16,500,000	-	\$12,300,000	\$4,100,000

▼ Outfall
■ Existing Modeled Storage
■ Existing Modeled Ditch
■ Existing Modeled Conduit
CIP Improvements
■ Priority 2 Detention
■ Priority 1 Conveyance
■ Priority 2 Conveyance
■ Priority 3 Conveyance

Capital Improvement Plan – Priority 3



Priority	Project Description	Estimated Cost	SDC Eligibility	SDC Improvement Amount	City Amount
3A	Upsize N 13th Street to West Street (North Trunk)	\$200,000	0%	\$0	\$200,000
3B	Upsize from 6th Street Ball Park to N 10th Street (North Trunk)	\$900,000	0%	\$0	\$900,000
3C	Upsize Milton Way at Street Helens Street (North Trunk)	\$600,000	75%	\$450,000	\$150,000
3D	Upsize N 7th Street from Columbia Boulevard to Trunkline (North Trunk)	\$400,000	0%	\$0	\$400,000
3E	Upsize N 4th Street south of West Street (North Trunk)	\$1,400,000	0%	\$0	\$1,400,000
3F	Upsize and Regrade along S 14th Street (Middle Trunk)	\$600,000	50%	\$298,000	\$302,000
3G	Upsize existing pipes from Heinie Huemann to Tualatin Street (Middle Trunk)	\$400,000	0%	\$0	\$400,000
3H	Street Helens Street to South 4th Street Upsizing (Downtown)	\$500,000	0%	\$0	\$500,000
3I	S 4th Street to Outfall Pipe Upsizing (Downtown)	\$2,400,000	0%	\$0	\$2,400,000
3J	Crouse Way Upsize (Milton Creek)	\$1,000,000	14%	\$137,000	\$863,000
3K	Eilertson Street (Milton Creek)	\$100,000	0%	\$0	\$100,000
3L	N Vernonia Road from Oakwood to Ava Court (Milton Creek)	\$400,000	0%	\$0	\$400,000
3M	Ethan Lane Upsizing (Milton Creek)	\$600,000	0%	\$0	\$600,000
3N	Sunset Boulevard to Outfall Upsize (Milton Creek)	\$800,000	0%	\$0	\$800,000
3O	Sunset Boulevard, Trillium Street and Salmon Street upsize (Milton Creek)	\$1,100,000	0%	\$0	\$1,100,000
3P	Sykes Road Upsize from Columbia Boulevard to Outfall (McNulty Creek)	\$2,700,000	0%	\$0	\$2,700,000
3Q	McBride Street Upsize (McNulty Creek)	\$600,000	0%	\$0	\$600,000
3R	Port Avenue Upsize (McNulty Creek)	\$900,000	0%	\$0	\$900,000
3S	Whitetail Avenue Upsize (McNulty Creek)	\$800,000	0%	\$0	\$800,000
3T	Sykes Road Cuvert near Mountain View Drive Upsize (McNulty Creek)	\$80,000	0%	\$0	\$80,000
Total Priority 3 Improvement Costs		\$16,500,000	-	\$900,000	\$15,600,000

O&M Recommendations

- Clean and CCTV every 2 years (1/2 system annually)
- Clean catch basins and manholes every 2 years (1/2 system annually)
- Clean/Inspect ditches and inlets annually
- Sweep roadways twice per year
- Perform detention facility maintenance annually
- Continue in-house storm line replacement and repair
- Complete construction inspection and permitting
- Comply with new Mercury TMDL plan and reporting

Annual Costs and Staffing



Item	Lifespan	Total Quantity	Annual Cost ¹ (rounded)
Lineal Feet of Storm Lines	75 Years	237,000	\$600,000
Number of Catch Basins	50 Years	1,500	\$110,000
Number of Manholes	50 Years	800	\$180,000
Total (Rounded)			\$900,000
<i>1) Storm pipes unit price equal to average unit price of 12" to 30". Manhole unit price equal to average of 48" and 60" manhole.</i>			

- 4.25 – 4.5 FTE to meet O&M and level of service goals
 - Recommend increase budgeted FTE or reduce non-utility work
- Additional engineering FTE for GIS and CIP projects
- Implement stormwater CCTV program
- Implement mercury TMDL plan and annual report

Questions or Comments?

Thank you for your participation.





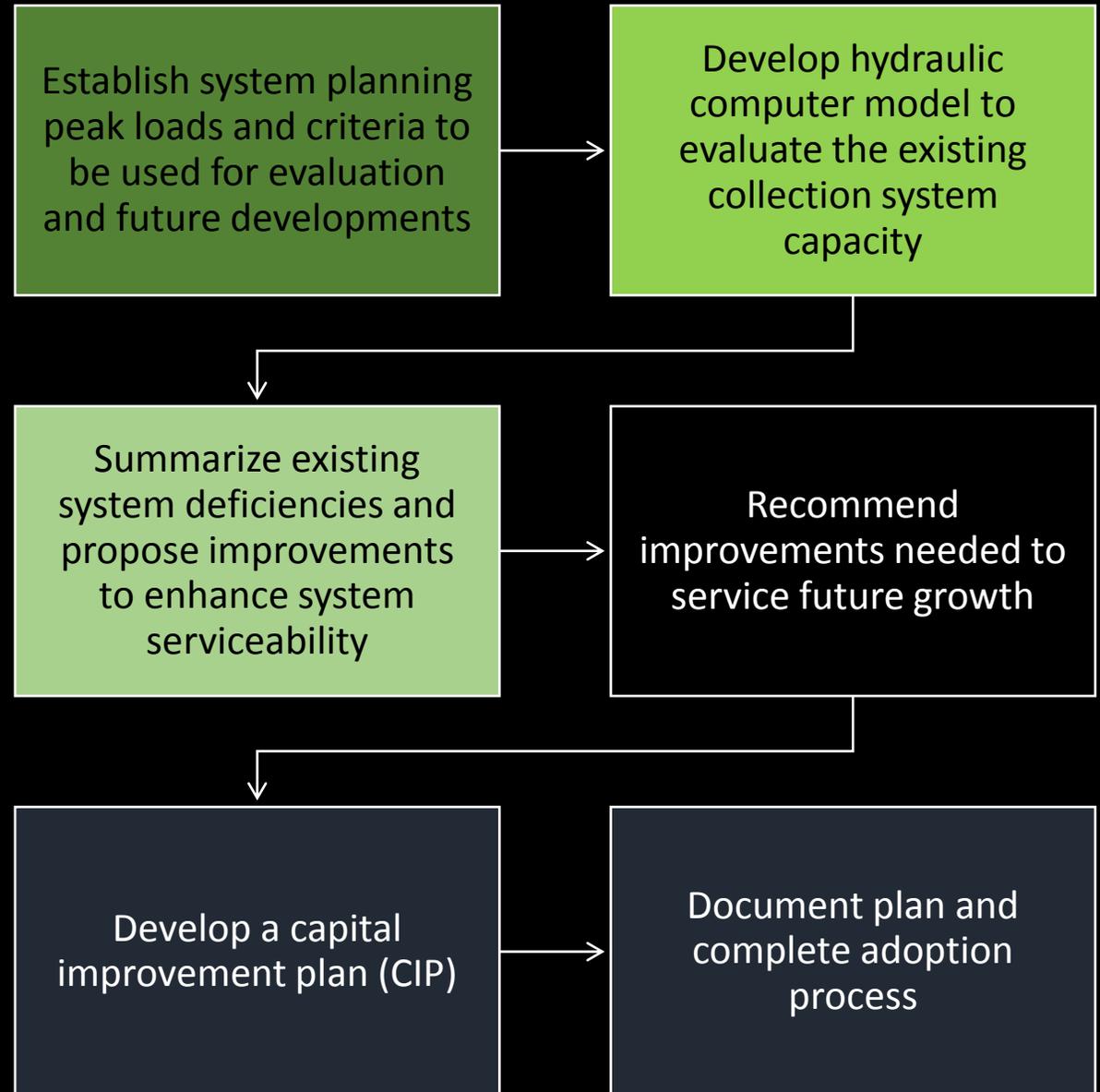
Wastewater Master Plan (WWMP) – City of St. Helens

