APPENDICES

Appendix A NOTICE OF PREPARATION

City of Merced

Notice of Preparation of a Draft Environmental Impact Report

Date:	June 26, 2018
Project Title:	City of Merced Sewer Master Plan Update
To:	Responsible Agencies, Organizations, and Interested Parties
Lead Agency:	City of Merced City Council 678 W 18th St Merced, CA 95340 (209) 385-6800
Contact:	Ken Elwin, PE, Public Works Director, City of Merced

INTRODUCTION

The City of Merced (City) will prepare an Environmental Impact Report (EIR) that addresses the potential impacts of implementing the proposed Updated Wastewater Collection System (WCS) Master Plan (Master Plan or proposed Project) to address key wastewater infrastructure needs within the City. Your input is requested in the form of written comments regarding the scope of the EIR including potential environmental impacts and alternatives to be considered.

The EIR is being prepared in compliance with the California Environmental Quality Act (CEQA). Under CEQA, upon deciding to prepare and EIR, the City, as lead agency, must issue a Notice of Preparation (NOP) to inform trustee agencies, the public, and responsible agencies of the decision. Accordingly, the purpose of this NOP is to provide information describing the Master Plan including associated potential environmental effects to those in the public who may wish to comment regarding the scope and content of the information to be included in the EIR. Agencies should comment on such information as is related to their statutory responsibilities in connection with the Master Plan.

The EIR will provide an evaluation of potential environmental impacts associated with implementation of the Master Plan at a project- and program-level where appropriate. The Master Plan location, description, and environmental resource areas that may be affected by development of the Master Plan are described below. The EIR will evaluate potentially significant environmental impacts of the Master Plan, on both a direct and indirect, and cumulative basis; identify mitigation measures that may be feasible to lessen or avoid such impacts; and identify alternatives that may lessen one or more potentially significant impact to the Master Plan.

PROJECT LOCATION/SETTING

Figure 1, Project Vicinity, shows the setting of the proposed Project area in the Merced County region. The proposed Project is located entirely within the boundaries shown in the City's *Merced Vision 2030 General Plan*, including the University of California at Merced (UC Merced) campus and additional community planning areas (Figure 2). This area includes the area within existing City limits, as well as the authorized sphere-of-influence (SOI) for the City, as recognized by the Merced County Local Agency Formation Commission (LAFCo).

PROJECT DESCRIPTION

Development of the WCS Master Plan has been an iterative process from 2002 to 2017 to evaluate and assess function, expansion, and replacement of the wastewater collection system within the City to accommodate existing and future development. Wastewater generated within the City is collected in a series of pipelines which the City owns, operates, and maintains. The system includes over 400 miles of gravity sewers which collect wastewater from a majority of residential users, as well as, commercial users, industrial users, and public uses.

The current Master Plan identifies potential capacity constraints within the existing sewer system, assesses the future demand for these services, and develops recommendations for short- and long-term Capital Improvement Projects (CIP) to address the identified issues needed to serve the anticipated future capacity. During preparation of the Master Plan the City attempted to minimize impacts to the four natural streams that flow through the City: Fahrens Creek, Black Rascal Creek, Cottonwood Creek and Bear Creek, while working to maximize gravity flow of the sewer system to reduce energy and pump station costs.

This most recent draft Master Plan, released in December 2017, incorporated elements from other planning documents that have been developed, including the *Merced Vision 2030 General Plan* and the University of California (UC) Merced 2020 Project Addendum Long Range Development EIS/EIR. These planning documents, combined with the Master Plan, have led to the identification of Alternative Plan A as the preferred alternative to address the long-range sewer system planning needs for the City.

PROJECT ELEMENTS

The purpose of the Master Plan is to:

1. Update land use and wastewater flows accommodating the *Merced Vision 2030 General Plan*;
2. Assess the available capacity of the City's major sewers;
3. Determine the best means to sewer the build-out of the *Merced Vision 2030 General Plan* SUDP;
4. Develop an interim service plan and CIP for City growth; and
5. Establish a sewer repair and replacement program.

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City of Merced
Wastewater Collection System Master Plan
Environmental Impact Report

