



City of Merced
Wastewater Collection System
Master Plan 2022 Update
December 22, 2022



City of Merced Wastewater Collection System Master Plan

City Council Presentation

January 18, 2023





Agenda

- **Previous Studies**
- **Wastewater Unit Rate Update**
- **Updated Wastewater Flow Projections**
- **Existing System**
- **Interim System**
- **Buildout System**
- **CIPs & Recommendations**



2022 Master Plan Update Built on Previous Work

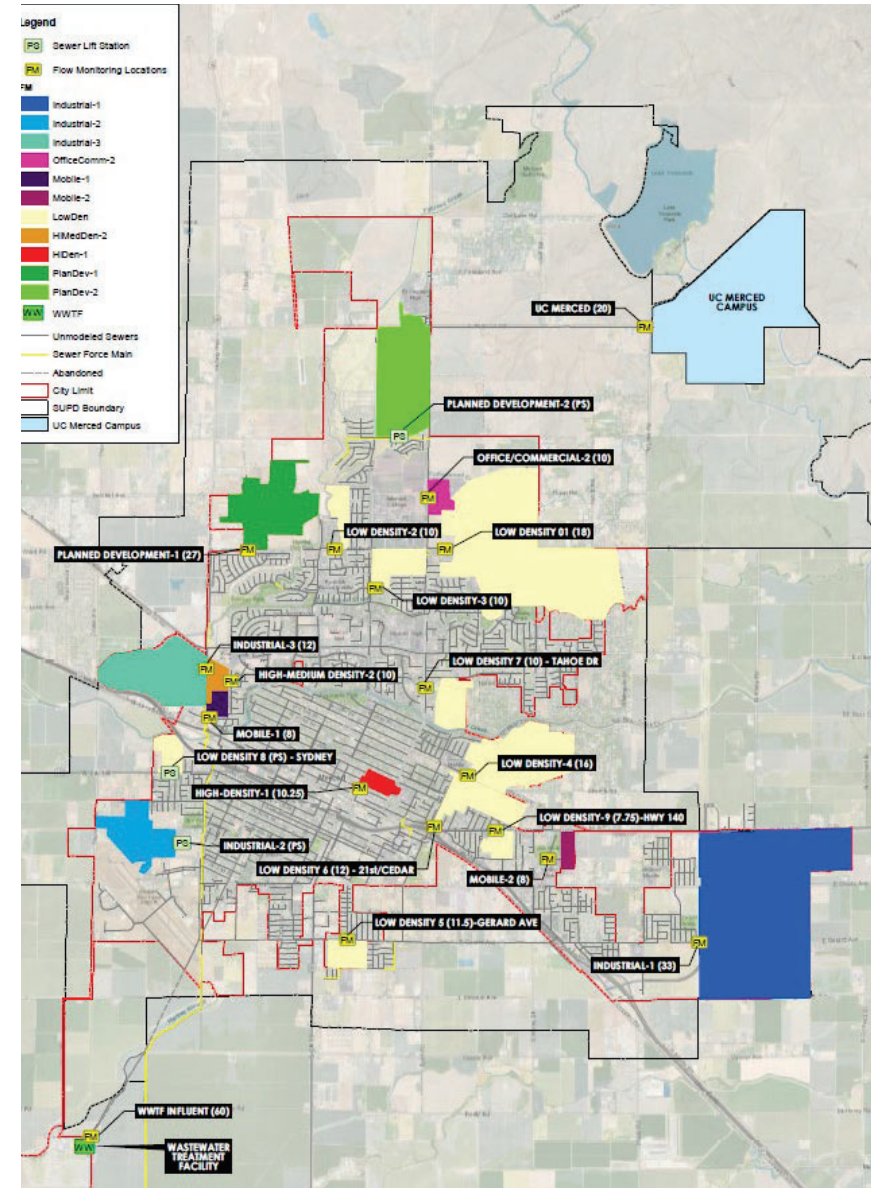
- 2017 Wastewater Collection System Master Plan Draft
 - Recommended expansion of existing WWTF instead of building new wastewater treatment plant in North Merced
 - Looked at two buildout sewer trunk options for collection system but no Interim Solution
- 2020 Wastewater Collection System Hydraulic Model Conversion & South Trunk Sewer Service Alternatives Analysis
 - Model was converted from ICM to PCSWMM using new flow monitoring data
 - Buildout solutions were reevaluated for South Merced



