

August 14, 2023

General Sewer Planning Update

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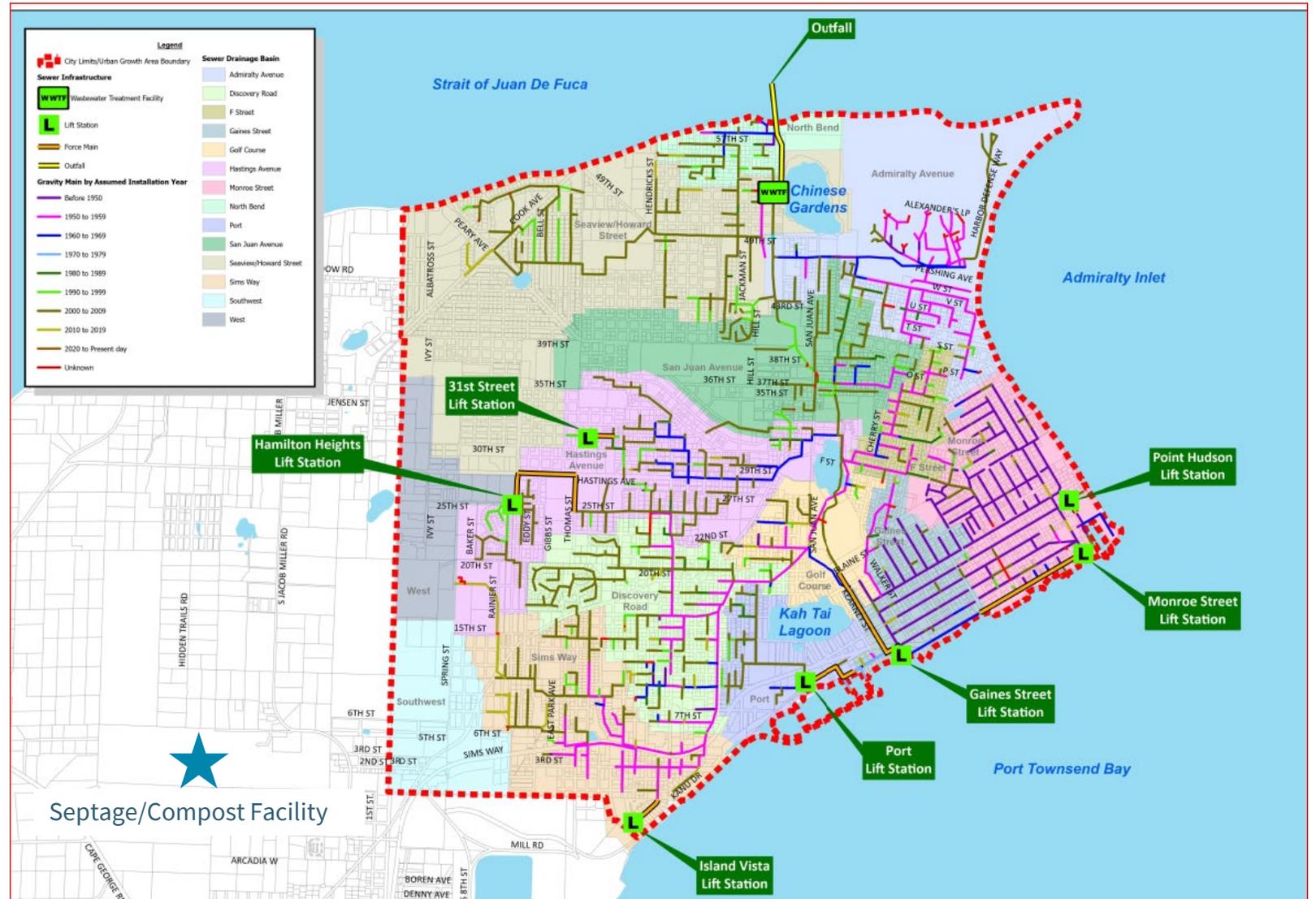


Overview

- General Sewer Plan Update
 - Overall Planning Updates
 - Collection System
 - WWTP
 - Septage and Compost Facility

