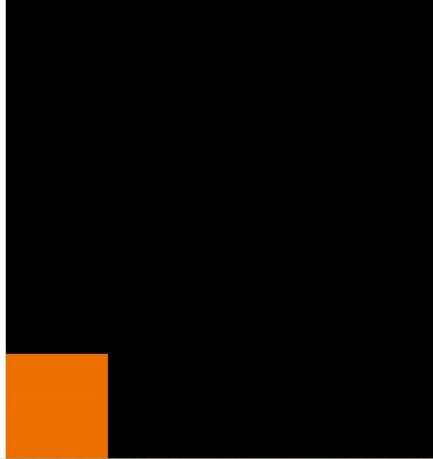




City of Merced
Wastewater Collection System
Master Plan 2022 Update
January 31, 2023



City of Merced Wastewater Collection System Master Plan

City Council Presentation

February 6, 2023





Agenda

- **Previous Studies**
- **Wastewater Unit Rate Update**
- **Hydraulic Model Results Existing System**
- **Hydraulic Model with Interim CIP Projects**
- **Updated Wastewater Flow Projections & EDUs**
- **CIP Costs**



2022 Master Plan Update Built on Previous Work

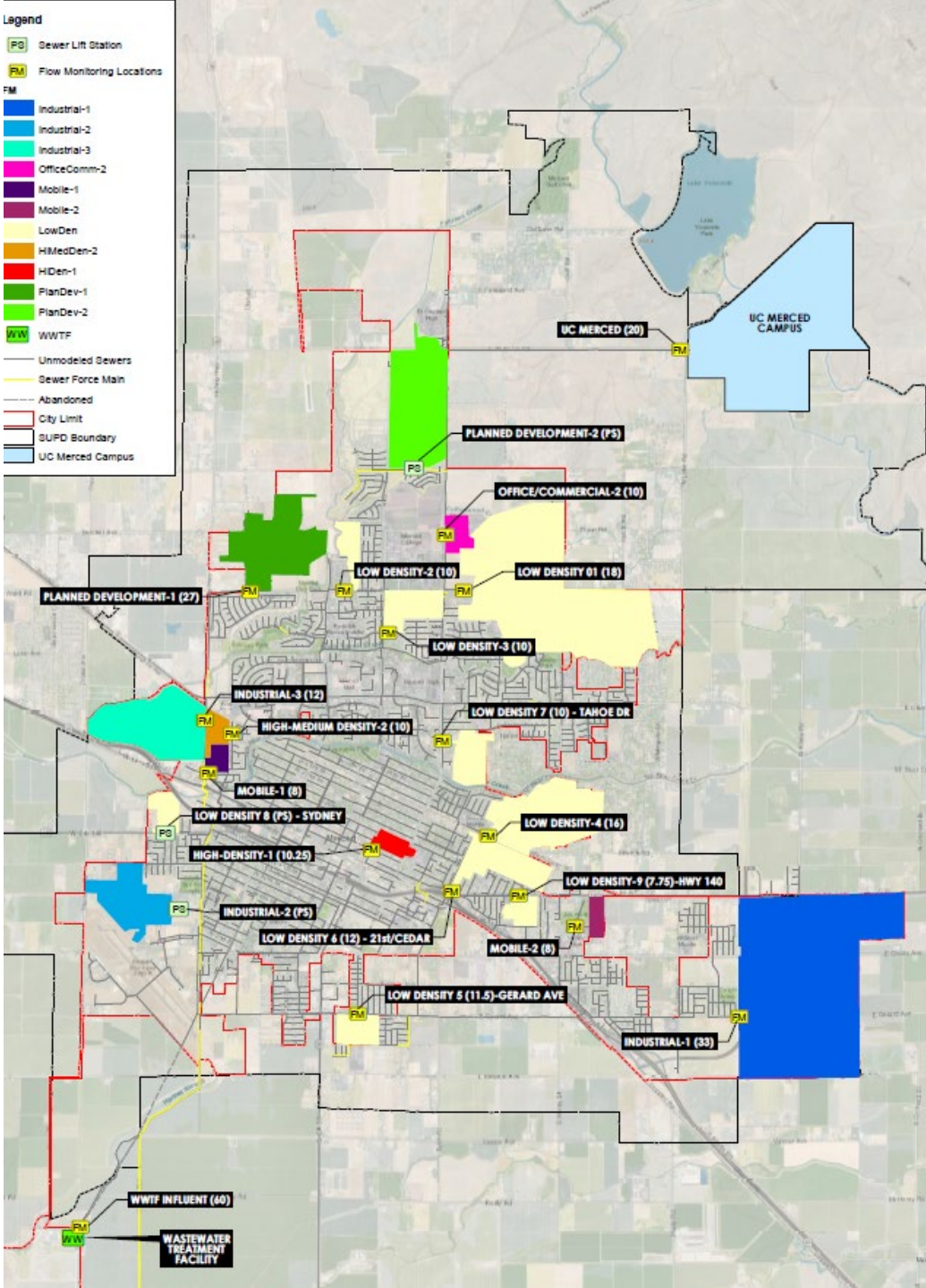
- 2017 Wastewater Collection System Master Plan Draft
 - Recommended expansion of existing WWTF instead of building new wastewater treatment plant in North Merced
 - Recommended project was new trunk sewer bypassing the existing collection system.
- 2020 Wastewater Collection System Hydraulic Model Conversion & South Trunk Sewer Service Alternatives Analysis
 - Model was converted from ICM to PCSWMM
 - Model was calibrated using actual flow monitoring data from 2019



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.