City Council Work Session

November 3, 2021



Need and Purpose



Planning Criteria

St. Helens Historical Flows (MGD)								
	5-Year Avg	Planning	Modified Planning	Projected Planning Flow (MGD)				
Year	2019	2019	2019	2020	2025	2030	2035	2040
Population	15,395	15,395	15,395	15,895	16,727	17,605	18,530	19,506
ADWF	1.11	1.11	1.11	1.15	1.21	1.28	1.34	1.41
MMDWF ₁₀	2.79	3.03	3.03	3.12	3.29	3.46	3.64	3.83
AADF	2.24	2.24	2.24	2.31	2.43	2.56	2.69	2.83
AWWF	3.36	3.36	3.36	3.47	3.65	3.84	4.04	4.25
MMWWF ₅	5.99	7.88	7.88	8.03	8.28	8.54	8.82	9.11
PWkF	9.08	14.19	14.19	14.35	14.62	14.91	15.21	15.53
PDAF ₅	16.71	21.90	19.90	20.09	20.40	20.73	21.08	21.44
PIF ₅	25.90	33.98	26.00	26.26	26.70	27.16	27.65	28.16

Definitions

MGD = million gallons per day

ADWF = average dry-weather flow

AADF = average annual daily flow

MMWWF₅ = maximum month wet-weather flow

PDAF₅ = peak daily average flow

MMDWF₁₀ = maximum month dry-weather flow

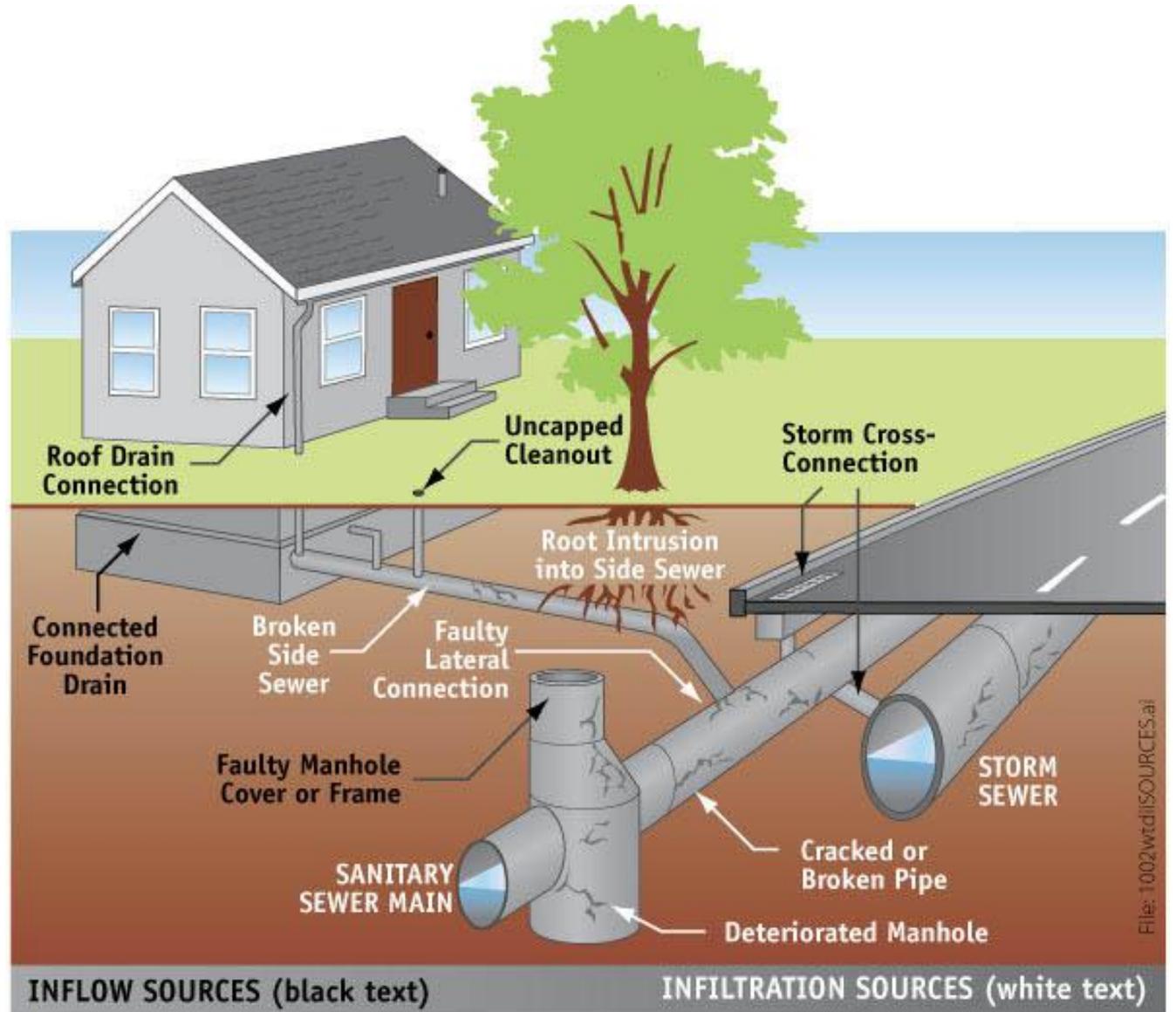
AWWF = average wet-weather flow

PWkF = peak week flow

PIF₅ = peak instantaneous flow associated w/ 5-yr storm

- Pipeline capacity – convey PIF₅ flows, do not exceed a water depth to diameter ratio of 0.85
- Pump stations – Convey PIF₅ flows with largest pump offline (firm capacity)
- PIF₅ flows occur during City's 5-year, 24-hour storm event = 2.4 inches precipitation
- Modified criteria created based on flow monitoring and pipeline capacity