Figure 1
Project Vicinity

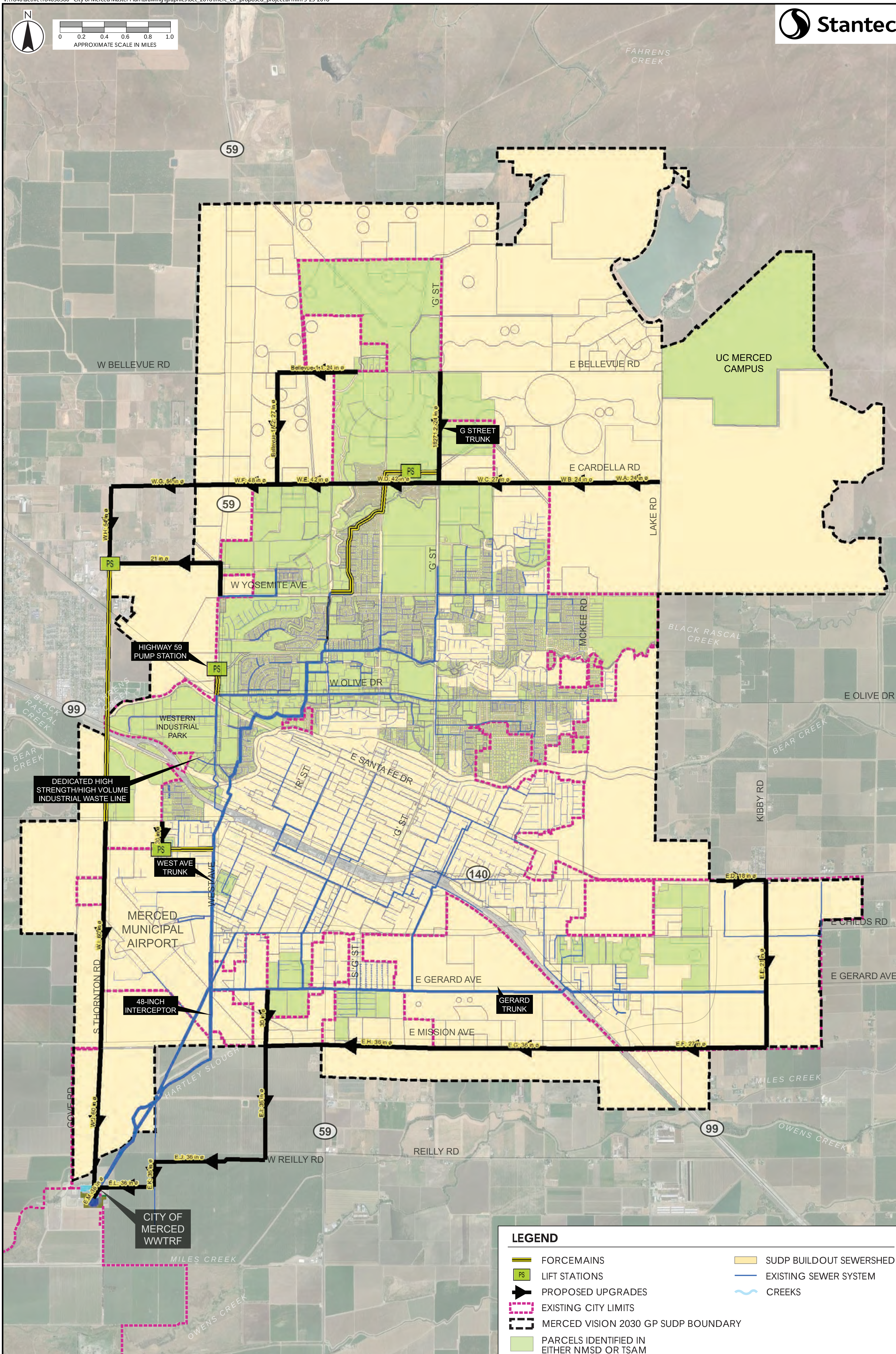

Figure 2
Proposed Project

ENVIRONMENTAL EFFECTS AND SCOPE OF THE EIR

The EIR will analyze potentially significant impacts that result from construction and operation of the Master Plan. Pursuant to section 15063(a) of the CEQA Guidelines, the EIR will evaluate the full range of environmental issues contemplated for consideration under CEQA statute and the CEQA Guidelines including:

- Aesthetics and Visual Resources
- Agriculture and Forestry Resources
- Air Quality and Greenhouse Gases
- Biological Resources
- Cultural and Tribal Resources
- Energy Resources
- Geology, Soils, and Mineral Resources
- Hazards, Hazardous Materials, and Wildfires
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Population and Housing
- Public Services and Utilities
- Recreation
- Transportation and Traffic

Potential environmental impacts associated with implementation of the Master Plan are anticipated to be analyzed at project-level where feasible and a program-level for all other considerations. Preliminary screenings indicate that any potential adverse effects can be avoided, redesigned, minimized and/or mitigated through the development of alternatives or adoption of appropriate mitigation measures. The EIR will consider a range of potential temporary construction-period impacts, permanent impacts, and cumulative impacts.

SUBMITTING COMMENTS

Comments and suggestions as to the appropriate scope of analysis in the EIR are invited from all interested parties. Written comments or questions concerning the EIR for the WCS Master Plan should be directed to the City's public works director at the following address by **5:00 PM on July 26, 2018**.

Ken Elwin, PE, City of Merced Public Works Director
678 W 18th Street
Merced, CA 95340
E-mail: elwink@cityofmerced.org

All comments should please include the name, email address, phone number, and mailing address of the contact person submitting the written response. In the event no response or request for additional time is received by any responsible agency or trustee agency by the end of the review period on **July 26, 2018**, the City may presume that the responsible agency or trustee agency has no response.

SCOPING MEETING

A public scoping meeting will be held to receive comments on environmental issues that should be addressed in the Draft EIR as well as the range of practicable alternatives to be evaluated in the Draft EIR. The address, date, and time of this meeting are as follows:

Date: **Tuesday, July 10, 2018**
Time: **5:00 – 8:00 pm**
Place: City of Merced City Council Chambers
678 W. 18th Street
Merced, CA 39540

November 2024

Appendix B AIR QUALITY

B.1 AIR QUALITY AND GREENHOUSE GAS EMISSIONS MODELING ASSUMPTIONS FOR THE CITY OF MERCED WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

Technical Memorandum

To:	City of Merced 1776 Grogan Avenue Merced, CA 95340	From:	Briette Shea, Air Quality and Climate Change Consultant Stantec – Sacramento
Project:	City of Merced Wastewater Collection System Master Plan Update Project	Date:	August 26, 2024

Reference: Air Quality and Greenhouse Gas Emissions Modeling Assumptions for the City of Merced Wastewater Collection System Master Plan Update Project

PURPOSE

The intent of this Technical Memorandum (Memo) is to document the assumptions and estimates applied in the air quality and greenhouse gas (GHG) emissions modeling conducted to evaluate the City of Merced 2022 Wastewater Collection System Master Plan (2022 WCSMP). The information contained in this Memo supports the analysis and conclusions presented in Section 3.3, Air Quality, and Section 3.7, Greenhouse Gases and Energy Resources, of the Environmental Impact Report for the 2022 WCSMP.

MODELING APPROACH

The 2022 WCSMP update sets forth a strategy to meet both interim and build-out wastewater collection system needs that are consistent with the City's 2030 General Plan. The four following specific components identified in the 2022 WCSMP were modeled:

1. Interim System Improvements (Capital Improvement Projects [CIPs] 1-6)
   - CIP 1: Bellevue Ranch Pump Station (BRPS) Discharge
   - CIP 2: Parallel Sewer and Bear Creek Crossing
   - CIPs 3 and 4: Replace 48-inch Interceptor and West Avenue Sewer
   - CIP 5: Yosemite Sewer Extension
   - CIP 6: Parallel G Street Sewer
2. North Merced Major Sewer Improvements
   - Highway 59 Pump Station (H59PS) Expansion and Force Main
   - South Highway 59 Trunk
   - West Cardella Trunk

- East Cardella Trunk
- G Street Extension 1
- G Street Extension 2

3. South Merced Major Sewer Improvements
    - South Mission Trunk
    - Gerard Relief Sewer
    - Gove Road Sewer
    - Thornton Road Sewer 1
4. City of Merced WWTF Expansion Projects (3- to 4-Mgal/d)

Emissions were estimated using the California Emissions Estimator Model (CalEEMod) Version 2022.1.1.6 within four separate models (one model per project component). CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operations from a variety of land use projects. CalEEMod quantifies direct GHG emissions, such as construction and operational activities and vehicle use, and indirect emissions, such as energy use, solid waste disposal, vegetation planting and/or removal, and water use.

The Program is located within the of the San Joaquin Valley Air Basin governed by the San Joaquin Valley Air Pollution Control District (SJVAPCD). Modeled emissions were compared to SJVAPCD's adopted thresholds of significance.

MODELING ASSUMPTIONS

The following assumptions were used as inputs into CalEEMod to quantify air quality and GHG emissions.

Construction Assumptions

Construction Footprint Assumptions

For each model run, the estimated disturbance footprint was estimated by multiplying the length of the new sewer segment by the diameter of the sewer pipe plus a 1-foot buffer. The hauling volumes were estimated by calculating the volume of material that would be exported to accommodate the installation of each pipeline segment, based on the segment length and pipeline radius.

The Interim System Improvements would require soil export for each CIP. Table 1, below, presents the estimated disturbance footprint and hauling volume for the Interim System Improvements. For CIPs 3 and 4, it was assumed that soil would only be exported to account for the expansion of the pipeline diameter.