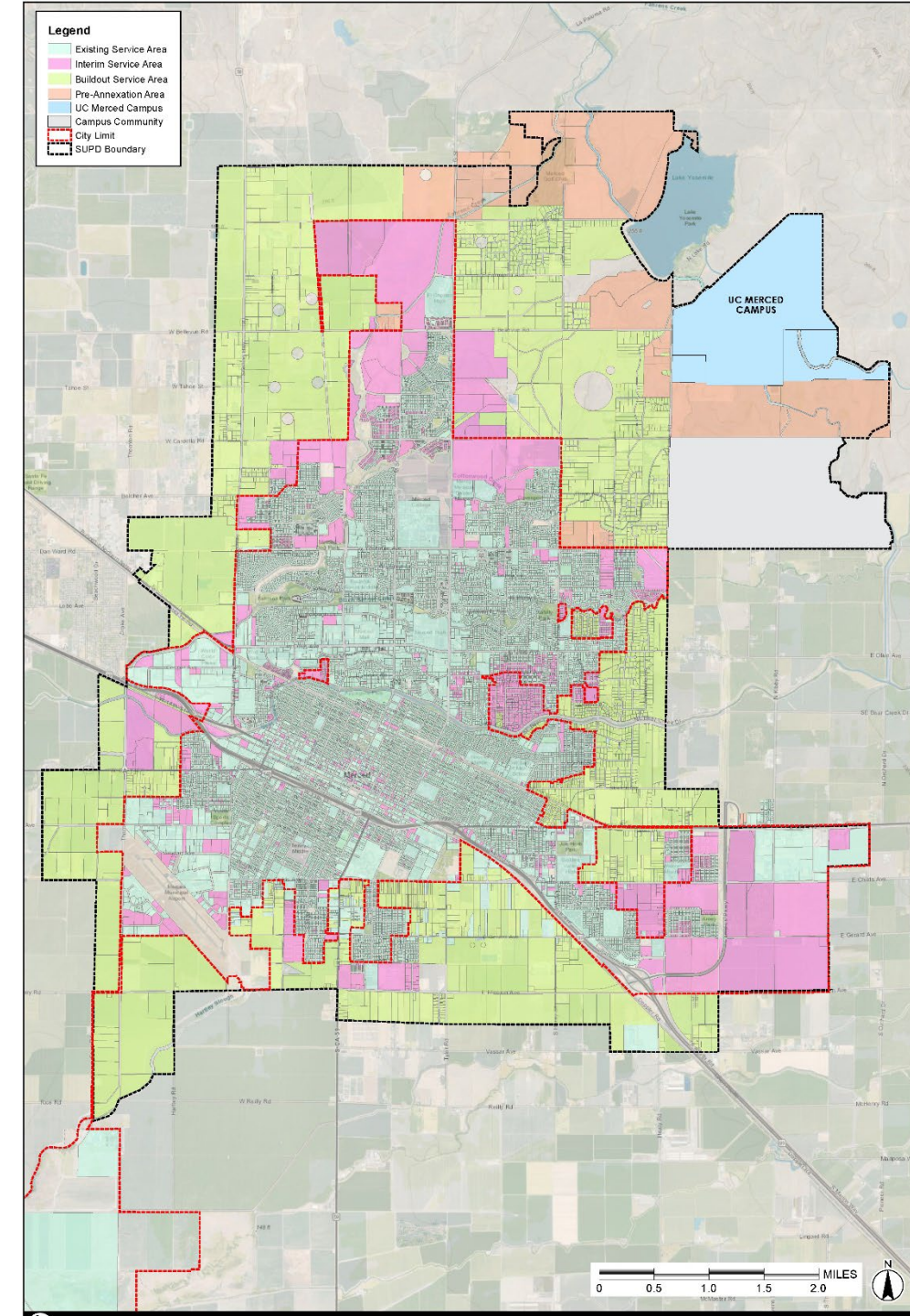




Serving Existing, Entitled EDUs, and UC Merced

ADWF = 13.25 MGD

- UC Merced = 1.13 MGD (original)
- Unit rate = 208 gpd/EDU
- Total EDUs = 63,702