Inflow and Infiltration





Existing System

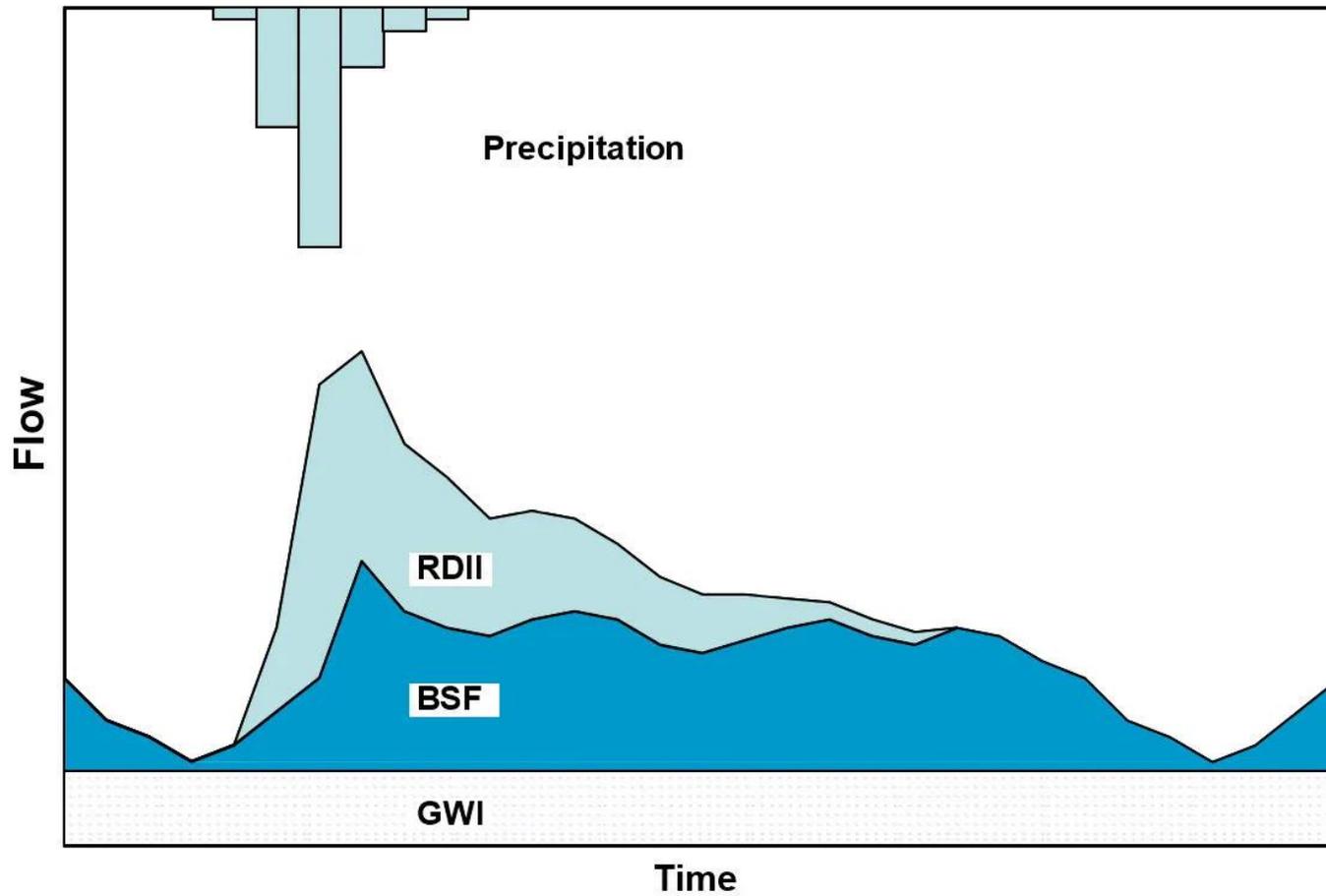
60 miles of gravity pipeline

2.5 miles of forcemain pipeline