Table 1. Interim System Improvements, Footprint and Export Assumptions

CIP	Notes	Estimated Disturbance Footprint (acres)	Estimated Soil Export (CY)
CIP 1: BRPS Discharge and Fahrens Creek Crossing	• No construction	N/A	N/A
CIP 2: Parallel Sewer and Bear Creek Crossing	• Project will construct approximately 1.2 miles of new 48-inch-diameter sewer.	0.73	2,959
CIPs 3 and 4: Replace 48-inch Interceptor and West Avenue Sewer	• Removal and replacement of the existing 48-inch interceptor and 42-inch trunk sewer in West Avenue, downstream of the connection point of CIP 2 and extending to the WWTF. • Project will construct approximately 3.1 miles of 60-inch sewer.	2.25	6,071
CIP 5: Yosemite Sewer Extension and Fahrens Creek Crossing	• Project will construct approximately 1.5 miles of 27-inch sewer.	0.59	1,166
CIP 6: Parallel G Street Sewer and Cottonwood Creek Crossing	• Project will construct approximately 1.5 miles of 27-inch sewer.	0.59	1,166
	Totals	*4.16*	*11,362*

The North Merced Major Sewer Improvements would include a total of 7.4 miles of pipeline installation/improvements, with a maximum pipe diameter of 48 inches, resulting in a disturbance footprint of approximately 4.5 acres and soil export volume of approximately 18,185 CY. In addition, to account for the expansion or replacement of H59PS, a new 2,000-square-foot structure was assumed in the model.

The South Merced Major Sewer Improvements would include a total of 5.8 miles of pipeline installation/improvements, with a maximum pipe diameter of 30 inches, resulting in a disturbance footprint of approximately 2.5 acres and soil export volume of approximately 5,568 CY.

For the City of Merced WWTF Expansion Projects, the disturbance footprint was assumed to be 22.5 acres and the building square footage was set to 50,000 square feet.

Construction Schedule

Construction of the Program would generally occur as development occurs in accordance with the 2030 General Plan. However, for this analysis, conservative estimates were used to consider construction activities. In general, construction would occur between 7 a.m. and 8 p.m., Monday through Friday. It is expected that the Interim System Improvements (CIPs 1–6) would be installed first, followed by the North Merced and South Merced Major Sewer Improvements projects, with associated infrastructure and smaller collectors and laterals developed as needed. Tables 2 through 5 provide the estimated construction schedule for each modeled activity.

Reference: Air Quality and Greenhouse Gas Emissions Modeling Assumptions for the City of Merced Wastewater Collection System Master Plan Update Project

Table 2. Interim System Improvements, Estimated Construction Activity Schedule

Construction Phase	Start Date	End Date	Phase Duration (Working Days)
Site Preparation/Grading	1/1/2026	4/30/2026	86
Pipeline Construction	5/1/2026	4/19/2027	252
Paving	4/20/2027	7/7/2027	57

Note: As described in the Project Description, each CIP within the Interim System Improvements is estimated to take approximately 18 months (395 workdays). This analysis conservatively assumes that all components are built during the same timeframe.

Table 3. North Merced Major Sewer Improvements, Estimated Construction Activity Schedule

Construction Phase	Start Date	End Date	Phase Duration (Working Days)
Site Preparation/Grading	7/8/2027	9/29/2027	60
Pipeline Construction	9/30/2027	8/29/2029	500
Paving	8/30/2029	9/19/2029	15
Architectural Coating	9/20/2029	10/31/2029	30

Table 4. South Merced Major Sewer Improvements, Estimated Construction Activity Schedule

Construction Phase	Start Date	End Date	Phase Duration (Working Days)
Site Preparation/Grading	7/8/2027	9/29/2027	60
Pipeline Construction	9/30/2027	1/3/2029	330
Paving	1/4/2029	1/24/2029	15

Table 5. City of Merced WWTF Expansion Improvements, Estimated Construction Activity Schedule

Construction Phase	Start Date	End Date	Phase Duration (Working Days)
Site Preparation/Grading	1/1/2026	5/6/2026	90
Facility Construction	5/7/2026	5/11/2027	264
Paving	5/12/2027	8/3/2027	60
Architectural Coating	8/4/2027	10/26/2027	60

For the purpose of the air quality modeling, construction of all components in the same timeframe would result in the most conservative (worst case) scenario for air quality emissions. It is likely that construction of individual components would not happen concurrently, but to achieve disclosure of the most significant potential impact that could occur, model inputs were set up to assume all activities would occur simultaneously. If individual projects are undertaken in a step-wise manner, Program and proposed Project construction emissions would be less than those modeled because the emissions would be spread out over time instead of occurring all at once.

Off-Road Equipment

The construction equipment lists for typical types of projects associated with the Program are provided in Tables 6 through 9. The construction fleet is based on CalEEMod default values for the disturbance area, and is often overestimated to produce conservative model results. Pipeline construction was conservatively assumed to require welding, but may equipment needs may vary based on pipe material selection. Additionally, the pipeline construction phase included generator sets to represent pumps for dewatering.

Table 6. Interim System Improvements, Construction Equipment Assumptions

Construction Stage	Equipment	Unit Amount	Hours Per Day	Horsepower	Load Factor
Site Preparation / Grading	Rubber Tired Dozers	1	8	367	0.40
	Tractors/Loaders/Backhoes	3	8	84	0.37
	Excavators	1	8	36	0.38
	Graders	1	8	148	0.38
	Trenchers	2	8	40	0.50
Pipeline Construction	Cranes	1	7	367	0.29
	Forklifts	3	8	82	0.20
	Generator Sets	1	8	14	0.74
	Tractors/Loaders/Backhoes	3	7	84	0.37
	Welders	2	8	46	0.45
Paving	Pavers	1	8	81	0.42
	Paving Equipment	2	6	89	0.36
	Rollers	2	6	36	0.38
	Cement and Mortar Mixers	2	6	10	0.56
	Tractors/Loaders/Backhoes	1	8	84	0.37

Table 7. North Merced Major Sewer Improvements, Construction Equipment Assumptions

Construction Stage	Equipment	Unit Amount	Hours Per Day	Horsepower	Load Factor
Site Preparation / Grading	Rubber Tired Dozers	1	8	367	0.40
	Tractors/Loaders/Backhoes	3	8	84	0.37
	Excavators	1	8	36	0.38
	Trenchers	2	8	40	0.50
	Graders	1	8	148	0.41
Pipeline Construction	Cranes	1	1	367	0.29
	Forklifts	1	5	82	0.2

Construction Stage	Equipment	Unit Amount	Hours Per Day	Horsepower	Load Factor
	Generator Sets	1	8	14	0.74
	Tractors/Loaders/Backhoes	3	4	84	0.37
	Welders	2	8	46	0.45
Paving	Pavers	1	8	81	0.42
	Cement and Mortar Mixers	2	6	10	0.56
	Paving Equipment	2	7	89	0.36
	Rollers	2	7	36	0.38
Architectural Coating	Air Compressors	1	6	37	0.48

Table 8. South Merced Major Sewer Improvements, Construction Equipment Assumptions

Construction Stage	Equipment	Unit Amount	Hours Per Day	Horsepower	Load Factor
Site Preparation / Grading	Rubber Tired Dozers	1	8	367	0.40
	Tractors/Loaders/Backhoes	3	8	84	0.37
	Excavators	1	8	36	0.38
	Trenchers	2	8	40	0.50
	Graders	1	8	148	0.41
Pipeline Construction	Cranes	1	1	367	0.29
	Forklifts	1	5	82	0.2
	Generator Sets	1	8	14	0.74
	Tractors/Loaders/Backhoes	3	4	84	0.37
	Welders	2	8	46	0.45
Paving	Pavers	1	8	81	0.42
	Cement and Mortar Mixers	2	6	10	0.56
	Paving Equipment	2	7	89	0.36
	Rollers	2	7	36	0.38