Per-Capita Flow Analysis

Parameter	Updated Unit Rate Values	Previous Planning Values
Average Per Capita Flow (gpcd)	60 ⁽¹⁾	85
Factor of Safety (gpcd)	5	
Recommended Per Capita Flow (gpcd)	65	
EDU Density (persons per household)	3.20 ⁽²⁾	3.02 ⁽³⁾
Unit Wastewater Generation Rate (gpd/EDU)	208	257

1. Average per capita flow based on 2021 flow monitoring efforts, as shown in **Table 4-3**.
2. The per-capita density of single-family housing units from the City's Financing Plan and Impact Fee Update Report (December 2021) prepared by Economic & Planning Systems, Inc.
3. The 2030 General Plan defines the average residential density within the City's SUDP as 3.02 persons/unit.

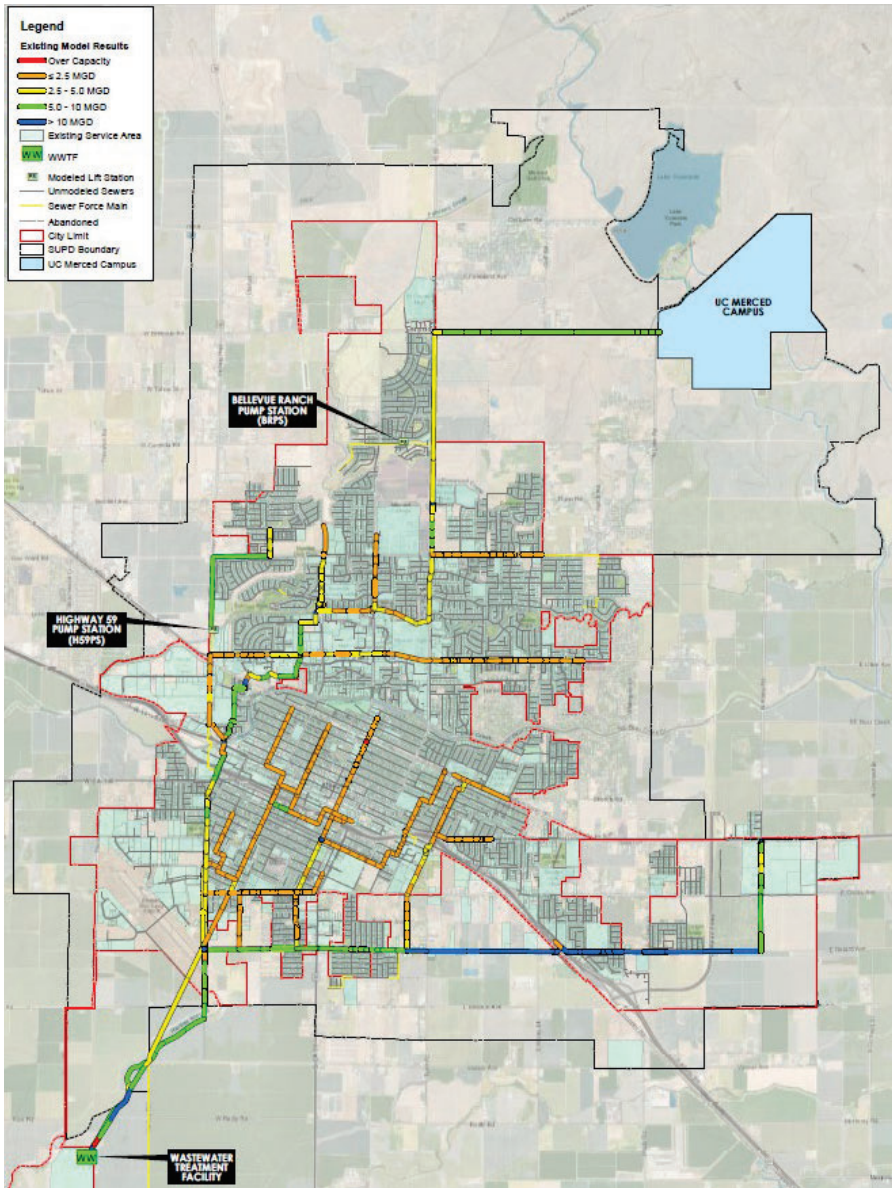




Updated Wastewater Flow Projections

Service Area	Total Area (Acres)	Total EDUs	ADWF (MGD)
Existing Service Area ⁽¹⁾	6,497	33,029	6.88
• UC Merced ⁽²⁾	200		0.14
Total Existing	6,697	33,029	7.02
Interim Service Area			
• General Plan Land Use Parcels	2,737	19,669	4.09
• City Specified Land Use Parcels	82	788	0.16
• Single Lot Parcels/ 1 EDU	407	2,129	0.44
• Specific Development Plan Parcels	311	2,417	0.50
• UC Merced (committed ADWF exceeding existing, 0.13 MGD) ⁽²⁾	380	-	0.13
• Pre-Annexation Areas ⁽⁵⁾	155	5,480	1.15
Subtotal Interim	4,072	30,483	6.47
Buildout Service Area			
• Pre-Annexation Areas (Remaining)	1,555	12,432	2.59