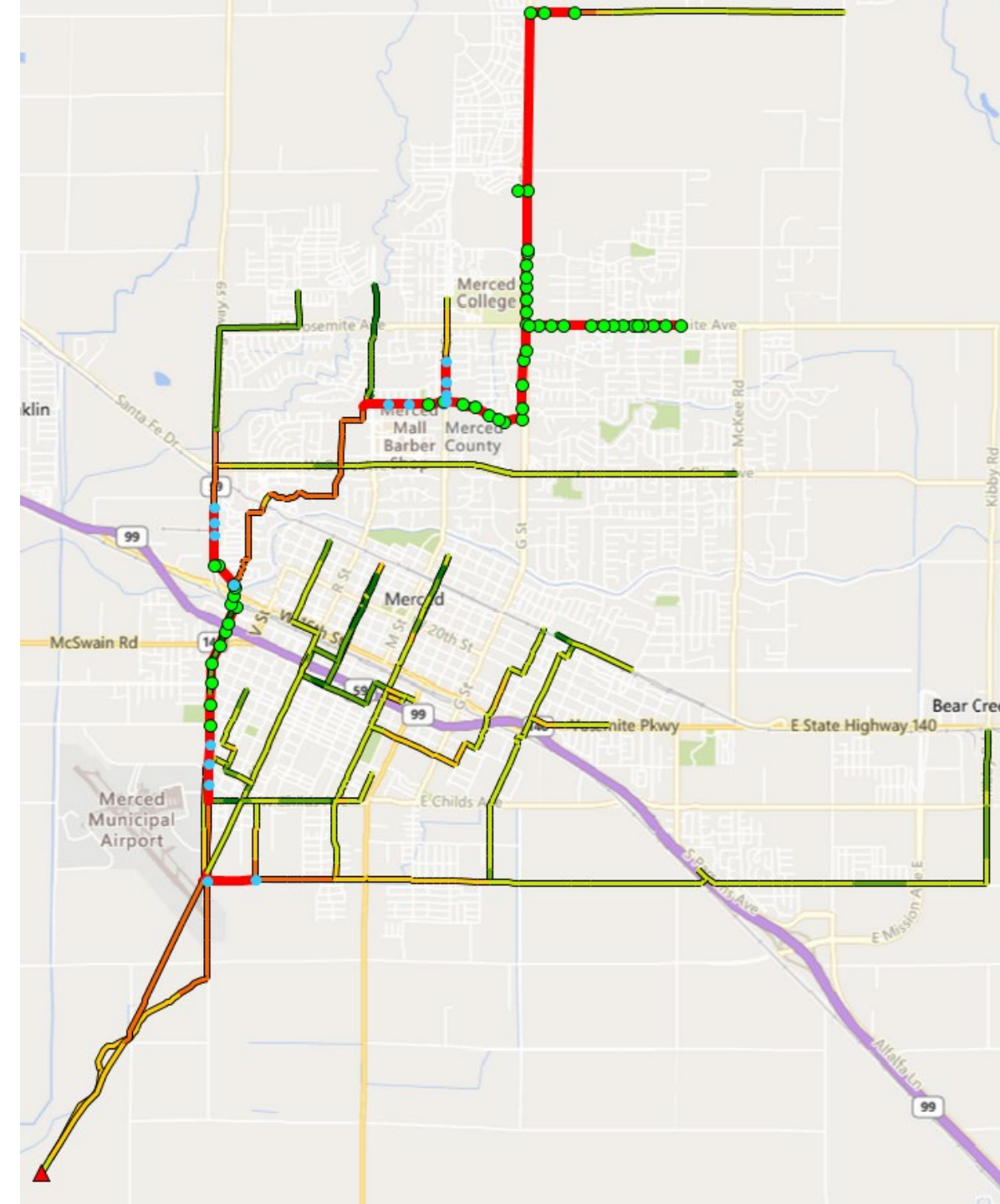




Existing System Hydraulic Model Results

Areas shown with green dots exceed design criteria Level of Service (LOS).

- G Street
- West Ave.
- Yosemite Ave.
- Bellevue Rd.





UC Merced 2020 Long Range Development Plan (LRPD)

UC Merced wastewater generation reduced from 1.13 MGD to 0.27 MGD reducing the requirement to serve existing and entitled by 4,135 EDUs.

Table 4.10-2
Wastewater Generation

	Existing (2017)	2020	2030
Wastewater Generation (mgd)	0.14	0.17	0.27
Campus Population	9,500	11,000	17,700
Wastewater Generation (gpd)/person	15.1	15.1	15.1

Source: Impact Sciences 2019

The 2020 LRPD reduces the 2030 student population from 25,000 students to 15,000 and states



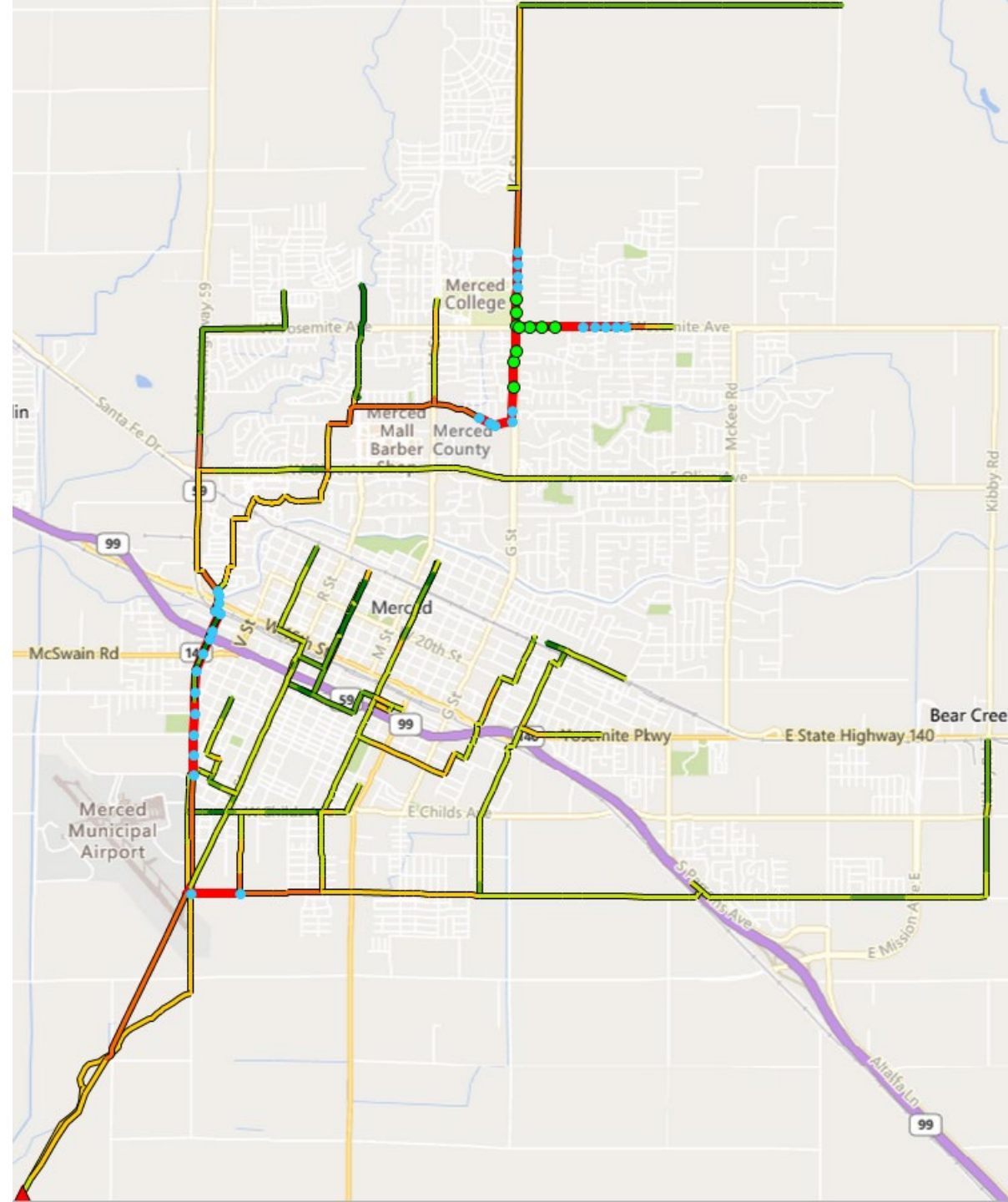
Existing System Hydraulic Model Results (Reduced UC Flows)

ADWF = 12.34 MGD

- UC Merced = 0.27 MGD (updated)
- Unit rate = 208 gpd/EDU
- Total EDUs = 59,327

Areas shown in red exceed design criteria
level of service.