Table 9. City of Merced WWTF Expansion Projects, Construction Equipment Assumptions

Construction Stage	Equipment	Unit Amount	Hours Per Day	Horsepower	Load Factor
Site Preparation / Grading	Rubber Tired Dozers	1	2	367	0.4
	Tractors/Loaders/Backhoes	3	2	84	0.37
	Scraper	2	1	423	0.48
	Excavators	3	2	36	0.38
	Graders	1	2	148	0.41
Facility Construction	Cranes	1	1	367	0.29
	Forklifts	2	1	82	0.20
	Generator Sets	1	8	14	0.74
	Tractors/Loaders/Backhoes	2	2	84	0.37
	Welders	1	1	46	0.45
Paving	Pavers	1	4	81	0.42
	Paving Equipment	4	4	89	0.36
	Rollers	2	4	36	0.38
Architectural Coating	Air Compressors	4	4	37	0.48

On-Road Vehicle Trips

On-road construction emissions are caused by motor vehicle exhaust from delivery vehicles, worker traffic, and road dust (PM_{10}). Tables 10 through 13 provide a summary of the estimated construction-related on-road vehicle trips.

The fleet mix for worker trips is light-duty passenger vehicles to light-duty trucks (LDA, LDT1, and LDT2). The vendor trips fleet mix is composed of a mixture of medium and heavy-duty diesel trucks (MHDT and HHDT). The hauling trips are assumed to be 100 percent heavy-duty diesel truck (HHDT) trips.[1] Based on CalEEMod default values for the Program area, the trip lengths were assumed to be 10.85 miles one-way for worker trips, 8.27 miles one-way for vendor trips, and 20.00 miles one-way for haul truck trips.

1 These estimates are provided for conservative air quality modeling purposes, and may differ from what is included for traffic impacts in the Draft EIR.

Table 10. Interim System Improvements, Construction Vehicle Assumptions

Construction Phase	Worker Trips/Day	Vendor Trips/Day	Haul Trips/Day
Site Preparation / Grading	20	5	17
Pipeline Construction	50	60	0
Paving	20	5	0

Table11. North Merced Major Sewer Improvements, Construction Vehicle Assumptions

Construction Phase	Worker Trips/Day	Vendor Trips/Day	Haul Trips/Day
Site Preparation / Grading	20	5	38
Pipeline Construction	50	60	0
Paving	18	5	0
Architectural Coating	5	0	0

Table12. South Merced Major Sewer Improvements, Construction Vehicle Assumptions

Construction Phase	Worker Trips/Day	Vendor Trips/Day	Haul Trips/Day
Site Preparation / Grading	20	5	12
Pipeline Construction	50	60	0
Paving	18	5	0

Table13. City of Merced WWTF Expansion Project, Construction Vehicle Assumptions

Construction Phase	Worker Trips/Day	Vendor Trips/Day	Haul Trips/Day
Site Preparation / Grading	15	5	0
Facility Construction	50	60	2
Paving	10	5	0
Architectural Coating	5	0	0

Operational Modeling Assumptions

Operational emissions are those emissions that occur during operation of the Program. The only substantial new sources of operational air quality emissions associated with operation of the Program would be potential increased truck trips associated with solids handling and disposal from the WWTF and occasional worker trips associated with maintenance and upkeep of the Program components throughout the City. Maintenance and additional worker trips would equate to approximately 10 additional trips per year which would result in a negligible amount of annual emissions and, as a result, are not included in the model.

The increase in truck trips for the biosolids could reach a maximum of 621 truck trips per year, approximately 2 additional trips per day as compared to existing conditions if all biosolids would require hauling offsite to a disposal facility. The trip length was assumed to be 22 miles, which is the distance to the

Synagro Central Valley Compost Facility, and the fleet was assumed to be 100 percent HHDT. In addition, during pump station operations, a backup generator would be installed. The model included installation of a 600-horsepower emergency generator that was assumed to operate for up to 100 hours per year for routine maintenance and inspections. Operational emissions were estimated using CalEEMod and were included in the City of Merced WWTF Expansion Projects model run.

Regards,

STANTEC CONSULTING SERVICES INC.

Briette Shea

Briette Shea
Air Quality and Climate Change Consultant
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Attachment A: CalEEMod Results

Attachment A

CalEEMod Results

B.2 2022 WCSMP- NORTH MERCED MAJOR SEWER IMPROVEMENT DETAILED REPORT

2022 WCSMP - North Merced Major Sewer Improvement Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	2022 WCSMP - North Merced Major Sewer Improvement
Construction Start Date	7/8/2027
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.80
Precipitation (days)	23.4
Location	37.30190428288776, -120.48696695622269
County	Merced
City	Merced
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2303
EDFZ	14
Electric Utility	Merced Irrigation District
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	2.00	1000sqft	4.50	2,000	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.46	2.06	19.8	21.9	0.05	0.74	7.99	8.73	0.68	3.67	4.35	—	6,170	6,170	0.17	0.45	6.50	6,314
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.08	0.91	7.80	10.4	0.02	0.19	0.80	0.99	0.18	0.20	0.38	—	3,036	3,036	0.08	0.24	0.13	3,111
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.75	0.63	5.35	7.35	0.02	0.16	1.46	1.61	0.14	0.64	0.78	—	2,150	2,150	0.05	0.17	1.35	2,203
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.14	0.11	0.98	1.34	< 0.005	0.03	0.27	0.29	0.03	0.12	0.14	—	356	356	0.01	0.03	0.22	365

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	2.46	2.06	19.8	21.9	0.05	0.74	7.99	8.73	0.68	3.67	4.35	—	6,170	6,170	0.17	0.45	6.50	6,314

2028	1.07	0.90	7.36	10.8	0.02	0.17	0.80	0.97	0.16	0.20	0.36	—	3,033	3,033	0.08	0.23	4.37	3,109
2029	1.03	0.87	7.15	10.5	0.02	0.19	0.80	0.95	0.18	0.20	0.35	—	2,986	2,986	0.07	0.23	3.79	3,061
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	1.08	0.91	7.80	10.4	0.02	0.19	0.80	0.99	0.18	0.20	0.38	—	3,036	3,036	0.08	0.24	0.13	3,111
2028	1.04	0.87	7.53	10.2	0.02	0.17	0.80	0.97	0.16	0.20	0.36	—	2,992	2,992	0.08	0.23	0.11	3,064
2029	0.99	0.84	7.29	10.0	0.02	0.15	0.80	0.95	0.14	0.20	0.35	—	2,946	2,946	0.08	0.23	0.10	3,018
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.60	0.50	4.69	5.47	0.01	0.16	1.46	1.61	0.14	0.64	0.78	—	1,567	1,567	0.04	0.12	0.85	1,604
2028	0.75	0.63	5.35	7.35	0.02	0.12	0.56	0.69	0.11	0.14	0.26	—	2,150	2,150	0.05	0.17	1.35	2,203
2029	0.54	0.46	3.70	5.20	0.01	0.08	0.38	0.46	0.08	0.10	0.17	—	1,466	1,466	0.04	0.11	0.79	1,501
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.11	0.09	0.86	1.00	< 0.005	0.03	0.27	0.29	0.03	0.12	0.14	—	259	259	0.01	0.02	0.14	266
2028	0.14	0.11	0.98	1.34	< 0.005	0.02	0.10	0.13	0.02	0.03	0.05	—	356	356	0.01	0.03	0.22	365
2029	0.10	0.08	0.68	0.95	< 0.005	0.01	0.07	0.08	0.01	0.02	0.03	—	243	243	0.01	0.02	0.13	249