Sewer System Overview

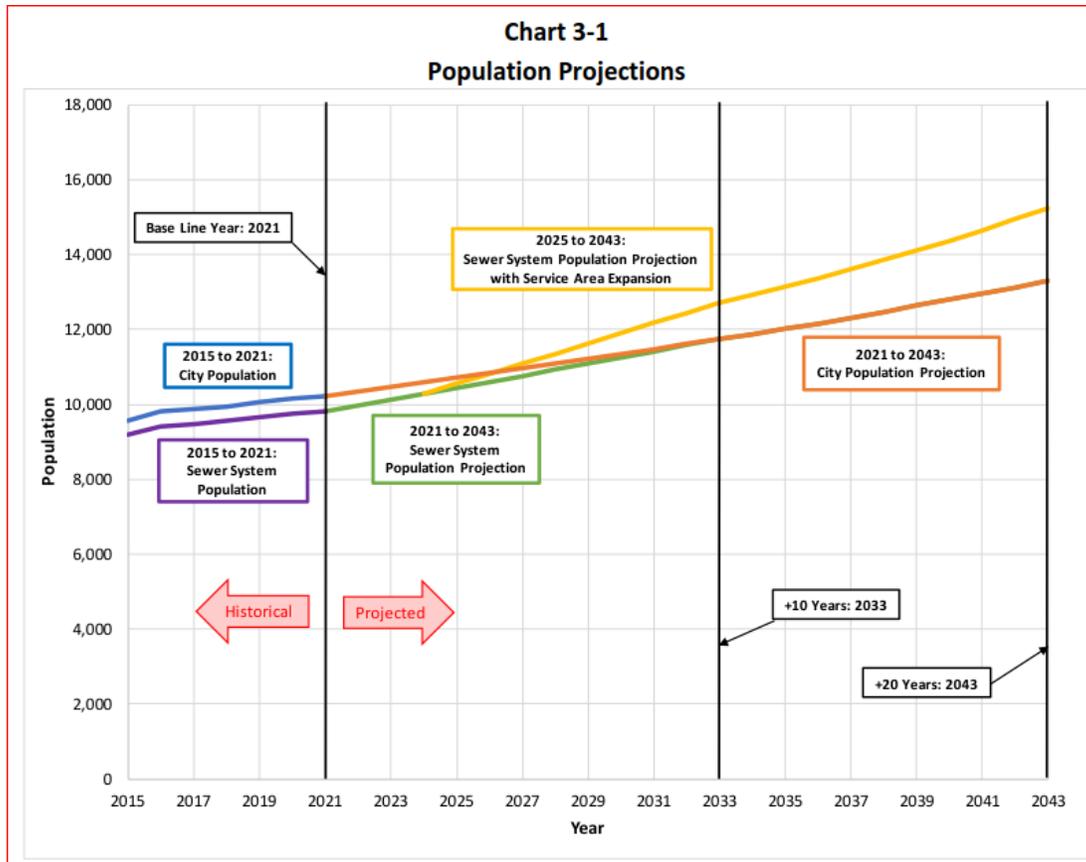
- ~80 Miles of Pipe
- 14 Sewer Drainage Basins
- 7 Lift Stations
- 2 Permitted WWTPs
- 1 Septage Receiving and Compost Facility



Population Projections

Sewer Population

- Consistent with 2016 Comprehensive Plan
- Expansion area included separately



**Table 3-3
Population Projections**

Year	City Population	City Sewer System Population	Population Served by Septic Systems	Sewer Service Expansion Equivalent Population ¹	Sewer System Population with Expansion
2015	9,579	9,188	391	--	--
2016	9,805	9,414	391	--	--
2017	9,871	9,480	391	--	--
2018	9,950	9,559	391	--	--
2019	10,060	9,669	391	--	--
2020	10,148	9,757	391	--	--
2021	10,220	9,829	391	--	--
2022	10,339	9,981	359	--	--
2023	10,460	10,134	326	--	--
2024	10,582	10,289	294	0	10,289
2025	10,706	10,445	261	108	10,553
2026	10,831	10,603	228	216	10,819
2027	10,958	10,762	196	324	11,086
2028	11,086	10,923	163	432	11,354
2029	11,215	11,085	130	540	11,624
2030	11,346	11,248	98	648	11,896
2031	11,479	11,413	65	755	12,169
2032	11,613	11,580	33	863	12,444
2033 (+10 years)	11,748	11,748	0	971	12,720
2034	11,886	11,886	0	1,041	12,927
2035	12,025	12,025	0	1,116	13,140
2036	12,165	12,165	0	1,196	13,361
2037	12,321	12,321	0	1,282	13,603
2038	12,479	12,479	0	1,374	13,853
2039	12,639	12,639	0	1,472	14,111
2040	12,801	12,801	0	1,578	14,379
2041	12,965	12,965	0	1,691	14,656
2042	13,132	13,132	0	1,812	14,944
2043 (+20 years)	13,300	13,300	0	1,943	15,242
Buildout	23,035	23,035	0	2,771	25,973

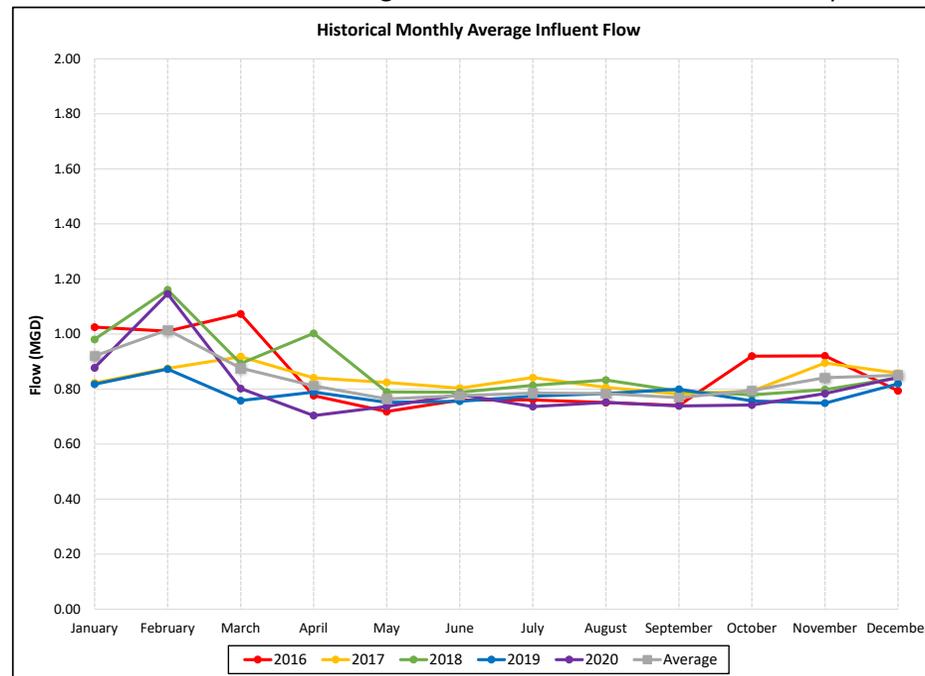
¹ = Equivalent population is shown based upon the projected flow and is representative of the growth in terms of population.