- G Street
- West Ave.

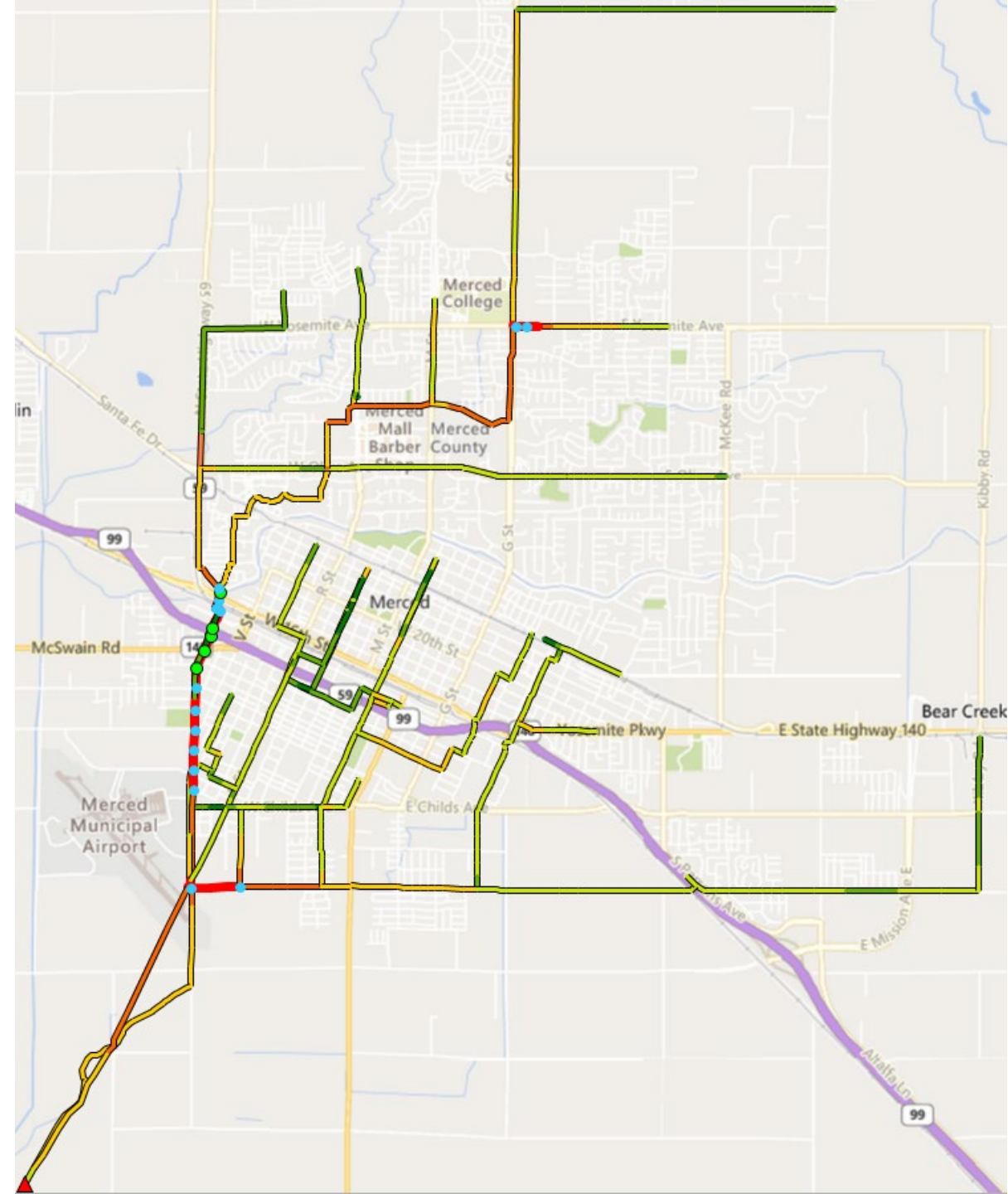




Interim System Results CIP 1

CIP 1 = BRPS Operational Change
Force main to R. Street

- Eliminates LOS failure on G Street.
- LOS failure on West Ave. remains.