3. Construction Emissions Details

3.1. Site Prep/Grading (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.28	1.92	16.7	20.1	0.03	0.68	—	0.68	0.63	—	0.63	—	3,375	3,375	0.14	0.03	—	3,387

Dust From Material Movement	—	—	—	—	—	—	7.10	7.10	—	3.43	3.43	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.37	0.31	2.74	3.30	0.01	0.11	—	0.11	0.10	—	0.10	—	555	555	0.02	< 0.005	—	557
Dust From Material Movement	—	—	—	—	—	—	1.17	1.17	—	0.56	0.56	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.50	0.60	< 0.005	0.02	—	0.02	0.02	—	0.02	—	91.9	91.9	< 0.005	< 0.005	—	92.2
Dust From Material Movement	—	—	—	—	—	—	0.21	0.21	—	0.10	0.10	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	0.06	1.07	0.00	0.00	0.15	0.15	0.00	0.04	0.04	—	163	163	0.01	0.01	0.58	165

Vendor	0.01	< 0.005	0.16	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	125	125	< 0.005	0.02	0.29	131
Hauling	0.07	0.05	2.97	0.64	0.02	0.05	0.70	0.75	0.05	0.19	0.24	—	2,508	2,508	0.02	0.40	5.64	2,632
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.14	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	24.6	24.6	< 0.005	< 0.005	0.04	25.0
Vendor	< 0.005	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	20.5	20.5	< 0.005	< 0.005	0.02	21.4
Hauling	0.01	0.01	0.51	0.11	< 0.005	0.01	0.11	0.12	0.01	0.03	0.04	—	412	412	< 0.005	0.06	0.40	432
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.07	4.07	< 0.005	< 0.005	0.01	4.14
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.40	3.40	< 0.005	< 0.005	< 0.005	3.55
Hauling	< 0.005	< 0.005	0.09	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	68.3	68.3	< 0.005	0.01	0.07	71.6

3.3. Pipeline Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.78	0.65	5.60	7.67	0.01	0.17	—	0.17	0.15	—	0.15	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.78	0.65	5.60	7.67	0.01	0.17	—	0.17	0.15	—	0.15	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.02	1.40	< 0.005	0.03	—	0.03	0.03	—	0.03	—	214	214	0.01	< 0.005	—	214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.19	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	—	35.4	35.4	< 0.005	< 0.005	—	35.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.25	0.24	0.15	2.68	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	406	406	0.02	0.02	1.44	413
Vendor	0.08	0.05	1.89	0.69	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,498	1,498	0.02	0.22	3.46	1,567
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	2.05	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	363	363	0.01	0.02	0.04	368
Vendor	0.07	0.05	2.01	0.70	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,500	1,500	0.02	0.22	0.09	1,565
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.04	0.04	0.03	0.39	0.00	0.00	0.07	0.07	0.00	0.02	0.02	—	68.1	68.1	< 0.005	< 0.005	0.11	69.2
Vendor	0.01	0.01	0.36	0.13	< 0.005	< 0.005	0.07	0.08	< 0.005	0.02	0.02	—	273	273	< 0.005	0.04	0.27	285
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.07	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	11.3	11.3	< 0.005	< 0.005	0.02	11.5
Vendor	< 0.005	< 0.005	0.06	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	45.2	45.2	< 0.005	0.01	0.04	47.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Pipeline Construction (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.62	5.43	7.66	0.01	0.15	—	0.15	0.13	—	0.13	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.62	5.43	7.66	0.01	0.15	—	0.15	0.13	—	0.13	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.54	0.45	3.89	5.48	0.01	0.11	—	0.11	0.10	—	0.10	—	840	840	0.03	0.01	—	843
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.08	0.71	1.00	< 0.005	0.02	—	0.02	0.02	—	0.02	—	139	139	0.01	< 0.005	—	140
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.24	0.22	0.13	2.46	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	398	398	0.01	0.02	1.31	405
Vendor	0.08	0.05	1.80	0.65	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,462	1,462	0.02	0.21	3.07	1,527
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.22	0.20	0.17	1.88	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	356	356	0.01	0.02	0.03	361
Vendor	0.07	0.05	1.93	0.67	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,463	1,463	0.02	0.21	0.08	1,526
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.16	0.15	0.11	1.40	0.00	0.00	0.27	0.27	0.00	0.06	0.06	—	263	263	0.01	0.01	0.40	267
Vendor	0.05	0.04	1.35	0.47	0.01	0.02	0.29	0.31	0.02	0.08	0.10	—	1,047	1,047	0.01	0.15	0.95	1,093
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.25	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	43.5	43.5	< 0.005	< 0.005	0.07	44.2
Vendor	0.01	0.01	0.25	0.09	< 0.005	< 0.005	0.05	0.06	< 0.005	0.01	0.02	—	173	173	< 0.005	0.02	0.16	181