Historical Flow (Last 6 Years)

Year	Sewer System Population	AAF (MGD)	AAF per Capita			PHF (MGD)	Percent of NPDES Permit Max. Month Limit ¹	Peaking Factors		
			Capita (gpcd)	MMF (MGD)	MDF (MGD)			MMF/AAF	MDF/AAF	PHF/AAF
2016	9,403	0.85	91	1.07	1.99	--	52%	1.26	2.33	--
2017	9,469	0.84	88	0.92	1.39	2.79	45%	1.10	1.66	3.33
2018	9,548	0.87	91	1.16	1.82	3.06	57%	1.33	2.09	3.52
2019	9,658	0.78	81	0.87	1.12	2.35	43%	1.11	1.43	2.99
2020	9,746	0.80	82	1.15	2.37	3.34	56%	1.43	2.96	4.17
2021	9,818	0.84	85	1.02	2.18	---	50%	1.22	2.60	---
2016 to 2019 Average²		0.84	88	1.01	1.58	2.74	--	1.20	1.88	3.28
2016 to 2019 Max.²		0.87	91	1.16	1.99	3.06	--	1.33	2.33	3.52

1 = The City's WWTF is permitted for a maximum month average influent flow of 2.05 MGD.

2 = 2020 and 2021 values are not included in the historical averages and maximums due to the COVID pandemic.



Projected Flow – City

Table 4-8

Projected WWTF Influent Flow for Sewer System Population Within City Limits

Year	Equivalent Sewer System Population	Projected AAF (MGD) ¹	Projected MMF (MGD) ²	Percent of NPDES Permit Max. Month Limit ³	Projected MDF (MGD) ⁴	Projected PHF (MGD) ⁵	Projected PHF with Inflow Reduction (MGD) ⁶
2018 (Baseline)	9,559	0.87	1.16	57%	1.82	3.06	--
2019	9,669	0.78	0.87	43%	1.12	2.35	--
2020	9,757	0.80	1.15	56%	2.37	3.34	--
2021	9,829	0.84	1.02	50%	2.18	---	--
2022	9,981	0.91	1.21	59%	2.57	3.63	--
2023	10,134	0.92	1.23	60%	2.61	3.69	--
2024	10,289	0.94	1.25	61%	2.65	3.75	--
2025	10,445	0.95	1.27	62%	2.69	3.80	--
2026	10,603	0.97	1.29	63%	2.73	3.86	--
2027	10,762	0.98	1.31	64%	2.78	3.92	--
2028	10,923	0.99	1.33	65%	2.82	3.98	--
2029	11,085	1.01	1.35	66%	2.86	4.04	--
2030	11,248	1.02	1.37	67%	2.90	4.10	--
2031	11,413	1.04	1.39	68%	2.94	4.16	--
2032	11,580	1.05	1.41	69%	2.99	4.22	--
2033 (+ 10 years)	11,748	1.07	1.43	70%	3.03	4.28	3.86
2034	11,886	1.08	1.44	70%	3.07	4.33	3.91
2035	12,025	1.09	1.46	71%	3.10	4.38	3.96
2036	12,165	1.11	1.48	72%	3.14	4.43	4.02
2037	12,321	1.12	1.50	73%	3.18	4.49	4.07
2038	12,479	1.14	1.52	74%	3.22	4.54	4.13
2039	12,639	1.15	1.53	75%	3.26	4.60	4.19
2040	12,801	1.17	1.55	76%	3.30	4.66	4.25
2041	12,965	1.18	1.57	77%	3.34	4.72	4.31
2042	13,132	1.20	1.59	78%	3.39	4.78	4.37
2043 (+ 20 years)	13,300	1.21	1.61	79%	3.43	4.84	4.43
Buildout	23,035	2.10	2.80	136%	5.94	8.39	7.97

WWTP MMF Rated Capacity = 2.05 MGD

Projected Flow – Expansion Area

Table 4-9

Projected WWTF Influent Flow for Sewer System Population Expansion

Year	Equivalent Sewer System Population	Projected AAF (MGD) ¹	Projected MMF (MGD) ²	Projected MDF (MGD) ³	Projected PHF (MGD) ⁴
2018 (Baseline)	--	--	--	--	--
2019	--	--	--	--	--
2020	--	--	--	--	--
2021	--	--	--	--	--
2022	--	--	--	--	--
2023	--	--	--	--	--
2024	0	0.00	0.00	0.00	0.00
2025	108	0.01	0.02	0.04	0.07
2026	216	0.03	0.04	0.08	0.14
2027	324	0.04	0.05	0.12	0.21
2028	432	0.05	0.07	0.15	0.28
2029	540	0.07	0.09	0.19	0.35
2030	648	0.08	0.11	0.23	0.42
2031	755	0.10	0.13	0.27	0.49
2032	863	0.11	0.15	0.31	0.56
2033 (+ 10 years)	971	0.12	0.16	0.35	0.63
2034	1,041	0.13	0.17	0.37	0.68
2035	1,116	0.14	0.19	0.40	0.72
2036	1,196	0.15	0.20	0.43	0.77
2037	1,282	0.16	0.22	0.46	0.82
2038	1,374	0.17	0.23	0.49	0.88
2039	1,472	0.19	0.25	0.53	0.94
2040	1,578	0.20	0.27	0.56	1.00
2041	1,691	0.21	0.28	0.60	1.07
2042	1,812	0.23	0.30	0.65	1.14
2043 (+ 20 years)	1,943	0.24	0.33	0.69	1.22
Buildout	2,771	0.29	0.39	0.83	1.43