9 pump stations

1,300 manholes

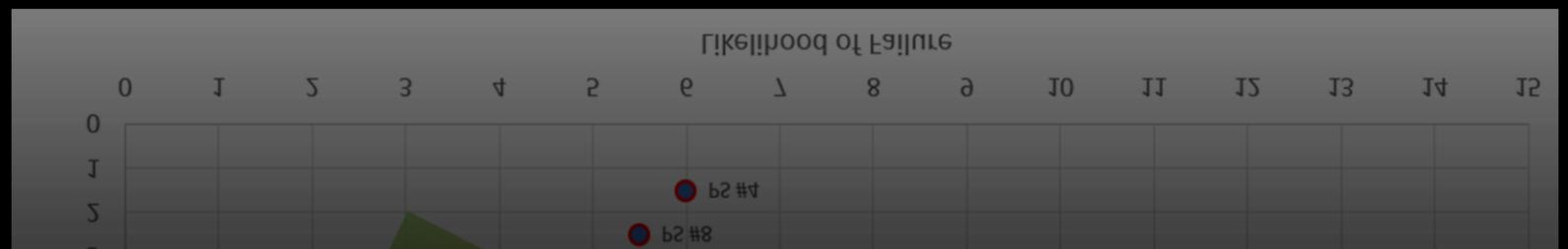
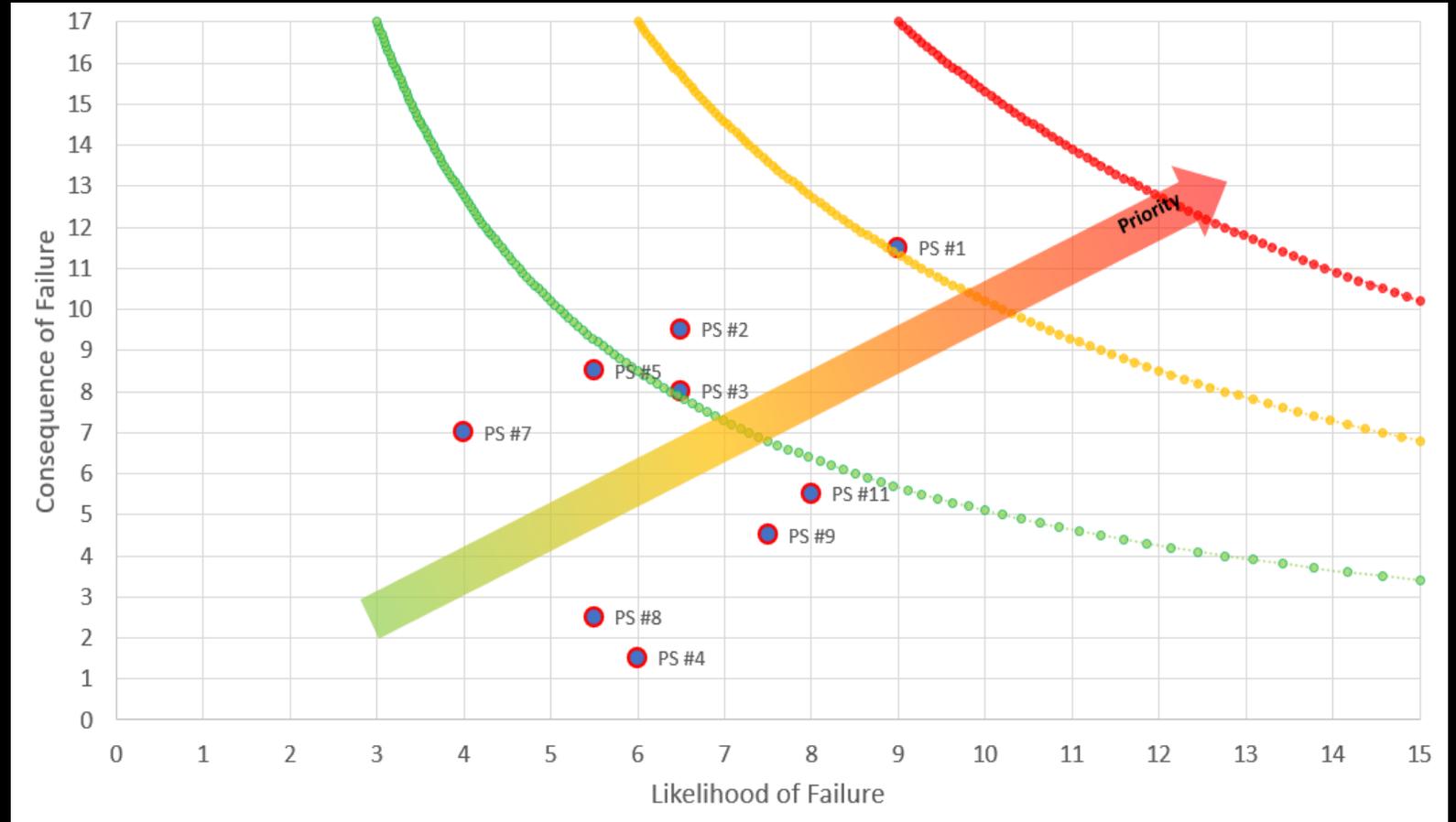
400 cleanouts