• Remaining Parcels within SUDP (General Plan) Boundary ⁽³⁾	9,313	49,642	10.33
• Campus Community (planning ADWF estimate, 0.84 MGD) ⁽⁴⁾	1,106	-	0.84
Subtotal Buildout	11,974	62,074	13.76
Total Interim Service Area	10,769	63,512	13.49
Total Buildout Service Area	22,743	125,586	27.25

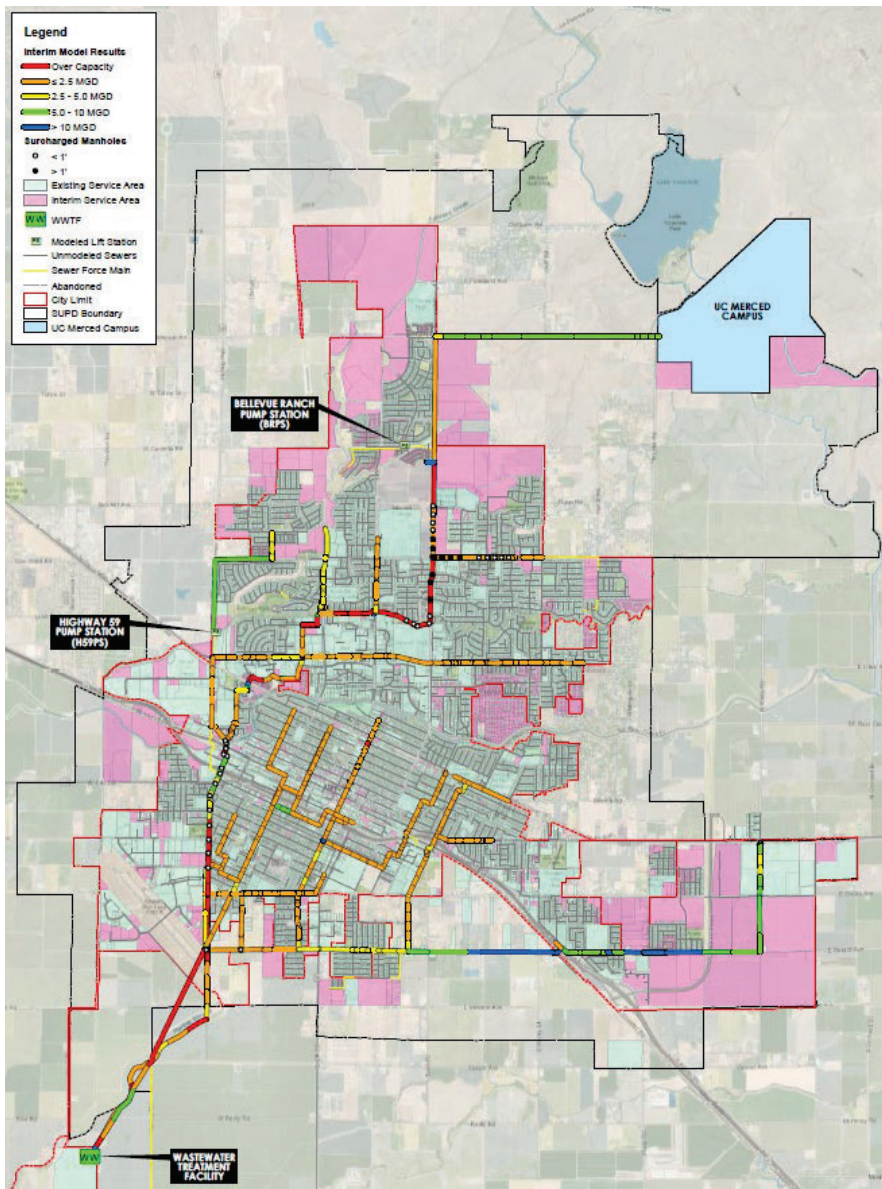
1. The existing total EDU estimate is approximate and was provided by the City; existing system flows are based on flow monitoring data independent of actual EDUs.
2. UC Merced wastewater flow equates to the projections provided in the 2020 UC Merced Long Range Development Plan Recirculated Draft Subsequent Environmental Impact Report, (December 2019). The existing flow is approximately 0.14 MGD with an addition of 0.13 MGD projected under future conditions resulting in a total flow of approximately 0.27 MGD.
3. The area and EDU estimate of parcels bisected by the City's SUDP boundary are limited to the portion that exists within the City's planning area.
4. ADWF estimate from Table 2.0-8 of the UC Merced and University Community Project Final EIS/EIR (March 2009), scaled to reflect changes to the wastewater unit rate (208/257). See Section 4.1 of this report.
5. After model completion, the amount of available capacity for pre-annexation areas, after implementation of proposed improvements, was considered. These available EDUs and flow capacity are listed here.