Projected Flow – Total

Table 4-10

Total Projected WWTF Flow

Year	Equivalent Sewer System Population	Projected AAF ¹ (MGD)	Projected MMF ² (MGD)	Percent of NPDES Permit Max. Month Limit ³	Projected MDF ⁴ (MGD)	Projected PHF ⁵ (MGD)	Projected PHF with Inflow Reduction ⁶ (MGD)
2018 (Baseline)	9,559	0.87	1.16	57%	1.82	3.06	--
2019	9,669	0.78	0.87	43%	1.12	2.35	--
2020	9,757	0.80	1.15	56%	2.37	3.34	--
2021	9,829	0.84	1.02	50%	2.18	---	--
2022	9,981	0.91	1.21	59%	2.57	3.63	--
2023	10,134	0.92	1.23	60%	2.61	3.69	--
2024	10,289	0.94	1.25	61%	2.65	3.75	--
2025	10,553	0.96	1.29	63%	2.73	3.87	--
2026	10,819	0.99	1.32	65%	2.81	4.00	--
2027	11,086	1.02	1.36	66%	2.89	4.13	--
2028	11,354	1.05	1.40	68%	2.97	4.26	--
2029	11,624	1.08	1.44	70%	3.05	4.39	--
2030	11,896	1.11	1.47	72%	3.13	4.52	--
2031	12,169	1.13	1.51	74%	3.21	4.65	--
2032	12,444	1.16	1.55	76%	3.29	4.78	--
2033 (+ 10 years)	12,720	1.19	1.59	78%	3.38	4.91	4.50
2034	12,927	1.21	1.62	79%	3.44	5.01	4.59
2035	13,140	1.24	1.65	80%	3.50	5.10	4.69
2036	13,361	1.26	1.68	82%	3.56	5.20	4.79
2037	13,603	1.28	1.71	83%	3.64	5.31	4.90
2038	13,853	1.31	1.75	85%	3.71	5.42	5.01
2039	14,111	1.34	1.78	87%	3.79	5.54	5.13
2040	14,379	1.36	1.82	89%	3.86	5.66	5.25
2041	14,656	1.39	1.86	91%	3.95	5.79	5.38
2042	14,944	1.42	1.90	93%	4.03	5.92	5.51
2043 (+ 20 years)	15,242	1.46	1.94	95%	4.12	6.06	5.65
Buildout	25,806	2.39	3.19	156%	6.77	9.82	9.40

WWTP MMF Rated Capacity = 2.05 MGD

Projected BOD Loading

- WWTP MM BOD Permitted Capacity = 3,754 ppd
- However, with current operations to remove nitrogen, BOD treatment capacity is reduced.

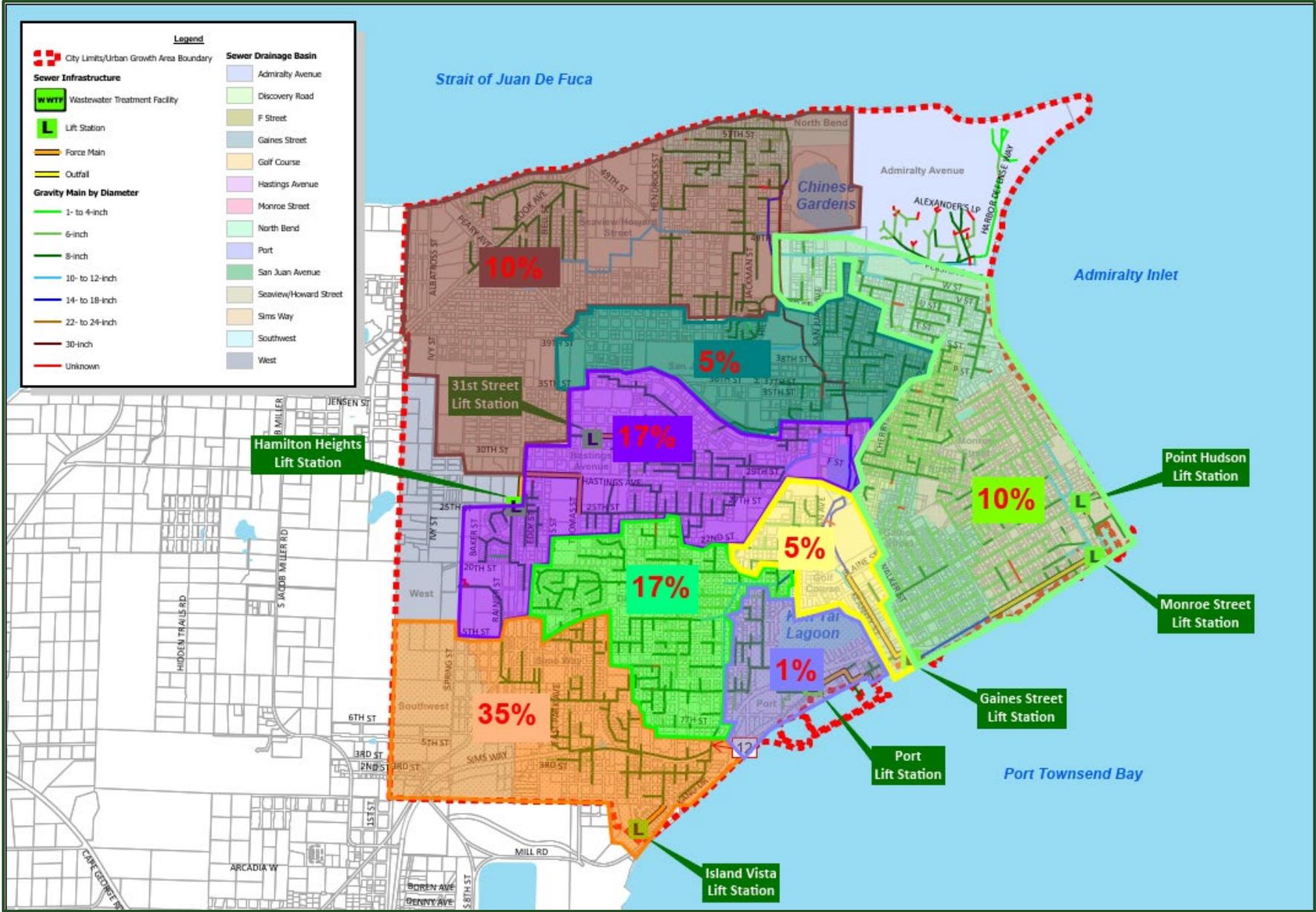
Table 4-16
Total Projected WWTF BOD₅ Loading