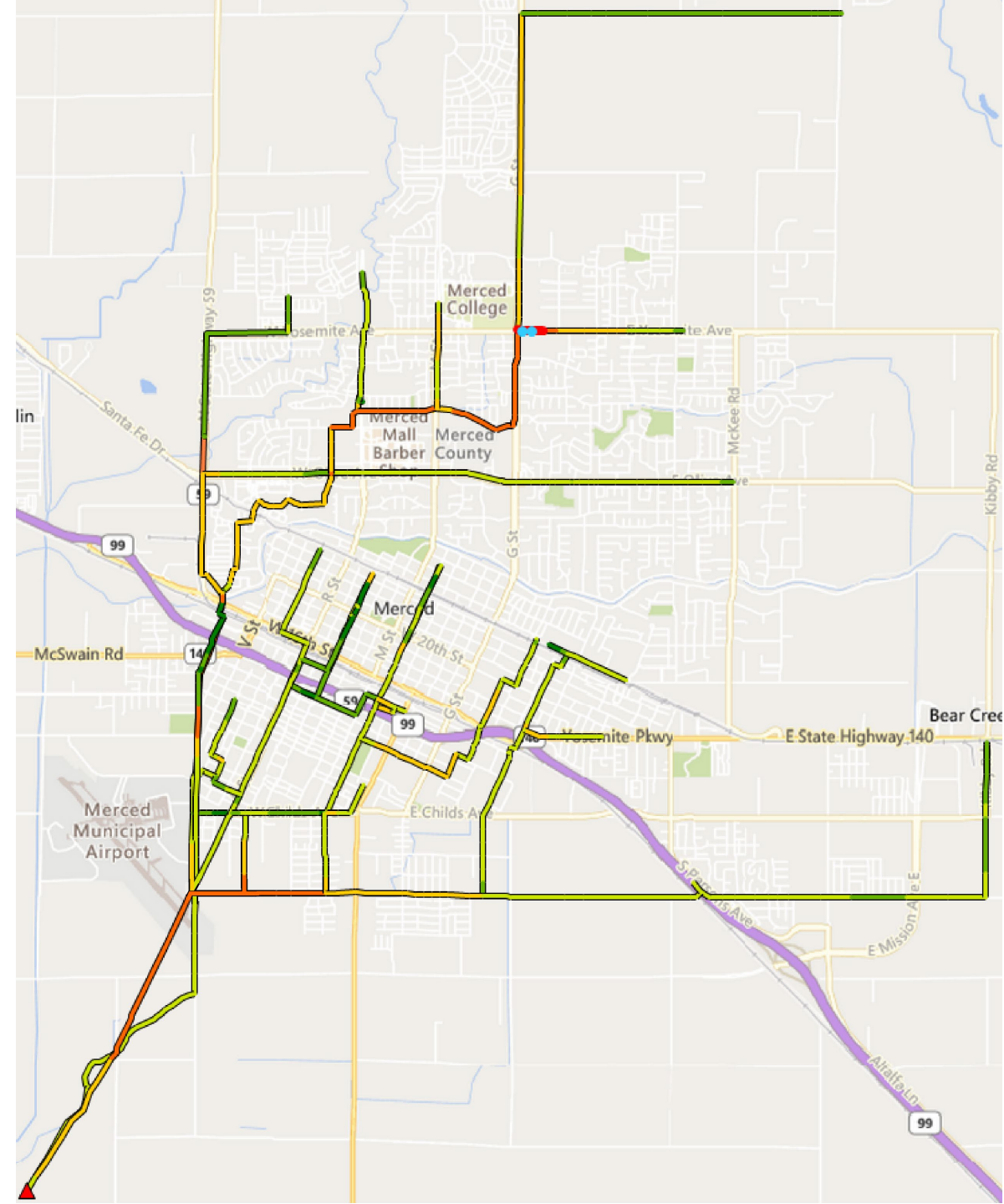
Influent Trunk – Existing Condition



Interim System Results

CIP 1, 3, & 4

CIP 3 & 4 – West Ave. & 48-inch Interceptor:
Replace 48-inch Interceptor and West Ave.
sewers with 60-inch diameter sewer starting at
V Street and West Ave. and ending at the
WWTF.

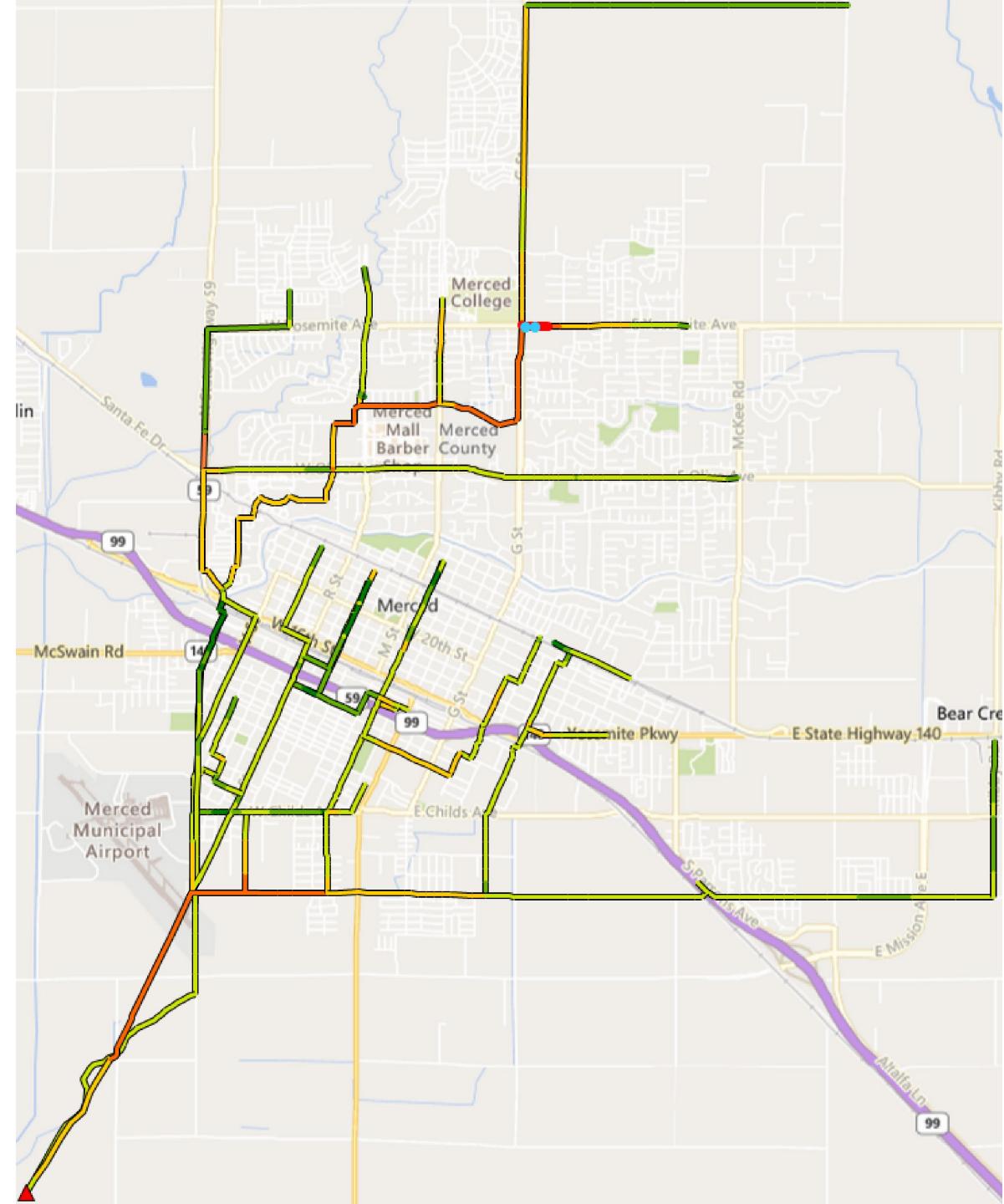




Interim System Results

CIP 1, 2, 3, & 4

CIP 2 – Parallel Sewer & Bear Creek Crossing: New 48-inch parallel sewer and creek crossing starting Bear Creek Ct. and ending at V Street and West Ave.