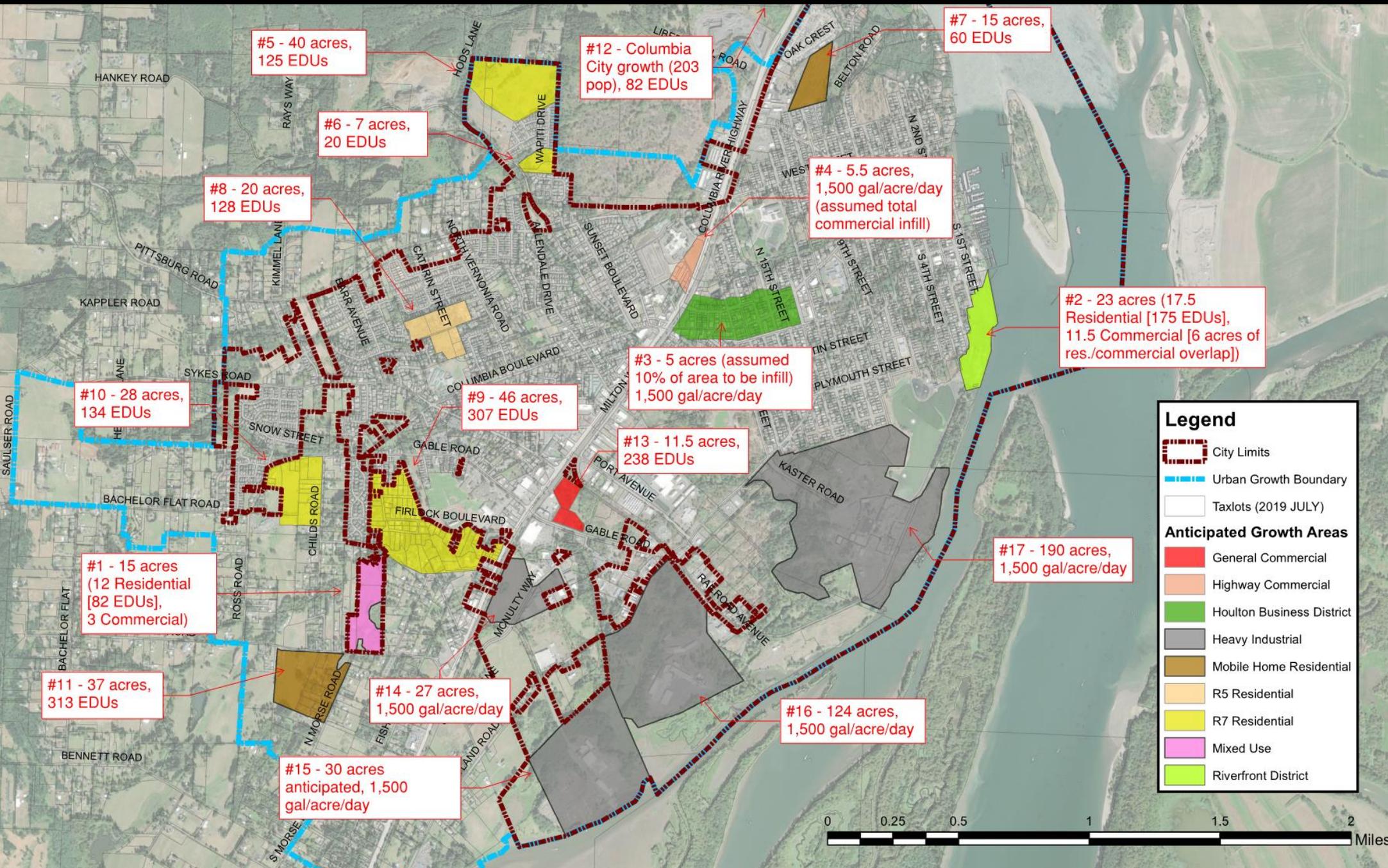
Model Development

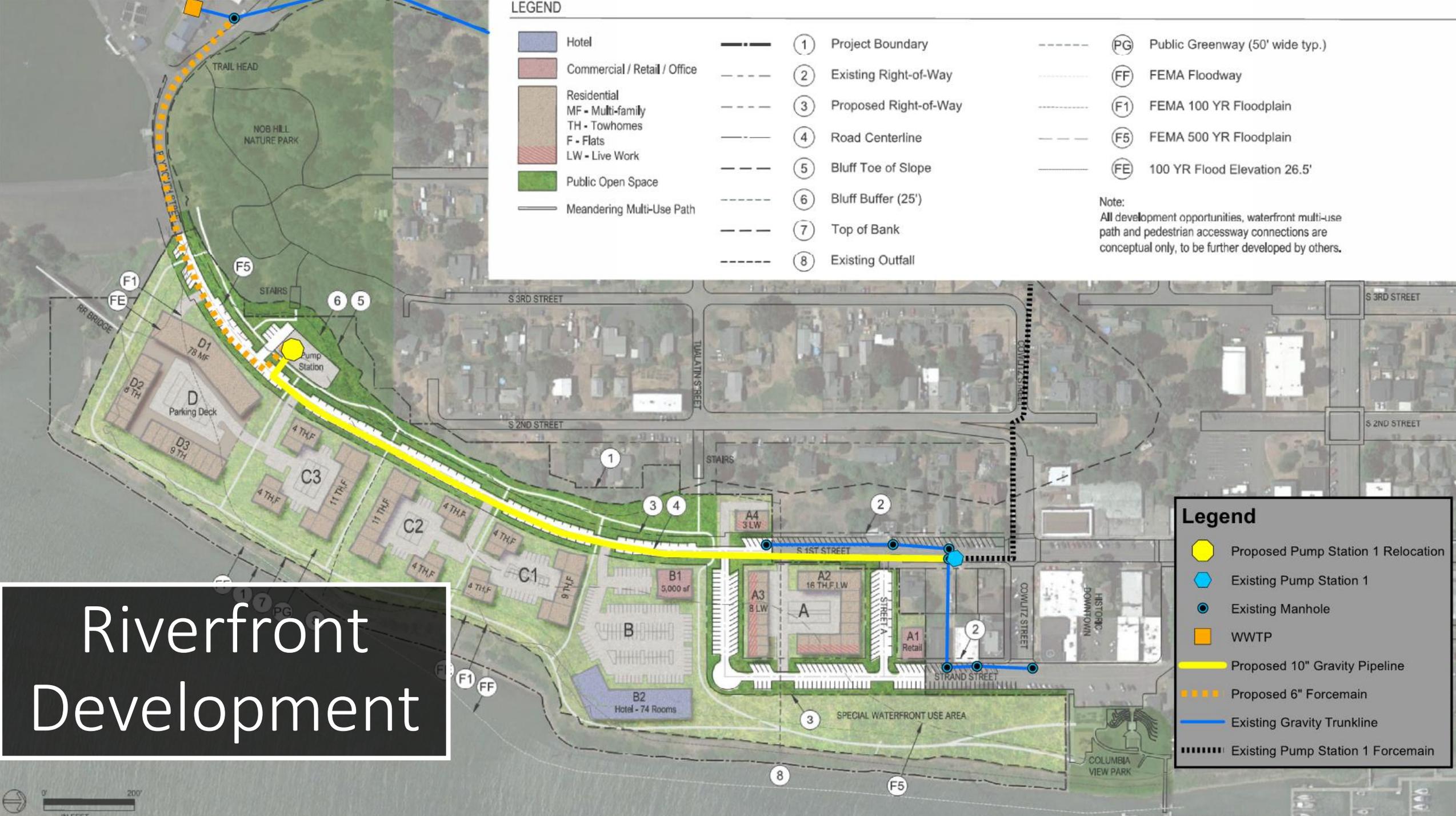
- RTK method was used for rainfall-derived infiltration and inflow (RDII) prediction
- Hydraulic model to evaluate existing capacities

Pump Stations – Risk of Failure Analysis



20-Year Growth Areas





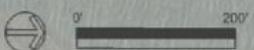
LEGEND

- | | | |
|---|-------------------------|--------------------------------------|
| Hotel | 1 Project Boundary | (PG) Public Greenway (50' wide typ.) |
| Commercial / Retail / Office | 2 Existing Right-of-Way | (FF) FEMA Floodway |
| Residential
MF - Multi-family
TH - Townhomes
F - Flats
LW - Live Work | 3 Proposed Right-of-Way | (F1) FEMA 100 YR Floodplain |
| Public Open Space | 4 Road Centerline | (F5) FEMA 500 YR Floodplain |
| Meandering Multi-Use Path | 5 Bluff Toe of Slope | (FE) 100 YR Flood Elevation 26.5' |
| | 6 Bluff Buffer (25') | |
| | 7 Top of Bank | |
| | 8 Existing Outfall | |

Note:
All development opportunities, waterfront multi-use path and pedestrian accessway connections are conceptual only, to be further developed by others.