Year	Equivalent Sewer System Population	Projected Average Annual BOD ₅ (ppd) ¹	Projected Max. Month Average BOD ₅ (ppd) ²	Percent of NPDES Permit Max. Month Limit ³
2018	9,559	2,509	2,968	79%
2019 (Baseline)	9,669	2,591	2,718	72%
2020	9,757	2,147	2,422	65%
2021	9,829	2,221	2,500	67%
2022	9,981	2,654	2,939	78%
2023	10,134	2,684	2,973	79%
2024	10,289	2,715	3,007	80%
2025	10,553	2,768	3,066	82%
2026	10,819	2,821	3,125	83%
2027	11,086	2,875	3,184	85%
2028	11,354	2,928	3,243	86%
2029	11,624	2,982	3,303	88%
2030	11,896	3,037	3,363	90%
2031	12,169	3,091	3,424	91%
2032	12,444	3,146	3,485	93%
2033 (+ 10 years)	12,720	3,202	3,546	94%
2034	12,927	3,243	3,592	96%
2035	13,140	3,286	3,639	97%
2036	13,361	3,330	3,688	98%
2037	13,603	3,378	3,741	100%
2038	13,853	3,428	3,797	101%
2039	14,111	3,480	3,854	103%
2040	14,379	3,533	3,913	104%
2041	14,656	3,589	3,975	106%
2042	14,944	3,646	4,039	108%
2043 (+ 20 years)	15,242	3,706	4,105	109%
Buildout	25,806	5,819	6,445	172%