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Pipeline Construction (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.72	0.60	5.31	7.64	0.01	0.13	—	0.13	0.12	—	0.12	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.72	0.60	5.31	7.64	0.01	0.13	—	0.13	0.12	—	0.12	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.34	0.28	2.50	3.60	0.01	0.06	—	0.06	0.06	—	0.06	—	553	553	0.02	< 0.005	—	555
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipm	0.06	0.05	0.46	0.66	< 0.005	0.01	—	0.01	0.01	—	0.01	—	91.6	91.6	< 0.005	< 0.005	—	91.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.12	2.26	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	390	390	0.01	0.02	1.18	396
Vendor	0.08	0.05	1.73	0.62	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,423	1,423	0.02	0.21	2.61	1,488
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.19	0.19	0.15	1.73	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	349	349	0.01	0.02	0.03	354
Vendor	0.07	0.05	1.84	0.65	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,424	1,424	0.02	0.21	0.07	1,487
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.09	0.06	0.85	0.00	0.00	0.18	0.18	0.00	0.04	0.04	—	170	170	< 0.005	0.01	0.24	172
Vendor	0.03	0.02	0.85	0.30	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	671	671	0.01	0.10	0.53	701
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.15	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	28.1	28.1	< 0.005	< 0.005	0.04	28.5
Vendor	0.01	< 0.005	0.15	0.05	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	111	111	< 0.005	0.02	0.09	116
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.69	0.58	5.26	7.62	0.01	0.19	—	0.19	0.17	—	0.17	—	1,170	1,170	0.05	0.01	—	1,174
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.1	48.1	< 0.005	< 0.005	—	48.2
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.96	7.96	< 0.005	< 0.005	—	7.99
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.08	0.07	0.04	0.79	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	137	137	< 0.005	0.01	0.41	139
Vendor	0.01	< 0.005	0.14	0.05	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	119	119	< 0.005	0.02	0.22	124
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.17	5.17	< 0.005	< 0.005	0.01	5.25
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.88	4.88	< 0.005	< 0.005	< 0.005	5.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.86	0.86	< 0.005	< 0.005	< 0.005	0.87
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	< 0.005	< 0.005	< 0.005	0.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Architectural Coating (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.10	0.79	1.11	< 0.005	0.01	—	0.01	0.01	—	0.01	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	0.31	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.10	0.79	1.11	< 0.005	0.01	—	0.01	0.01	—	0.01	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	0.31	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.0	11.0	< 0.005	< 0.005	—	11.0
Architectural Coatings	0.03	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.82	1.82	< 0.005	< 0.005	—	1.82
Architectural Coatings	< 0.005	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.23	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	39.0	39.0	< 0.005	< 0.005	0.12	39.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.17	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	34.9	34.9	< 0.005	< 0.005	< 0.005	35.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.95	2.95	< 0.005	< 0.005	< 0.005	3.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.49	0.49	< 0.005	< 0.005	< 0.005	0.50
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Prep/Grading	Grading	7/8/2027	9/29/2027	5.00	60.0	—
Pipeline Construction	Building Construction	9/30/2027	8/29/2029	5.00	500	—
Paving	Paving	8/30/2029	9/19/2029	5.00	15.0	—
Architectural Coating	Architectural Coating	9/20/2029	10/31/2029	5.00	30.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Prep/Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Site Prep/Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Prep/Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Site Prep/Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Site Prep/Grading	Trenchers	Diesel	Average	2.00	8.00	40.0	0.50
Pipeline Construction	Cranes	Diesel	Average	1.00	1.00	367	0.29
Pipeline Construction	Forklifts	Diesel	Average	1.00	5.00	82.0	0.20
Pipeline Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Pipeline Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	4.00	84.0	0.37
Pipeline Construction	Welders	Diesel	Average	2.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	7.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	7.00	36.0	0.38

Paving	Cement and Mortar Mixers	Diesel	Average	2.00	6.00	10.0	0.56
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Prep/Grading	—	—	—	—
Site Prep/Grading	Worker	20.0	10.9	LDA,LDT1,LDT2
Site Prep/Grading	Vendor	5.00	8.27	HHDT,MHDT
Site Prep/Grading	Hauling	37.9	20.0	HHDT
Site Prep/Grading	Onsite truck	—	—	HHDT
Pipeline Construction	—	—	—	—
Pipeline Construction	Worker	50.0	10.9	LDA,LDT1,LDT2
Pipeline Construction	Vendor	60.0	8.27	HHDT,MHDT
Pipeline Construction	Hauling	0.00	20.0	HHDT
Pipeline Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	17.5	10.9	LDA,LDT1,LDT2
Paving	Vendor	5.00	8.27	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	5.00	10.9	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.27	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	3,000	1,000	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Prep/Grading	—	18,185	86.0	0.00	—
Paving	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2027	0.00	453	0.03	< 0.005

2028	0.00	453	0.03	< 0.005
2029	0.00	453	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	25.1	annual days of extreme heat
Extreme Precipitation	1.90	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth

Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A

Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	72.5
AQ-PM	88.9
AQ-DPM	75.0
Drinking Water	62.8
Lead Risk Housing	88.3
Pesticides	51.6
Toxic Releases	15.4
Traffic	66.7
Effect Indicators	—
CleanUp Sites	58.5

Groundwater	95.2
Haz Waste Facilities/Generators	67.0
Impaired Water Bodies	23.9
Solid Waste	0.00
Sensitive Population	—
Asthma	97.1
Cardio-vascular	99.5
Low Birth Weights	95.2
Socioeconomic Factor Indicators	—
Education	72.9
Housing	88.3
Linguistic	53.4
Poverty	79.5
Unemployment	97.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	15.64224304
Employed	4.516874118
Median HI	4.504042089
Education	—
Bachelor's or higher	31.19466188
High school enrollment	100
Preschool enrollment	1.873476197
Transportation	—
Auto Access	4.18324137

Active commuting	30.89952521
Social	—
2-parent households	43.38508918
Voting	9.624021558
Neighborhood	—
Alcohol availability	53.49672783
Park access	46.72141666
Retail density	80.59797254
Supermarket access	75.45232901
Tree canopy	51.62325164
Housing	—
Homeownership	31.90042346
Housing habitability	60.51584756
Low-inc homeowner severe housing cost burden	85.02502246
Low-inc renter severe housing cost burden	50.78916977
Uncrowded housing	66.9190299
Health Outcomes	—
Insured adults	65.67432311
Arthritis	15.6
Asthma ER Admissions	0.5
High Blood Pressure	8.1
Cancer (excluding skin)	32.7
Asthma	19.7
Coronary Heart Disease	12.2
Chronic Obstructive Pulmonary Disease	13.3
Diagnosed Diabetes	29.7
Life Expectancy at Birth	10.9
Cognitively Disabled	4.9

Physically Disabled	3.3
Heart Attack ER Admissions	0.4
Mental Health Not Good	27.0
Chronic Kidney Disease	10.6
Obesity	17.5
Pedestrian Injuries	93.6
Physical Health Not Good	24.5
Stroke	17.3
Health Risk Behaviors	—
Binge Drinking	54.2
Current Smoker	24.8
No Leisure Time for Physical Activity	26.6
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	28.6
Elderly	32.8
English Speaking	52.8
Foreign-born	7.6
Outdoor Workers	86.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	68.3
Traffic Density	57.5
Traffic Access	0.0
Other Indices	—
Hardship	69.6
Other Decision Support	—
2016 Voting	28.8

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	98.0
Healthy Places Index Score for Project Location (b)	7.00
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	See AQ Memo for assumptions.
Land Use	See AQ Memo for assumptions.
Construction: Off-Road Equipment	See AQ Memo for assumptions.
Construction: Trips and VMT	See AQ Memo for assumptions.
Construction: Architectural Coatings	See AQ Memo for assumptions.
Operations: Fleet Mix	See AQ Memo for assumptions.
Operations: Refrigerants	See AQ Memo for assumptions.
Construction: Dust From Material Movement	See AQ Memo for assumptions

B.3 2022 WCSMP- SOUTH MERCED MAJOR SEWER IMPROVEMENT DETAILED REPORT

2022 WCSMP - South Merced Major Sewer Improvement Detailed Report

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7.6. Health & Equity Custom Measures

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	2022 WCSMP - South Merced Major Sewer Improvement
Construction Start Date	7/8/2027
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.80
Precipitation (days)	23.4
Location	37.30190428288776, -120.48696695622269
County	Merced
City	Merced
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2303
EDFZ	14
Electric Utility	Merced Irrigation District
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	1.00	1000sqft	2.50	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.41	2.03	17.8	21.4	0.04	0.70	7.49	8.19	0.65	3.53	4.18	—	4,430	4,430	0.15	0.24	4.90	4,488
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.08	0.91	7.80	10.4	0.02	0.19	0.80	0.99	0.18	0.20	0.38	—	3,036	3,036	0.08	0.24	0.13	3,111
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.75	0.63	5.35	7.35	0.02	0.15	1.37	1.52	0.14	0.62	0.76	—	2,150	2,150	0.05	0.17	1.35	2,203
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.14	0.11	0.98	1.34	< 0.005	0.03	0.25	0.28	0.03	0.11	0.14	—	356	356	0.01	0.03	0.22	365