Existing System Results

The existing model was used to evaluate the extent of hydraulic deficiencies within system under peak flow conditions. The model simulates an ADWF of 7.02 MGD and predicts a PWWF of 19.5 MGD will occur at the WWTF under 10-year, 24-hour design storm conditions.

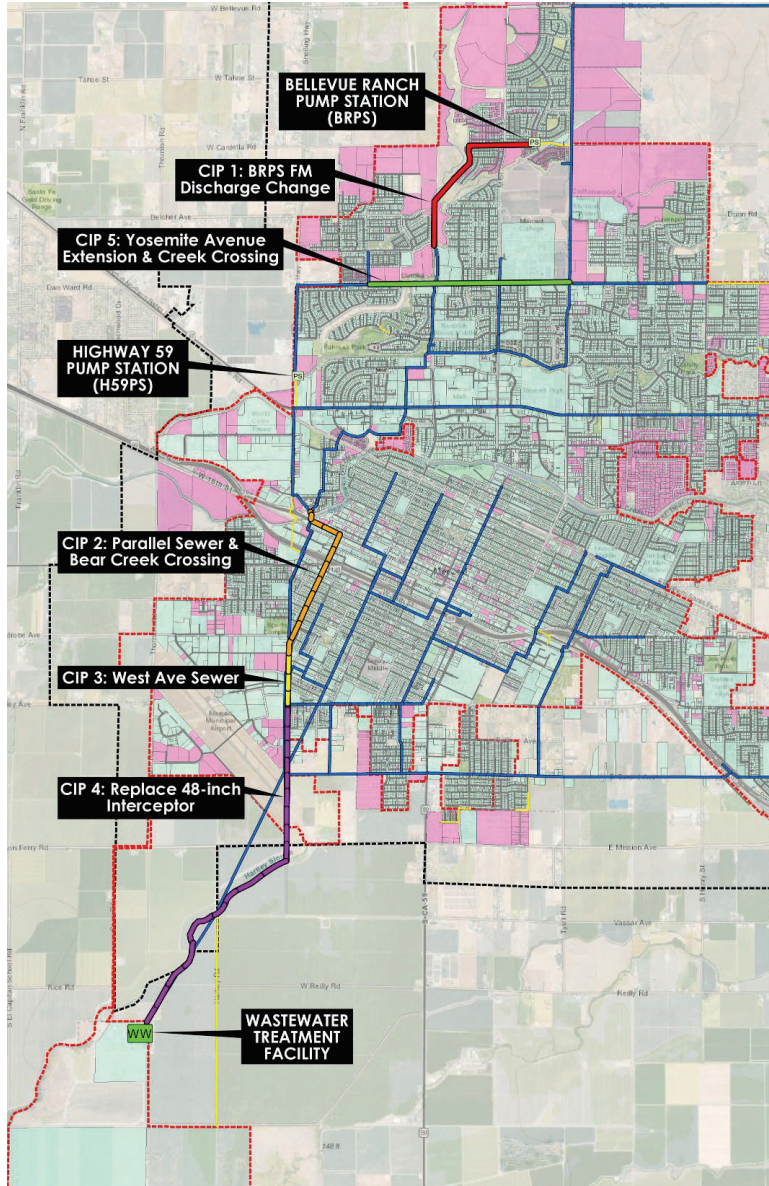
The existing system has sufficient capacity to convey PWWF flows and meet level of service (LOS) guidelines with no significant surcharging.