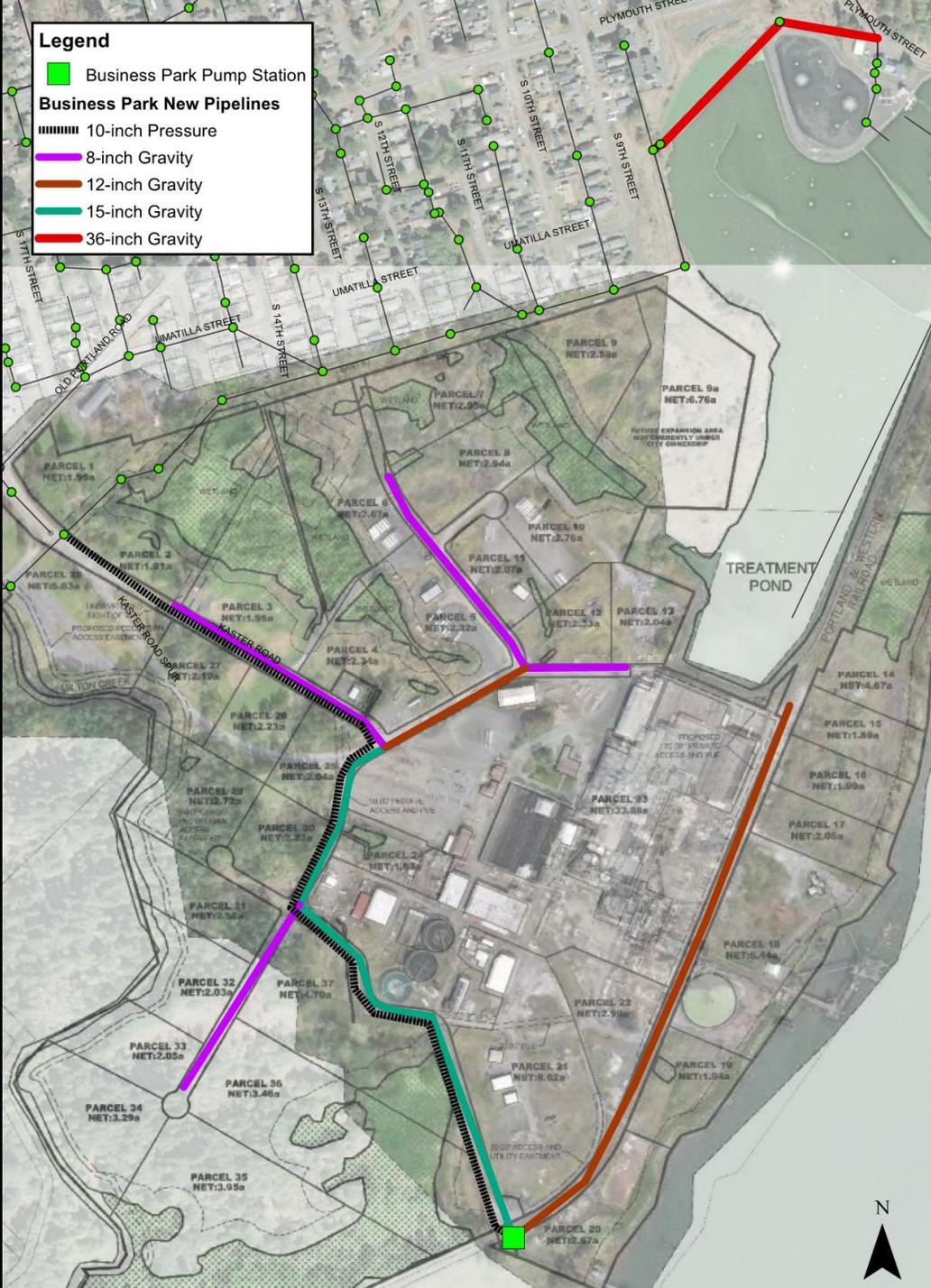
- Legend**
- Proposed Pump Station 1 Relocation
 - Existing Pump Station 1
 - Existing Manhole
 - WWTP
 - Proposed 10" Gravity Pipeline
 - Proposed 6" Forcemain
 - Existing Gravity Trunkline
 - Existing Pump Station 1 Forcemain

Riverfront Development



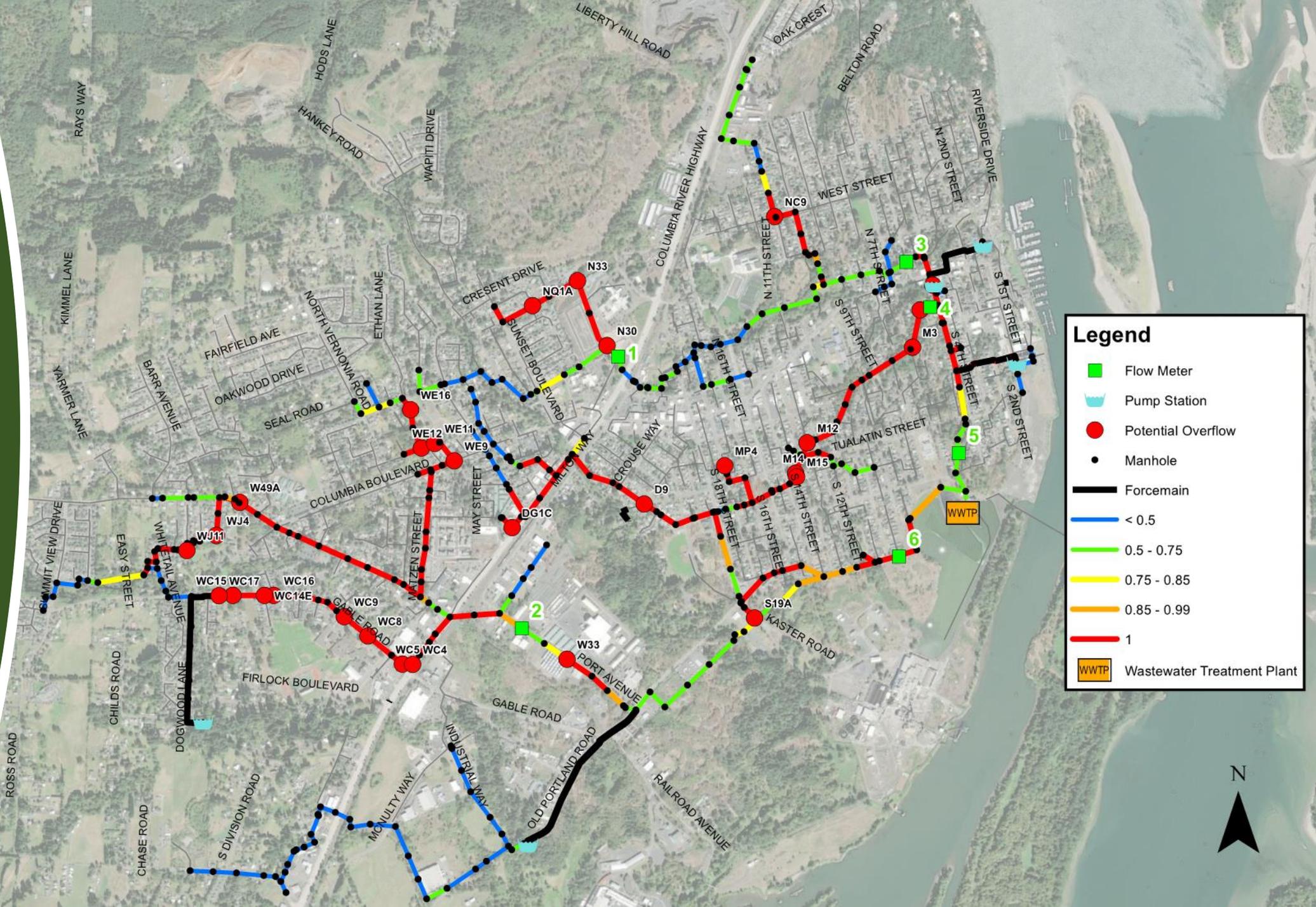
Legend

- Business Park Pump Station
- Business Park New Pipelines**
- 10-inch Pressure
- 8-inch Gravity
- 12-inch Gravity
- 15-inch Gravity
- 36-inch Gravity