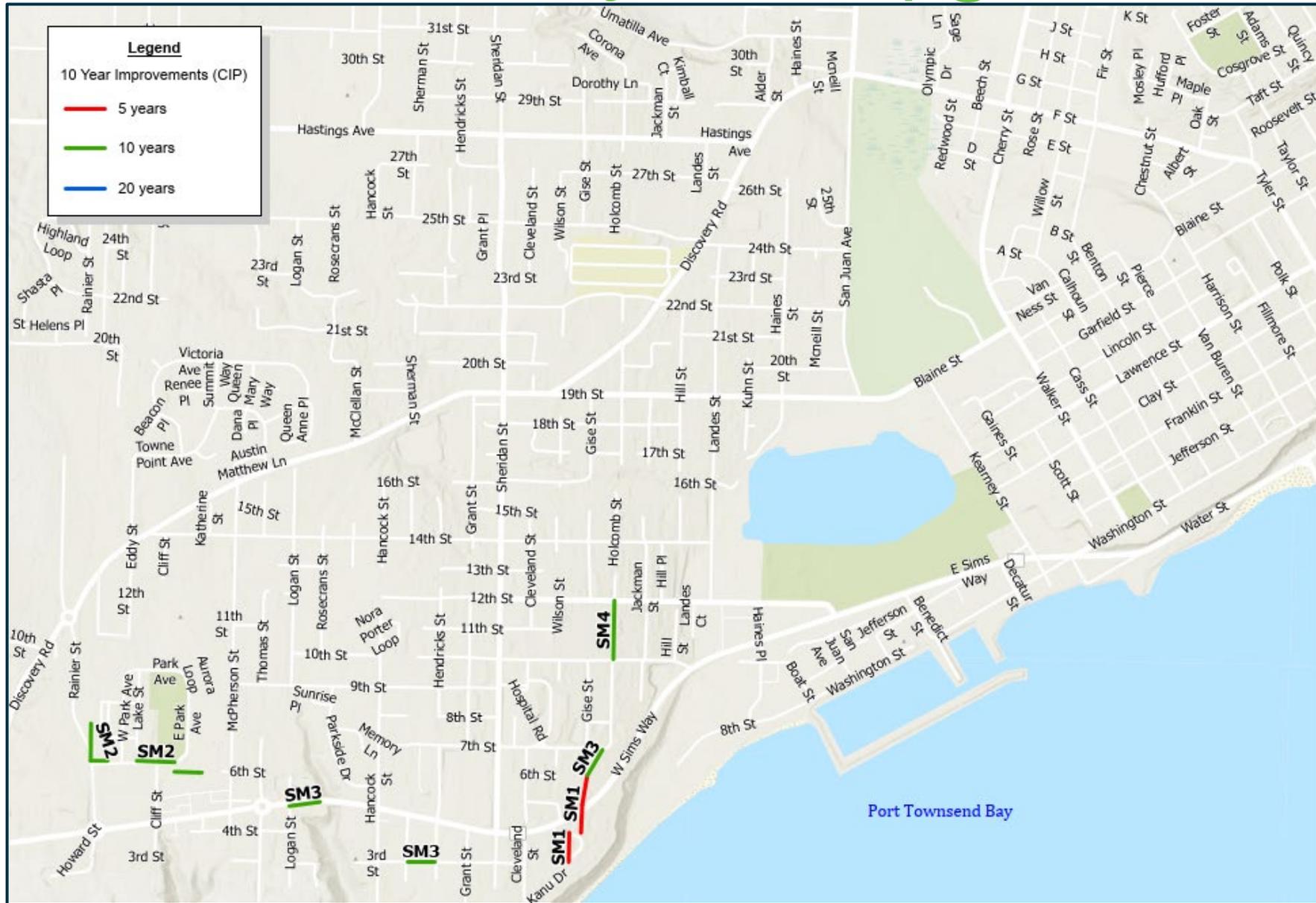
Collection System Analysis

- Pipes Analyzed on Hydraulic Capacity and Pipe Condition
 - Hydraulic capacity
 - Analysis performed using computer model for existing flows and 5-, 10- and 20-year forecasted growth
 - Growth allocated to Mill Site and infill growth throughout City