Interim System Results

The results of the interim system model predicts LOS failures and capacity deficiencies in several reaches of the trunk system, including the G Street, Rascal, North Merced West Ave, and 48-inch Interceptor trunk sewers.

Despite surcharging and capacity limitations, no sewer system overflows (SSOs) are predicted to occur within the system under interim conditions.



Interim System Improvements

- **CIP 1: BRPS FM Discharge Change:** Operational modifications to FM discharge location.

Adds Additional 3,000 EDUs, limited to the G Street trunk sewer

- **CIP 2: Parallel Sewer & Creek Crossing:** New 48-inch parallel sewer and creek crossing.

Adds Additional 48,500 EDUs, limited by upstream capacity & CIP 3 & 4

- **CIP 3 & 4: West Ave. & 48-inch Interceptor:** Replace and expand the 48-inch Interceptor and West Ave sewers to 60-inch.

Adds Additional 48,500 EDUs, limited by upstream capacity and CIP 2

- **CIP 5: Yosemite Sewer Extension & Creek Crossing:** A new 27-inch extension of the Yosemite Avenue sewer west connecting G Street, R Street, and the Highway 59 Pump Station (H59PS) sewer shed.

Adds Additional 5,480 EDUs, limited by upstream capacity and H59PS



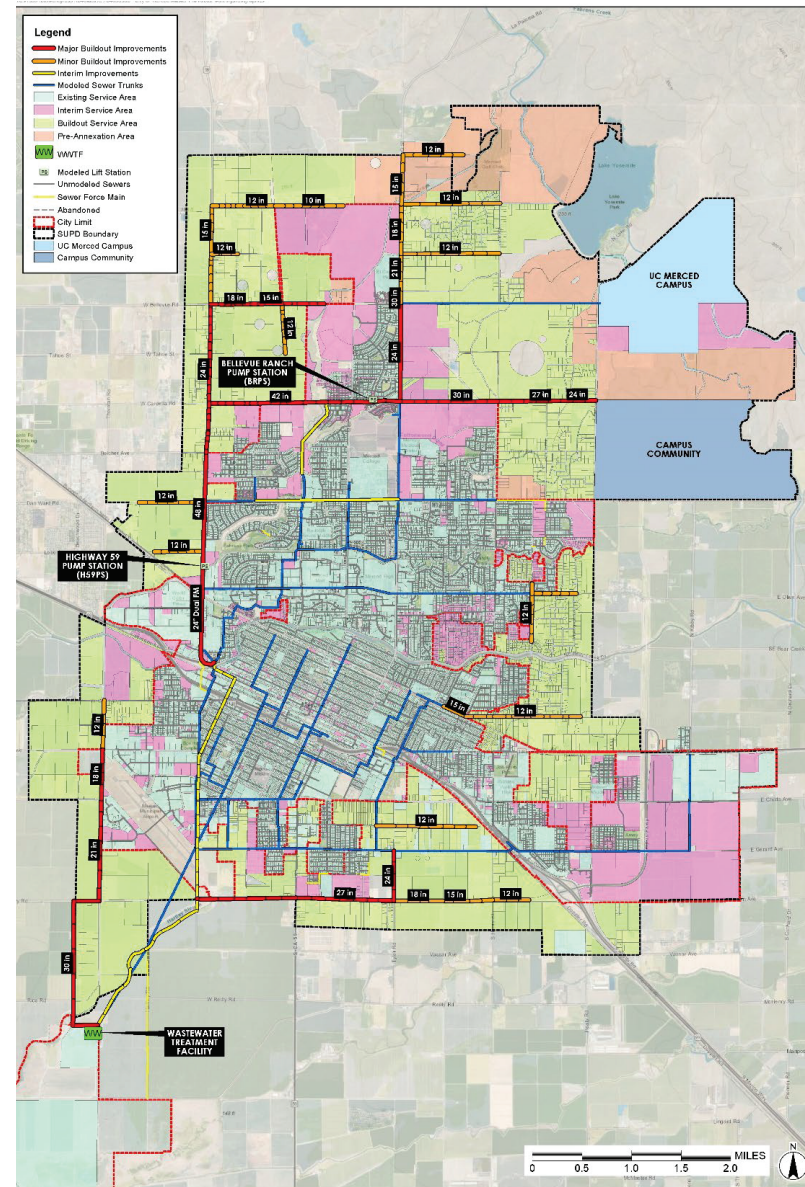
Influent Trunk – Existing Condition

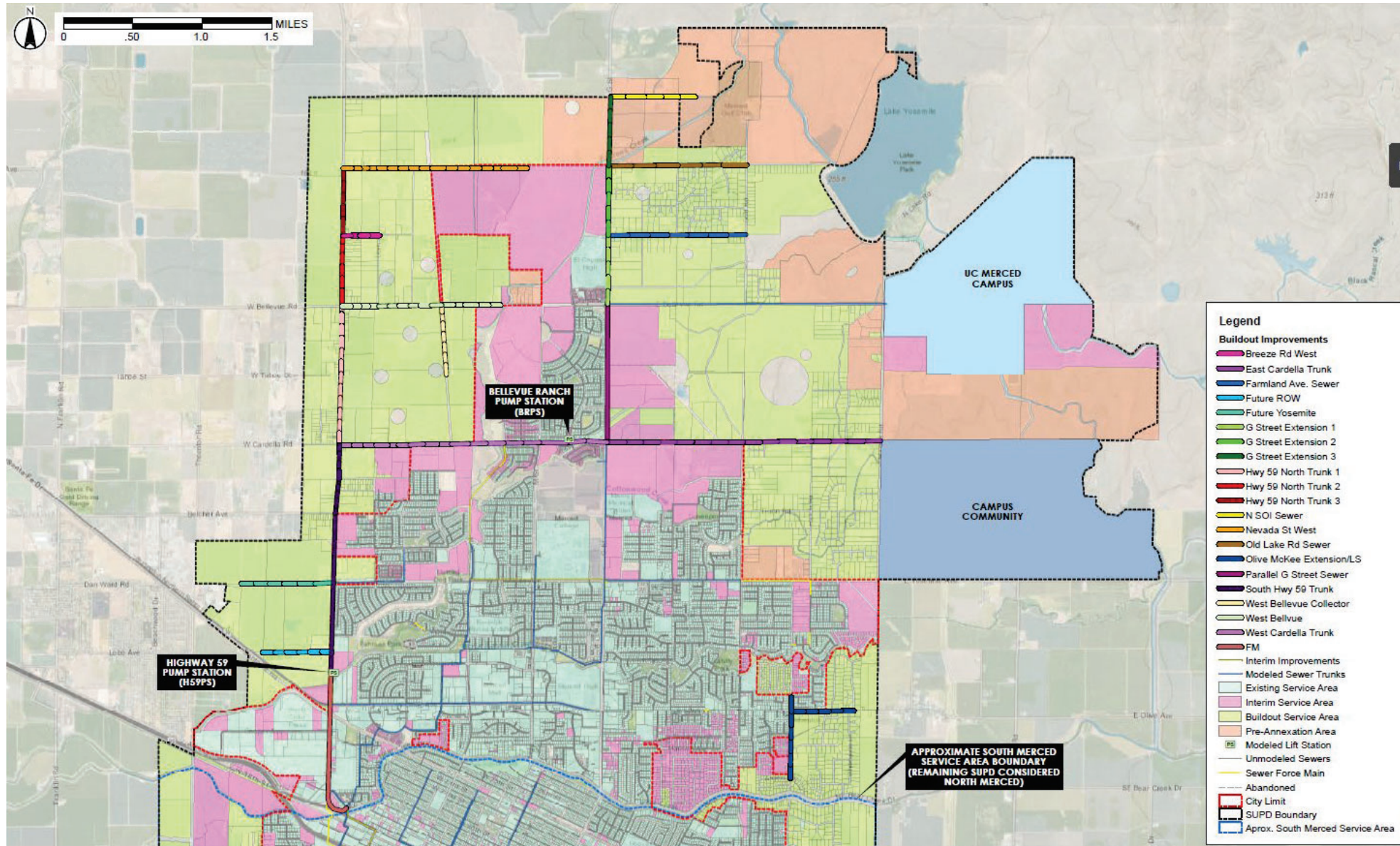
Buildout System Approach

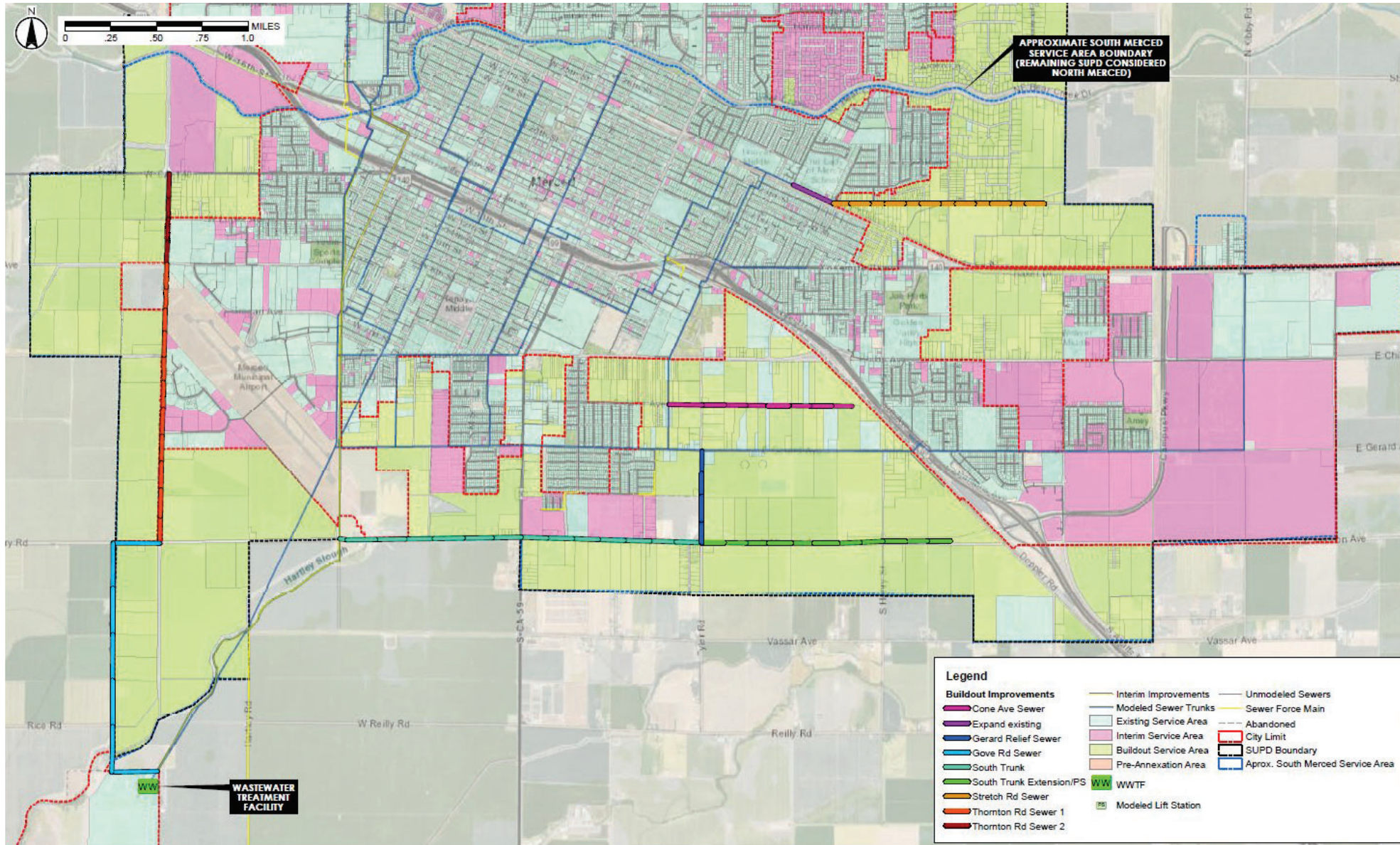
Size Interim Improvements for Build-out and Upsize Highway 59 Pump Station.