Industrial Business Park

20-Year Capacity Evaluation

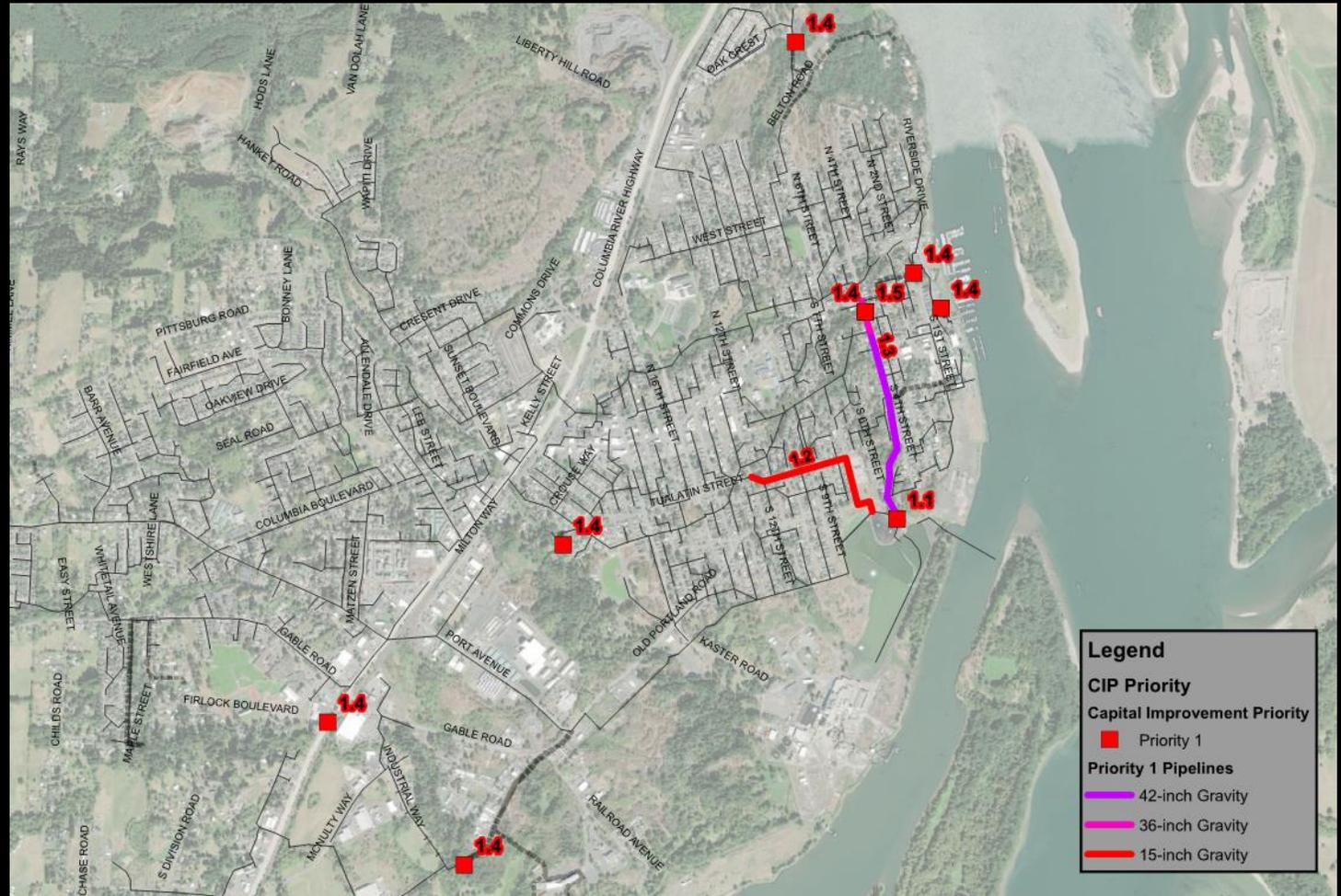


Design Standards, Code, and Comprehensive Plan

- Scheduling requirements
- Matching references to the Oregon Department of Transportation (ODOT)/ American Public Works Association (APWA) Oregon Standard Specifications for Construction (OSSC).
- Pipeline sizing, slope, cover, and utility spacing requirements
- Manhole design requirements
- Stream and creek crossing requirements