Growth Allocation

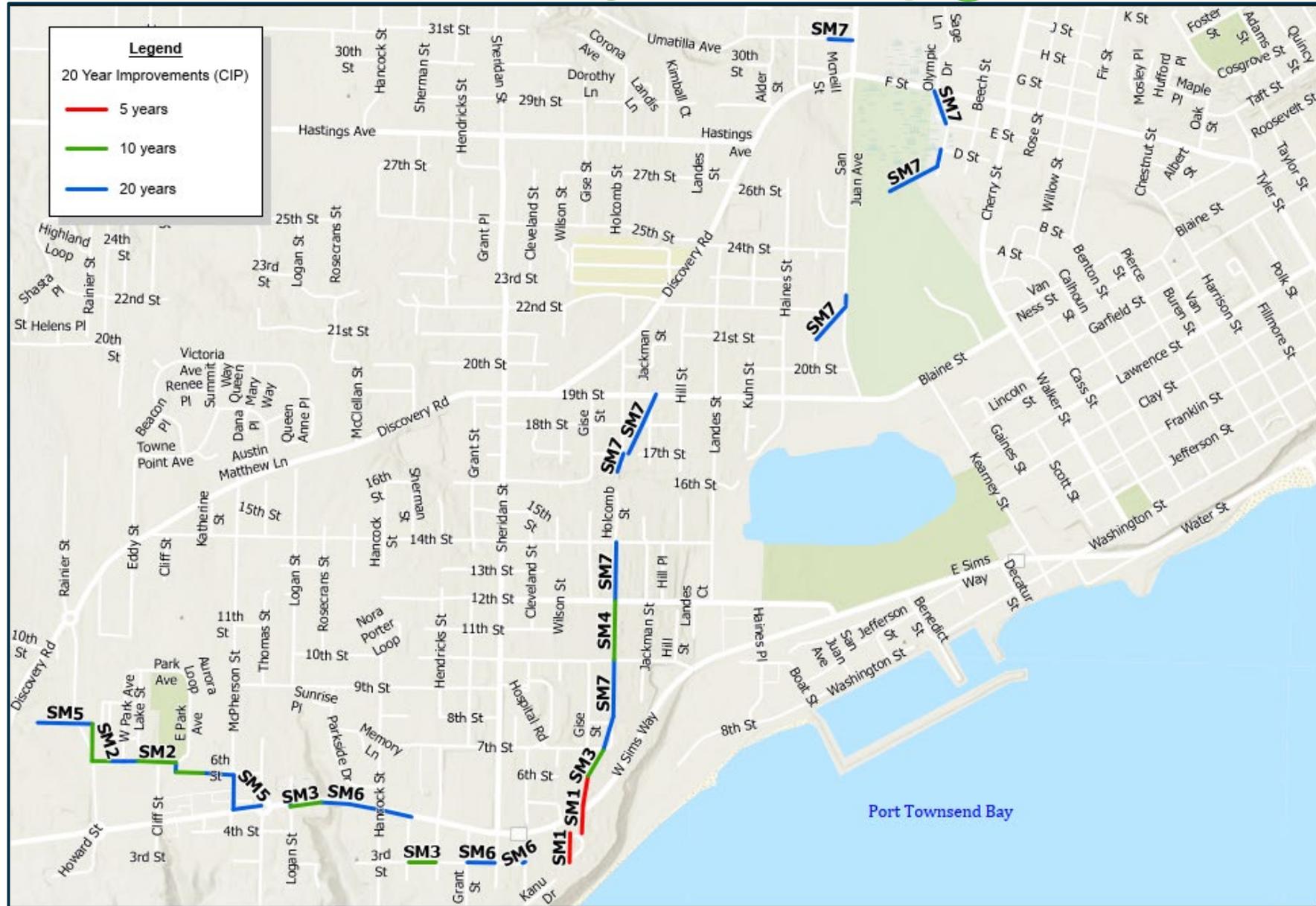


Collection System Upgrades for Capacity



5- and 10-Year Improvements

Collection System Upgrades for Capacity



5-, 10-, and 20-Year Improvements

Other Improvements



Collection System Analysis

- Pipes Analyzed on Hydraulic Capacity and Pipe Condition
 - Hydraulic capacity
 - Analysis performed using computer model for existing, 5-, 10- and 20-year forecasted growth
 - Growth allocated to Mill Site and infill growth throughout City
- Pipe Condition
 - Recommend improved pipeline data collection – conditions are unknown
 - Assumed \$350,000/yr in replacements – may want to increase

New Pipeline Inspection Van



Collection System CIP

PRELIMINARY

City of Port Townsend
Proposed Sewer System Improvements Implementation Schedule

PRELIMINARY

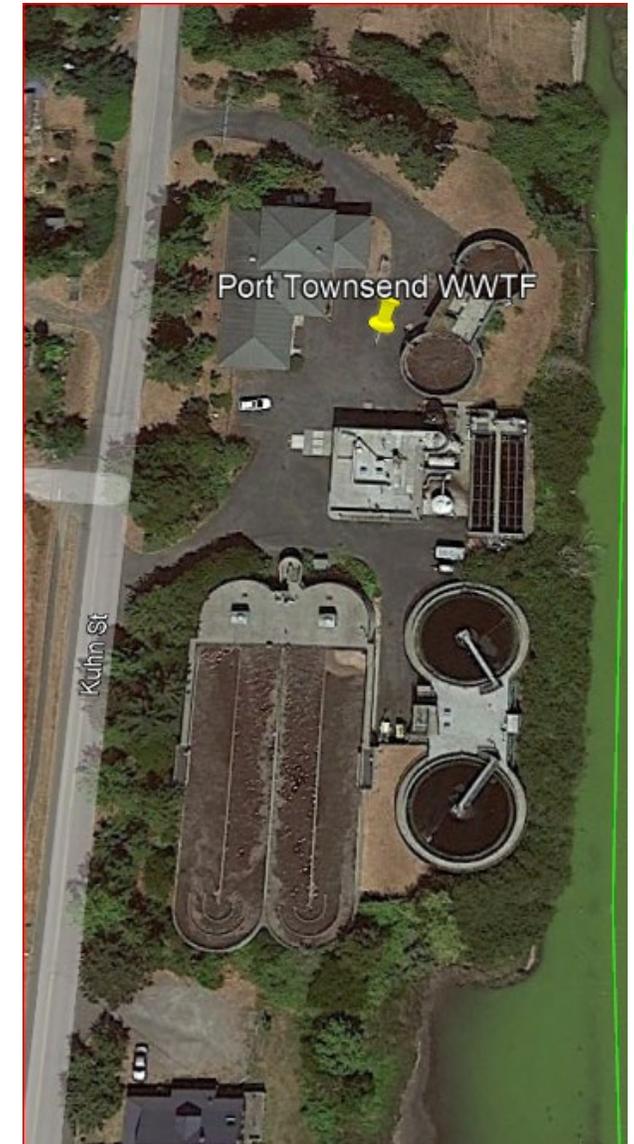
CIP No.	Project Description	Length (LF)	Estimated Cost (2023 \$)	Implementation Schedule						
				2024	2025	2026	2027	2028	6-10 years	11-20 years
Sewer Main Improvements										
SM1	Sims Way Crossing & Wilson Street Realignment	786	\$1,212,000		\$606K	\$606K				
SM2	Howard Street & South Park Ave	1,079	\$1,578,000						\$1,578K	
SM3	Sims Way, Third Street & Gise Street	796	\$1,186,000						\$1,186K	
SM4	Holcomb Street	531	\$819,000						\$819K	
SM5	Howard Street, South Park Ave & McPherson St	1,685	\$2,463,000							\$2,463K
SM6	West Sims Way & 3rd Street	1,149	\$1,679,000							\$1,679K
SM7	Future Interceptor Upsizing	3,785	\$6,722,000							\$6,722K
SM8	Sewer System Defect Investigation and Repair	--	\$3,150,000		\$350K	\$350K	\$350K	\$350K	\$1,750K	
SM9	Lawrence Street Combined Sewer Separation*	1,800	\$2,826,000		\$500K	\$1,163K	\$1,163K			
SM10	Suitcase (squashed) Pipe Replacement on Washington Street	303	\$399,000		\$399K					
SM11	Long Term Sewer System Investigation and Refurbishment (Placeholder to be refined)**		\$56,000,000							\$56,000K**
Total - Sewer Main Improvements			\$78,034,000	\$0K	\$1,855K	\$2,119K	\$1,513K	\$350K	\$5,333K	\$66,864K
*50% Cost shown in the CIP table. It is assumed an additional 50% will be paid by the road and storm drainage departments.										
**This cost is shown spread out over a period of 20 years. However, it is recommended that this cost be spread out over a longer period of time and grants be acquired for funding these refurbishments.										
Lift Station Improvements										
WW1	Existing Monroe Street Pump Station Improvements		\$5,000,000					\$1,667K	\$3,333K	
WW2	Sewer camera van, video camera and tractor, recording software and hardware, and staff training		\$300,000	\$300K						
WW3	General Lift Station Improvements		\$2,000,000	\$100K	\$100K	\$100K	\$100K	\$100K	\$500K	\$1,000K
WW4	Mill LS		\$4,100,000	\$1,000K	\$3,100K					
Total - Lift Station Improvements			\$11,400,000	\$1,400K	\$3,200K	\$100K	\$100K	\$1,767K	\$3,833K	\$1,000K