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	2.41	2.03	17.8	21.4	0.04	0.70	7.49	8.19	0.65	3.53	4.18	—	4,430	4,430	0.15	0.24	4.90	4,488

2028	1.07	0.90	7.36	10.8	0.02	0.17	0.80	0.97	0.16	0.20	0.36	—	3,033	3,033	0.08	0.23	4.37	3,109
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	1.08	0.91	7.80	10.4	0.02	0.19	0.80	0.99	0.18	0.20	0.38	—	3,036	3,036	0.08	0.24	0.13	3,111
2028	1.04	0.87	7.53	10.2	0.02	0.17	0.80	0.97	0.16	0.20	0.36	—	2,992	2,992	0.08	0.23	0.11	3,064
2029	0.99	0.84	7.29	10.0	0.02	0.19	0.80	0.95	0.18	0.20	0.35	—	2,946	2,946	0.08	0.23	0.10	3,018
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.59	0.50	4.34	5.39	0.01	0.15	1.37	1.52	0.14	0.62	0.76	—	1,281	1,281	0.04	0.07	0.57	1,304
2028	0.75	0.63	5.35	7.35	0.02	0.12	0.56	0.69	0.11	0.14	0.26	—	2,150	2,150	0.05	0.17	1.35	2,203
2029	0.04	0.03	0.27	0.40	< 0.005	0.01	0.01	0.02	0.01	< 0.005	0.01	—	75.5	75.5	< 0.005	< 0.005	0.02	76.4
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.11	0.09	0.79	0.98	< 0.005	0.03	0.25	0.28	0.03	0.11	0.14	—	212	212	0.01	0.01	0.09	216
2028	0.14	0.11	0.98	1.34	< 0.005	0.02	0.10	0.13	0.02	0.03	0.05	—	356	356	0.01	0.03	0.22	365
2029	0.01	0.01	0.05	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	12.5	12.5	< 0.005	< 0.005	< 0.005	12.6

3. Construction Emissions Details

3.1. Site Prep/Grading (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.28	1.92	16.7	20.1	0.03	0.68	—	0.68	0.63	—	0.63	—	3,375	3,375	0.14	0.03	—	3,387

Dust From Material Movement	—	—	—	—	—	—	7.09	7.09	—	3.43	3.43	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.37	0.31	2.74	3.30	0.01	0.11	—	0.11	0.10	—	0.10	—	555	555	0.02	< 0.005	—	557
Dust From Material Movement	—	—	—	—	—	—	1.17	1.17	—	0.56	0.56	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.50	0.60	< 0.005	0.02	—	0.02	0.02	—	0.02	—	91.9	91.9	< 0.005	< 0.005	—	92.2
Dust From Material Movement	—	—	—	—	—	—	0.21	0.21	—	0.10	0.10	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	0.06	1.07	0.00	0.00	0.15	0.15	0.00	0.04	0.04	—	163	163	0.01	0.01	0.58	165

Vendor	0.01	< 0.005	0.16	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	125	125	< 0.005	0.02	0.29	131
Hauling	0.02	0.01	0.91	0.20	0.01	0.02	0.22	0.23	0.02	0.06	0.07	—	768	768	0.01	0.12	1.73	806
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.01	0.14	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	24.6	24.6	< 0.005	< 0.005	0.04	25.0
Vendor	< 0.005	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	20.5	20.5	< 0.005	< 0.005	0.02	21.4
Hauling	< 0.005	< 0.005	0.16	0.03	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	126	126	< 0.005	0.02	0.12	132
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.07	4.07	< 0.005	< 0.005	0.01	4.14
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.40	3.40	< 0.005	< 0.005	< 0.005	3.55
Hauling	< 0.005	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	20.9	20.9	< 0.005	< 0.005	0.02	21.9

3.3. Pipeline Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.78	0.65	5.60	7.67	0.01	0.17	—	0.17	0.15	—	0.15	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.78	0.65	5.60	7.67	0.01	0.17	—	0.17	0.15	—	0.15	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.02	1.40	< 0.005	0.03	—	0.03	0.03	—	0.03	—	214	214	0.01	< 0.005	—	214
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.19	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	—	35.4	35.4	< 0.005	< 0.005	—	35.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.25	0.24	0.15	2.68	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	406	406	0.02	0.02	1.44	413
Vendor	0.08	0.05	1.89	0.69	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,498	1,498	0.02	0.22	3.46	1,567
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	2.05	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	363	363	0.01	0.02	0.04	368
Vendor	0.07	0.05	2.01	0.70	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,500	1,500	0.02	0.22	0.09	1,565
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.04	0.04	0.03	0.39	0.00	0.00	0.07	0.07	0.00	0.02	0.02	—	68.1	68.1	< 0.005	< 0.005	0.11	69.2
Vendor	0.01	0.01	0.36	0.13	< 0.005	< 0.005	0.07	0.08	< 0.005	0.02	0.02	—	273	273	< 0.005	0.04	0.27	285
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.07	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	11.3	11.3	< 0.005	< 0.005	0.02	11.5
Vendor	< 0.005	< 0.005	0.06	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	45.2	45.2	< 0.005	0.01	0.04	47.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Pipeline Construction (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.62	5.43	7.66	0.01	0.15	—	0.15	0.13	—	0.13	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.75	0.62	5.43	7.66	0.01	0.15	—	0.15	0.13	—	0.13	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.54	0.45	3.89	5.48	0.01	0.11	—	0.11	0.10	—	0.10	—	840	840	0.03	0.01	—	843
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.08	0.71	1.00	< 0.005	0.02	—	0.02	0.02	—	0.02	—	139	139	0.01	< 0.005	—	140
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.24	0.22	0.13	2.46	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	398	398	0.01	0.02	1.31	405
Vendor	0.08	0.05	1.80	0.65	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,462	1,462	0.02	0.21	3.07	1,527
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.22	0.20	0.17	1.88	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	356	356	0.01	0.02	0.03	361
Vendor	0.07	0.05	1.93	0.67	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,463	1,463	0.02	0.21	0.08	1,526
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.16	0.15	0.11	1.40	0.00	0.00	0.27	0.27	0.00	0.06	0.06	—	263	263	0.01	0.01	0.40	267
Vendor	0.05	0.04	1.35	0.47	0.01	0.02	0.29	0.31	0.02	0.08	0.10	—	1,047	1,047	0.01	0.15	0.95	1,093
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.25	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	43.5	43.5	< 0.005	< 0.005	0.07	44.2
Vendor	0.01	0.01	0.25	0.09	< 0.005	< 0.005	0.05	0.06	< 0.005	0.01	0.02	—	173	173	< 0.005	0.02	0.16	181