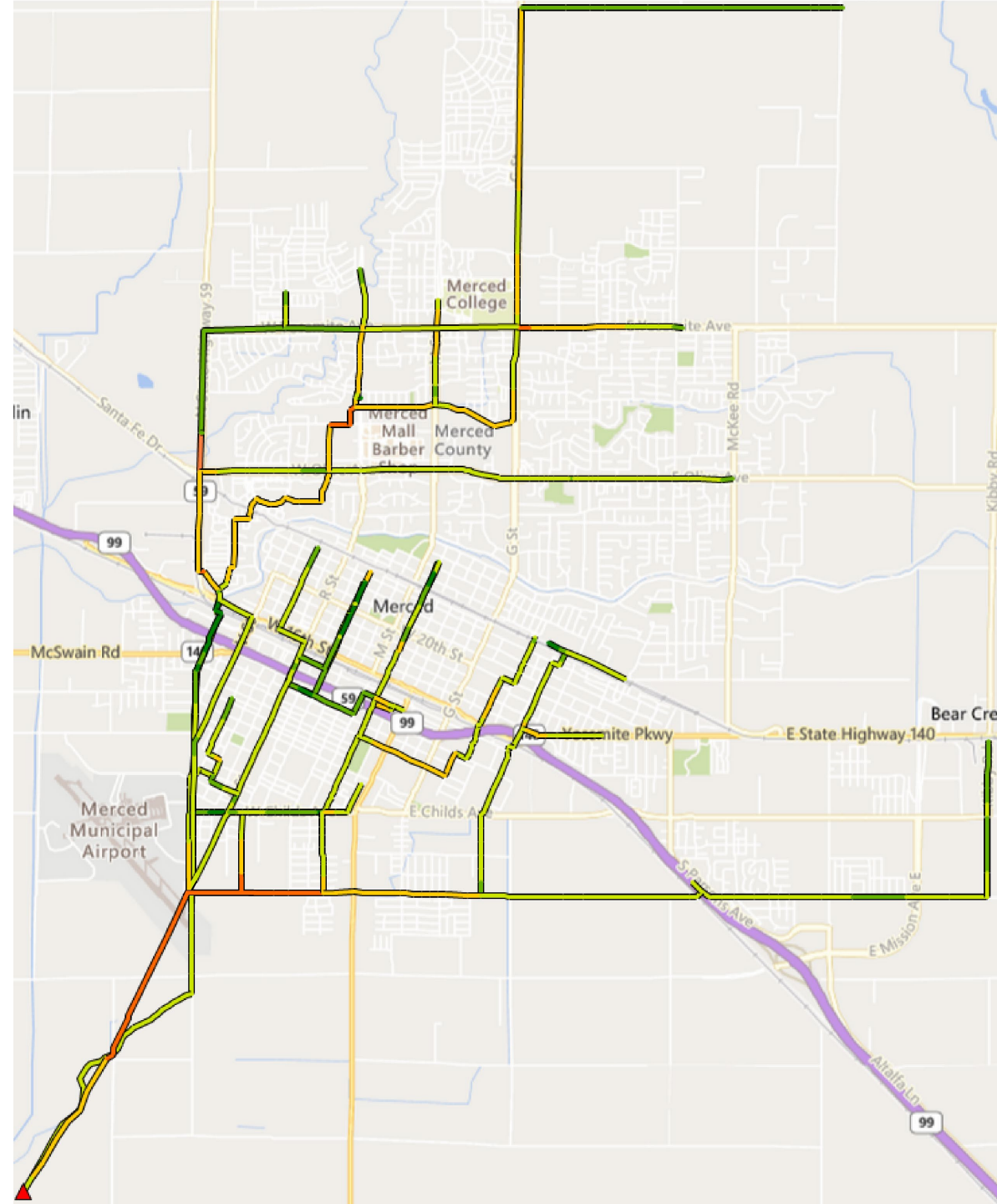




Interim System Results

CIP 1, 2, 3, 4, 5

CIP 5 – Yosemite Sewer Extension & Fahrens Creek Crossing: A new 27-inch extension of the Yosemite Avenue sewer starting at G Street and ending at El Redondo Drive.