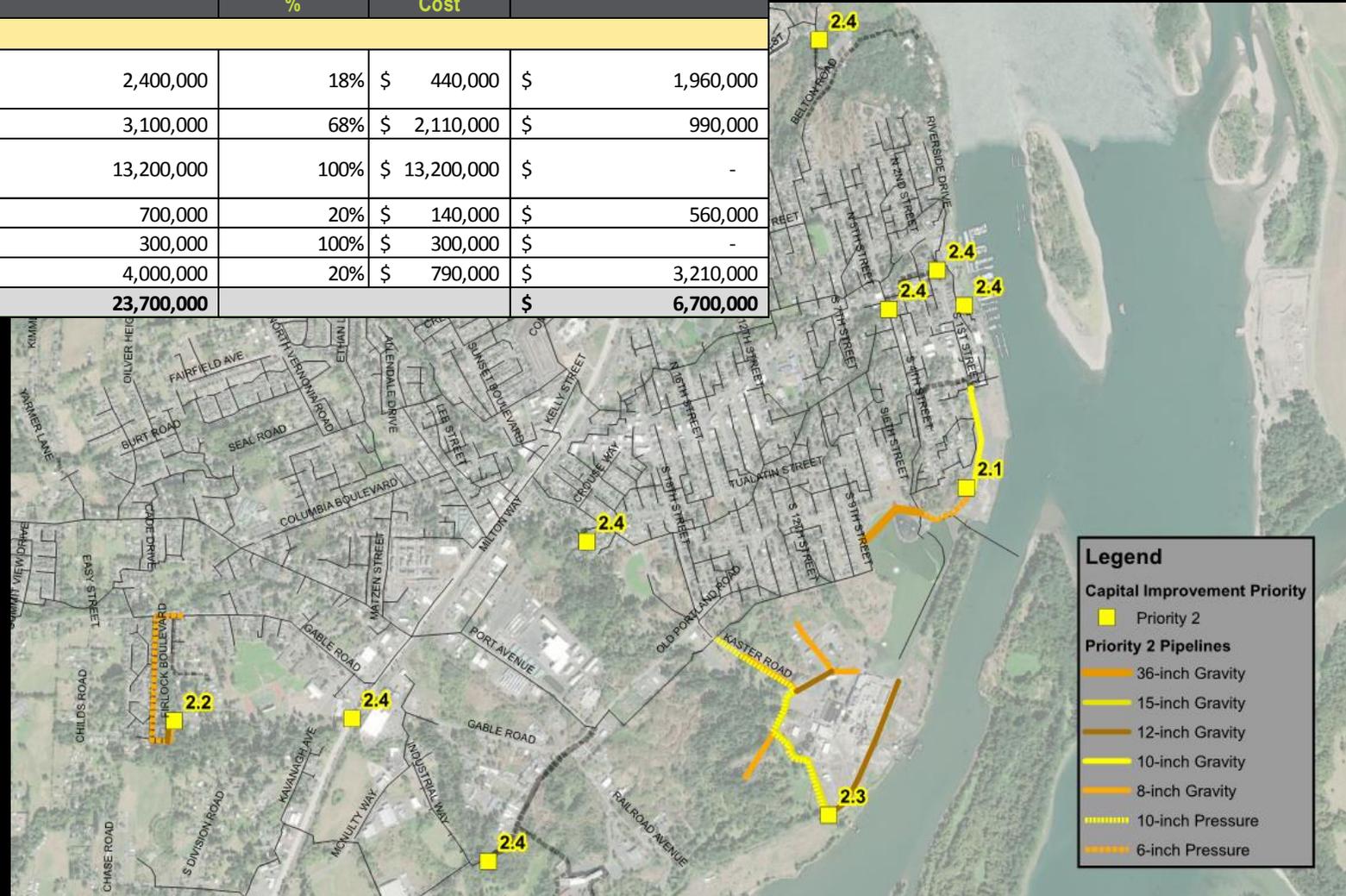
Project No.	Project Name	Primary Purpose	Total Estimated Cost (2021)	SDC Growth Apportionment		City's Estimated Portion
				%	Cost	
Priority 1 Improvements						
1.1	WWTP Influent Flow Meter	Operations	\$ 68,000	10%	\$ 7,000	\$ 61,000
1.2	Basin 4 Pipeline Upsize and Reroute	Capacity	\$ 3,600,000	0%	\$ -	\$ 3,600,000
1.3	Basin 5 Pipeline Upsize	Capacity	\$ 4,500,000	3%	\$ 150,000	\$ 4,350,000
1.4	Install Overflow Alarms	Operations	\$ 9,000	20%	\$ 2,000	\$ 7,000
1.5	Pump Station 3 On-site Generator	Operations	\$ 90,000	0%	\$ -	\$ 90,000
1.6	Annual I/I Reduction Program (6-Year)	Capacity	\$ 3,000,000	20%	\$ 590,000	\$ 2,410,000
Total Priority 1 Improvement Cost (rounded)			\$ 11,300,000			\$ 10,500,000

Capital Improvement Plan – Priority 1



Capital Improvement Plan – Priority 2

Project No.	Project Name	Primary Purpose	Total Estimated Cost (2021)	SDC Growth Apportionment		City's Estimated Portion
				%	Cost	
Priority 2 Improvements						
2.1	Riverfront District Trunkline and Pump Station 1 Relocation	Capacity, Operations	\$ 2,400,000	18%	\$ 440,000	\$ 1,960,000
2.2	Relocate Pump Station 11	Capacity, Operations	\$ 3,100,000	68%	\$ 2,110,000	\$ 990,000
2.3	Industrial Business Park Trunklines and Pump Station	Capacity, Operations	\$ 13,200,000	100%	\$ 13,200,000	\$ -
2.4	Pump Station Upgrades	Operations, Safety	\$ 700,000	20%	\$ 140,000	\$ 560,000
2.5	Master Plan Update	Operations	\$ 300,000	100%	\$ 300,000	\$ -
2.6	Annual I/I Reduction Program (8-Year)	Capacity	\$ 4,000,000	20%	\$ 790,000	\$ 3,210,000
Total Priority 2 Improvement Cost (rounded)			\$ 23,700,000		\$ 6,700,000	



Project No.	Project Name	Primary Purpose	Total Estimated Cost (2021)	SDC Growth Apportionment		City's Estimated Portion
				%	Cost	
Priority 3 Improvements						
3.1	Basin 6 Pipeline Upsize and Reroute	Capacity	\$ 6,300,000	7%	\$ 460,000	\$ 5,840,000
3.2	Basin 2 Pipeline Upsize and Reroute	Capacity	\$ 9,400,000	12%	\$ 1,140,000	\$ 8,260,000
3.3	Southern Trunkline Upsize	Capacity	\$ 3,900,000	26%	\$ 1,010,000	\$ 2,890,000
3.4	Pump Station 7 Upgrades	Capacity	\$ 2,200,000	65%	\$ 1,430,000	\$ 770,000
3.5	Basin 1 Pipeline Upsize	Capacity	\$ 1,800,000	9%	\$ 150,000	\$ 1,650,000
3.6	Basin 3 Pipeline Upsize	Capacity	\$ 1,200,000	3%	\$ 40,000	\$ 1,160,000
3.7	Annual I/I Reduction Program (6-year)	Capacity	\$ 3,000,000	20%	\$ 590,000	\$ 2,410,000
Total Priority 3 Improvement Cost (rounded)			\$ 27,900,000			\$ 23,000,000



Capital Improvement Plan – Priority 3

O&M Recommendations

- Clean the collection system every three years (1/3 system annually)
- CCTV every 6 years (1/6 system annually, in conjunction with cleaning)
- Coordinate manhole inspections and cleaning with pipeline cleaning and CCTV
- Prioritize I/I projects and sump pump efforts as part of the annual replacement program

Item	Lifespan	Total Quantity	Cost/Year
Lineal Feet of Collection Pipelines	75 Years	314,300	\$ 570,000
Number of Manholes	50 Years	1300	\$ 210,000
Number of Cleanouts	50 Years	400	\$ 5,000
Total (rounded)			\$ 790,000

Other Annual Cost Considerations

- \$500,000 annually was recommended in 20-year CIP. City should aim to increase to \$790,000 over the 20-year period.
- 3.5 – 4 FTE to meet O&M and level of service goals
 - Recommend increase budgeted FTE or reduce non-utility work
- Additional engineering FTE for GIS and CIP projects
- Implement wastewater CCTV program



Questions or Comments?

Thank you for your participation.