Long Range Sewer Main Refurbishments

- The \$56,000,000 cost estimate to line all concrete, asbestos-cement (AC) and vitrified clay pipe (VCP) is conservative.
 - Assumptions were made for pipe material if unknown.
 - Not all conc, AC and VCP will need lining based on condition
- To mitigate this cost, rigorous video inspection must be performed to rehabilitate pipe near failure.
- Possibly could defer \$40,000,000 in sewer lining to beyond 20 years
- City should have success obtaining grants for this infrastructure replacement work
 - Public Works Board, DOE SRF/Centennial Clean Water, FEMA, WIFIA

Wastewater Treatment Plant

- Main considerations
 - Age of facility (~30 years in service)
 - Capacity to serve planned growth
 - Puget Sound Nutrient Reduction Project (PSNRP) requirements
- Plant is well maintained, but no major upgrades in 30 years
- Existing WWTF site is built out
- Capital projects are needed to address these issues in the near term and longer term 20-year planning period



WWTP Layout



WWTP Near-Term Capital Improvements Plan

PRELIMINARY

City of Port Townsend
Proposed Sewer System Improvements Implementation Schedule

PRELIMINARY

CIP No.	Project Description	Estimated Cost (2023 \$)	Implementation Schedule						
			2024	2025	2026	2027	2028	6-10 years	11-20 years
Wastewater Treatment Plant Improvements									
F1	Influent Pump Station and Odor Control Improvements	\$2,120,000	\$300K	\$1,820K					
F2	Headworks Rehabilitation	\$1,200,000						\$1,200K	
F3	Clarifier No. 1 Improvements	\$1,250,000						\$1,250K	
F4	Clarifier No. 2 Improvements	\$1,250,000						\$1,250K	
F5	NPW Pump Replacements (City to install)	\$120,000	\$60K		\$60K				
F6	SCADA Upgrades	\$1,140,000	\$600K	\$540K					
F7	Electrical Upgrades	\$630,000	\$315K	\$315K					
F8	Near Term Oxidation Ditch Improvements	\$2,940,000					\$500K	\$2,440K	
F9	Outfall Upgrades	\$4,000,000	\$500K	\$600K	\$2,900K				
F10	Land Acquisition for WWTP Expansion	\$2,000,000	\$2,000K						
F11	Long Term WWTP Expansion (Placeholder to be refined)	\$30,000,000							\$30,000K
Total - Facility Improvements		\$46,650,000	\$3,775K	\$3,275K	\$2,960K	\$0K	\$500K	\$6,140K	\$30,000K

Future WWTP Expansion

- Main drivers
 - Expand or modify aeration basins for capacity and the PSNRP
 - Additional clarifier capacity for growth and reliability/redundancy
 - Hydraulic profile constraints
- The early 1990s upgrade made maximized use of the existing site. Future long-term upgrades will require additional land for new process units.



Septage and Compost Facility

- Constructed in 1993
- Cubic yards of compost per year: 4,318
- Capital projects
 - Replacement of aging equipment
 - Repair of site and facilities
 - Upgrades for additional capacity
- Jefferson County septage receiving study
 - In progress, meeting with County soon



Septage and Compost Facility Near-Term Capital Improvements Plan

PRELIMINARY

City of Port Townsend Proposed Sewer System Improvements Implementation Schedule

PRELIMINARY

CIP No.	Project Description	Estimated Cost (2023 \$)	Implementation Schedule					6-10 years	11-20 years
			2024	2025	2026	2027	2028		
C1	Solids Handling Influent Screening and Grit Removal	\$890,000			\$160K	\$365K	\$365K		
C2	Solids Handling Tank Replacement and Mechanical Upgrades	\$700,000	\$9K	\$142K	\$130K	\$130K	\$130K	\$160K	
C3	Compost Screen Replacement	\$460,000	\$460K						
C4	Compost Case Loader Replacement	\$390,000		\$390K					
C5	Compost Blowers Replacements	\$80,000	\$19K	\$19K	\$19K	\$23K			
C6	Compost Facility Infrastructure Upgrades	\$410,000		\$15K					\$395K
C7	6-inch Hydrant Line	\$670,000		\$100K	\$285K	\$285K			
C8	Office with Dedicated Lunchroom	\$520,000						\$520K	
Total - Facility Improvements		\$4,120,000	\$488K	\$666K	\$594K	\$803K	\$495K	\$680K	\$395K



QUESTIONS?