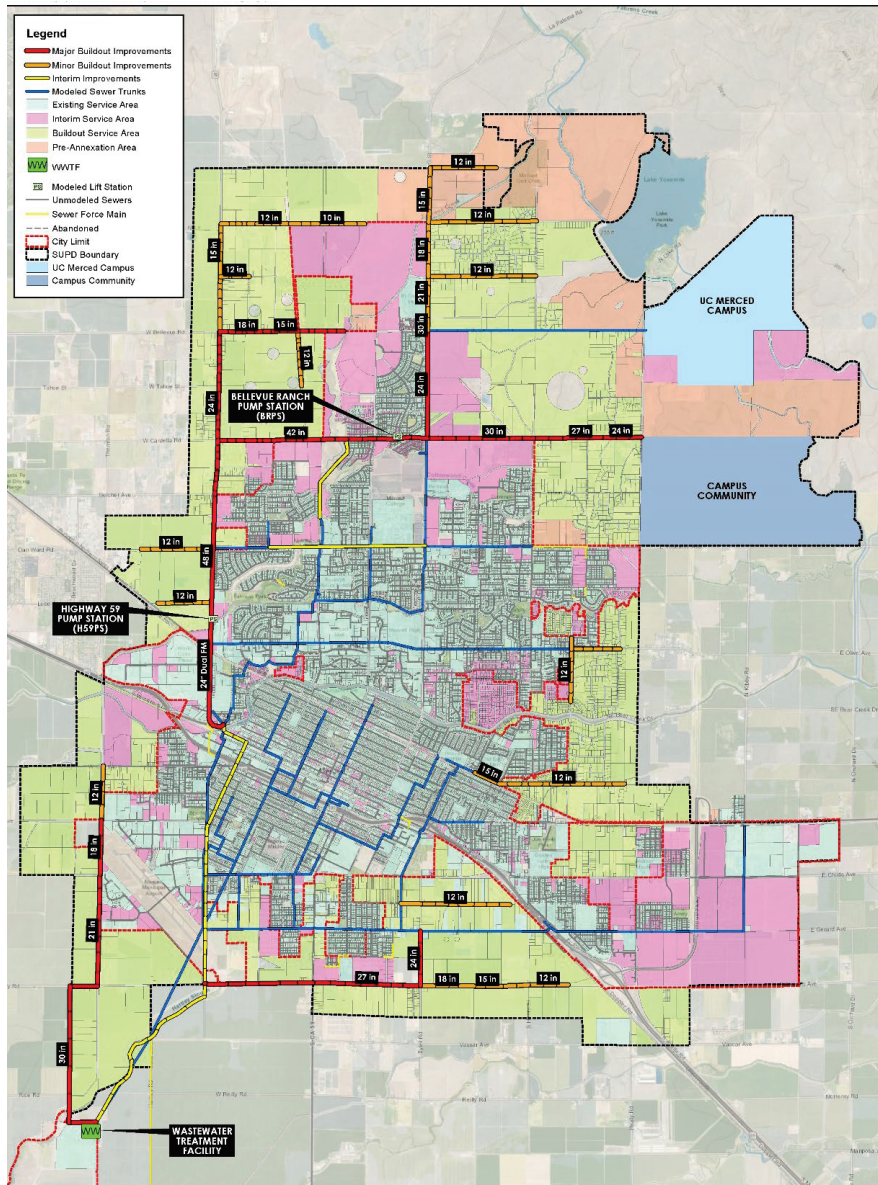
CIP No	Name	Existing Pipe Size (in)	Slope (ft/ft)	Length (ft)	Interim Pipe Size (in)	Buildout Pipe Size (in)
1	BRPS FM Discharge Change ⁽¹⁾	NA	NA	NA	NA	NA
2	Parallel Sewer & Creek Crossing	NA	0.00067	6,491	36	48
3	West Ave.	42	Current: 0.0007 New: 0.0006	1,900	48	Current Slope: 60 New Slope: 60
4	48-inch Interceptor	48	Current: 0.0003 New: 0.0006	14,695	48 ⁽²⁾	Current Slope: 66 New Slope: 60
5	Yosemite Sewer Extension	NA	0.00047	7,660	27	27

1. CIP No. 1 includes changing the discharge of the Bellevue Ranch Pump Station to utilize its existing alternative force main which discharges flow to the gravity sewer along R Street.
2. A new 48-inch pipe with a roughness (n) of 0.013 has capacity to convey interim flow at the existing slope. The existing 48-inch pipe is known to have a much higher roughness value and would require replacement.
3. CIPs 3 and 4 are recommended to be constructed together at the new specified slope, dropping the invert at the influent junction box at the WWTF









CIP Costs

Item	Area of Improvements	Total Cost
1	Interim System Improvements	\$30,310,000
2	North Merced Major Improvements	\$58,906,000
3	South Merced Major Improvements	\$18,182,000
	Subtotal Major Improvements	\$107,398,000
4	North Merced Minor Improvements	\$12,536,000
5	South Merced Minor Improvements	\$4,456,000
	Subtotal Minor Improvements	\$16,992,000
	Total Improvements Cost	\$124,390,000

•Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.