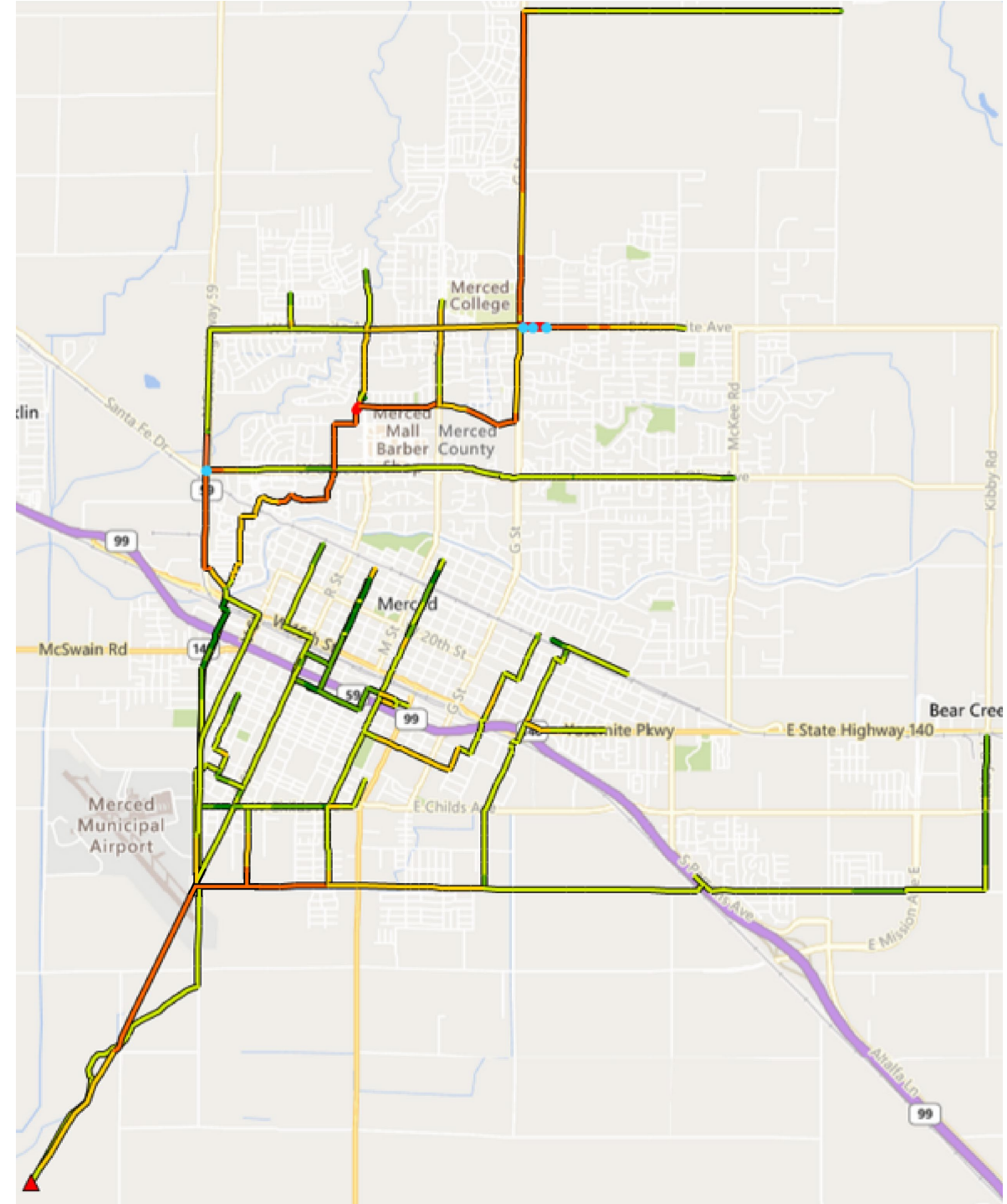


Interim System Results

CIP 1, 2, 3, 4, & 5

ADWF = 12.34 MGD + 1.14 MGD = 13.48 MGD

EDU = 58,032 + 5,480 = 63,512



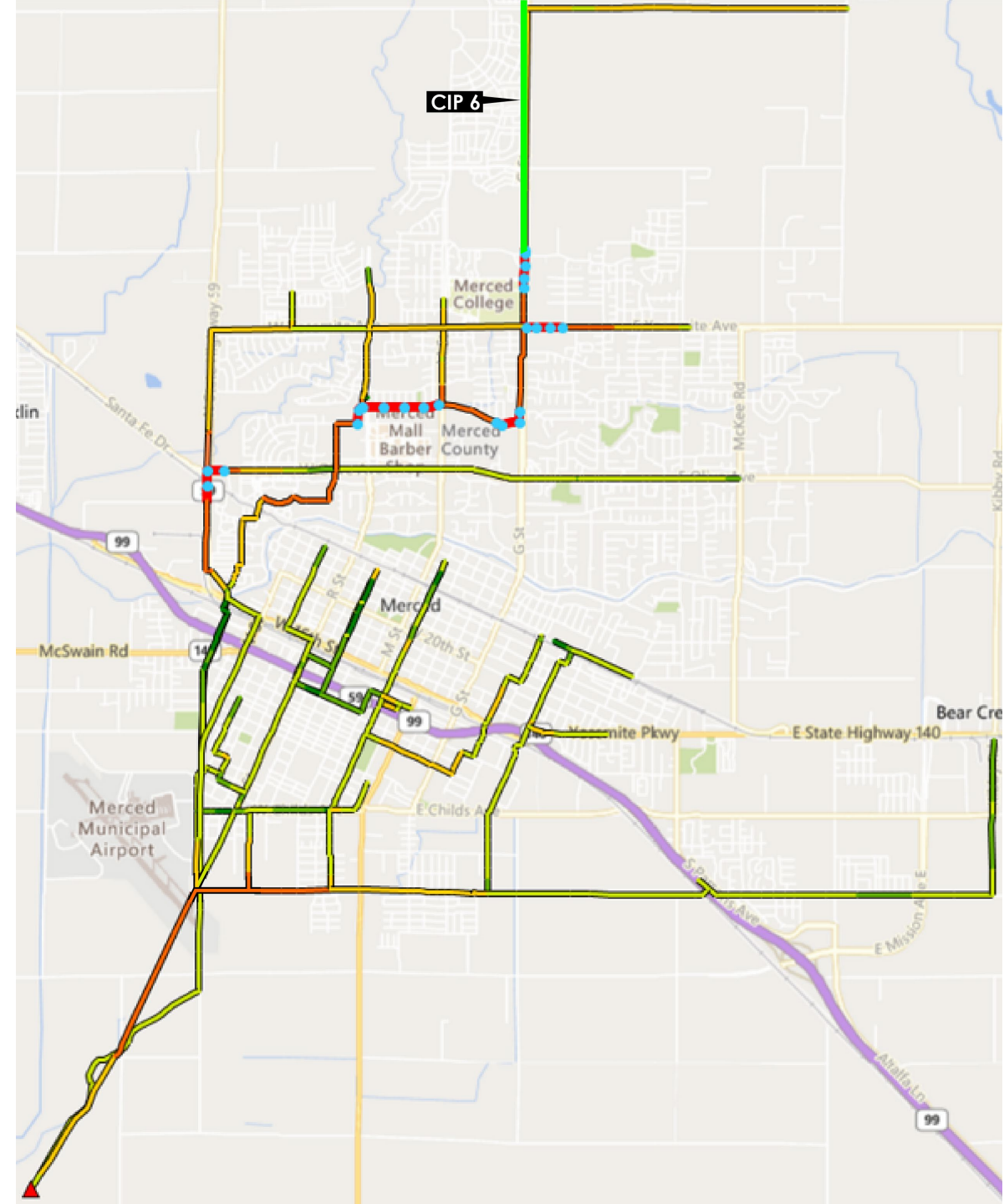


Interim System Results

CIP 1, 2, 3, 4, 5, & 6

ADWF = 12.34 MGD + 1.87 MGD = 14.21 MGD

EDU = 58,032 + 9,000 = 67,032

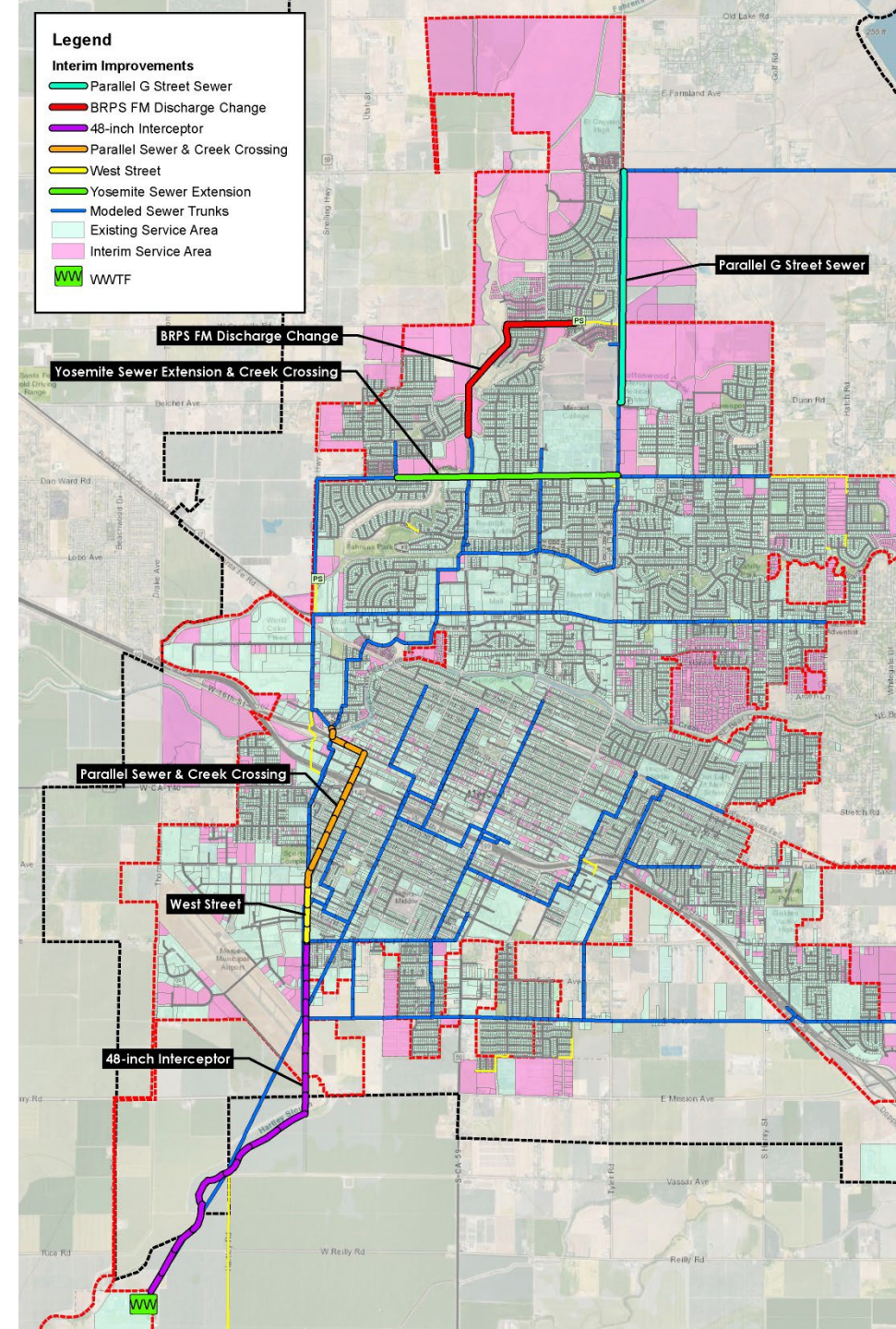




Interim CIP Projects

CIP No	Name	Length (LF)	Buildout Pipe Size (in)	Construction Cost
1	BRPS FM Discharge Change ⁽¹⁾	-	-	0
2	Parallel Sewer & Creek Crossing	6,500	48	\$4,634,333
3	West Street (2)	1,900	60	\$1,207,000
4	48-inch Interceptor (2)	14,700	60	\$10,868,667
5	Yosemite Sewer Extension	5,100	27	\$1,793,000
6	Parallel G Street Sewer	8,000	27	\$1,979,000

Description	Cost
<i>Subtotal</i>	\$20,482,000
5% Mobilization/Demobilization	\$1,025,000
<i>Construction Cost Subtotal</i>	\$21,507,000
30% Contingency	\$6,453,000
<i>Estimated Construction Cost</i>	\$27,960,000
20% Engineering, Environmental, & Admin	\$5,592,000
Total Project Cost	\$33,552,000

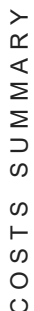




Updated Wastewater Flow Projections

Service Area	Total Area (Acres)	Total EDUs	ADWF (MGD)
Existing Service Area ⁽¹⁾	6,497	33,029	6.88
• UC Merced ⁽²⁾	200	673	0.14
Total Existing	6,697	33,702	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	625	0.13
• Pre-Annexation Areas ⁽⁵⁾	155	9,000	1.87
Subtotal Interim	4,072	34,628	7.19
Buildout Service Area			
• Pre-Annexation Areas (Remaining)	1,555	8,912	1.86
• 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	4,038	0.84
Subtotal Buildout	11,974	62,592	13.03
Total Interim Service Area	10,769	68,330	14.21
Total Buildout Service Area	22,743	130,923	27.24

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.



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

Item	Area of Improvements	Total Cost
1	Interim System Improvements	\$33,552,000
2	North Merced Major Improvements	\$56,835,000
3	South Merced Major Improvements	\$18,182,000
	Subtotal Major Improvements	\$108,569,000
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	\$125,561,000