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Pipeline Construction (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.72	0.60	5.31	7.64	0.01	0.13	—	0.13	0.12	—	0.12	—	1,173	1,173	0.05	0.01	—	1,177
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.89	6.89	< 0.005	< 0.005	—	6.91
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.14	1.14	< 0.005	< 0.005	—	1.14
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.19	0.19	0.15	1.73	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	349	349	0.01	0.02	0.03	354
Vendor	0.07	0.05	1.84	0.65	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,424	1,424	0.02	0.21	0.07	1,487
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.11	2.11	< 0.005	< 0.005	< 0.005	2.14
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	8.36	8.36	< 0.005	< 0.005	0.01	8.73
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.35	0.35	< 0.005	< 0.005	< 0.005	0.35
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.38	1.38	< 0.005	< 0.005	< 0.005	1.45
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2029) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.69	0.58	5.26	7.62	0.01	0.19	—	0.19	0.17	—	0.17	—	1,170	1,170	0.05	0.01	—	1,174
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.31	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.1	48.1	< 0.005	< 0.005	—	48.2
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	< 0.005	0.04	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.96	7.96	< 0.005	< 0.005	—	7.99
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.05	0.61	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	122	122	< 0.005	0.01	0.01	124
Vendor	0.01	< 0.005	0.15	0.05	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	119	119	< 0.005	0.02	0.01	124
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.17	5.17	< 0.005	< 0.005	0.01	5.25
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.88	4.88	< 0.005	< 0.005	< 0.005	5.09
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.86	0.86	< 0.005	< 0.005	< 0.005	0.87
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	< 0.005	< 0.005	< 0.005	0.84
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Prep/Grading	Grading	7/8/2027	9/29/2027	5.00	60.0	—
Pipeline Construction	Building Construction	9/30/2027	1/3/2029	5.00	330	—
Paving	Paving	1/4/2029	1/24/2029	5.00	15.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Prep/Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Prep/Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Site Prep/Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Site Prep/Grading	Trenchers	Diesel	Average	2.00	8.00	40.0	0.50
Site Prep/Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Pipeline Construction	Cranes	Diesel	Average	1.00	1.00	367	0.29
Pipeline Construction	Forklifts	Diesel	Average	1.00	5.00	82.0	0.20
Pipeline Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Pipeline Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	4.00	84.0	0.37
Pipeline Construction	Welders	Diesel	Average	2.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	7.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	7.00	36.0	0.38
Paving	Cement and Mortar Mixers	Diesel	Average	2.00	6.00	10.0	0.56

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Prep/Grading	—	—	—	—
Site Prep/Grading	Worker	20.0	10.9	LDA,LDT1,LDT2
Site Prep/Grading	Vendor	5.00	8.27	HHDT,MHDT
Site Prep/Grading	Hauling	11.6	20.0	HHDT
Site Prep/Grading	Onsite truck	—	—	HHDT

Pipeline Construction	—	—	—	—
Pipeline Construction	Worker	50.0	10.9	LDA,LDT1,LDT2
Pipeline Construction	Vendor	60.0	8.27	HHDT,MHDT
Pipeline Construction	Hauling	0.00	20.0	HHDT
Pipeline Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	17.5	10.9	LDA,LDT1,LDT2
Paving	Vendor	5.00	8.27	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Prep/Grading	—	5,568	86.0	0.00	—
Paving	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2027	0.00	453	0.03	< 0.005
2028	0.00	453	0.03	< 0.005
2029	0.00	453	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	25.1	annual days of extreme heat
Extreme Precipitation	1.90	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	72.5

AQ-PM	88.9
AQ-DPM	75.0
Drinking Water	62.8
Lead Risk Housing	88.3
Pesticides	51.6
Toxic Releases	15.4
Traffic	66.7
Effect Indicators	—
CleanUp Sites	58.5
Groundwater	95.2
Haz Waste Facilities/Generators	67.0
Impaired Water Bodies	23.9
Solid Waste	0.00
Sensitive Population	—
Asthma	97.1
Cardio-vascular	99.5
Low Birth Weights	95.2
Socioeconomic Factor Indicators	—
Education	72.9
Housing	88.3
Linguistic	53.4
Poverty	79.5
Unemployment	97.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—

Above Poverty	15.64224304
Employed	4.516874118
Median HI	4.504042089
Education	—
Bachelor's or higher	31.19466188
High school enrollment	100
Preschool enrollment	1.873476197
Transportation	—
Auto Access	4.18324137
Active commuting	30.89952521
Social	—
2-parent households	43.38508918
Voting	9.624021558
Neighborhood	—
Alcohol availability	53.49672783
Park access	46.72141666
Retail density	80.59797254
Supermarket access	75.45232901
Tree canopy	51.62325164
Housing	—
Homeownership	31.90042346
Housing habitability	60.51584756
Low-inc homeowner severe housing cost burden	85.02502246
Low-inc renter severe housing cost burden	50.78916977
Uncrowded housing	66.9190299
Health Outcomes	—
Insured adults	65.67432311
Arthritis	15.6

Asthma ER Admissions	0.5
High Blood Pressure	8.1
Cancer (excluding skin)	32.7
Asthma	19.7
Coronary Heart Disease	12.2
Chronic Obstructive Pulmonary Disease	13.3
Diagnosed Diabetes	29.7
Life Expectancy at Birth	10.9
Cognitively Disabled	4.9
Physically Disabled	3.3
Heart Attack ER Admissions	0.4
Mental Health Not Good	27.0
Chronic Kidney Disease	10.6
Obesity	17.5
Pedestrian Injuries	93.6
Physical Health Not Good	24.5
Stroke	17.3
Health Risk Behaviors	—
Binge Drinking	54.2
Current Smoker	24.8
No Leisure Time for Physical Activity	26.6
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	28.6
Elderly	32.8
English Speaking	52.8
Foreign-born	7.6

Outdoor Workers	86.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	68.3
Traffic Density	57.5
Traffic Access	0.0
Other Indices	—
Hardship	69.6
Other Decision Support	—
2016 Voting	28.8

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	98.0
Healthy Places Index Score for Project Location (b)	7.00
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	See AQ Memo for assumptions.
Land Use	See AQ Memo for assumptions.
Construction: Off-Road Equipment	See AQ Memo for assumptions.
Construction: Trips and VMT	See AQ Memo for assumptions.
Construction: Architectural Coatings	See AQ Memo for assumptions.
Operations: Fleet Mix	See AQ Memo for assumptions.
Operations: Refrigerants	See AQ Memo for assumptions.
Construction: Dust From Material Movement	See AQ Memo for assumptions

B.4 2022 WCSMP- INTERIM SYSTEM IMPROVEMENTS DETAILED REPORT

2022 WCSMP - Interim System Improvements Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	2022 WCSMP - Interim System Improvements
Construction Start Date	1/1/2026
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.80
Precipitation (days)	23.4
Location	37.30190428288776, -120.48696695622269
County	Merced
City	Merced
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2303
EDFZ	14
Electric Utility	Merced Irrigation District
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	1.00	1000sqft	4.16	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.54	2.13	19.0	21.8	0.04	0.77	7.59	8.35	0.71	3.56	4.27	—	4,787	4,787	0.16	0.26	5.49	4,864
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.52	2.12	19.1	21.5	0.04	0.77	7.59	8.35	0.71	3.56	4.27	—	4,770	4,770	0.16	0.26	0.14	4,843
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.47	1.23	10.9	13.5	0.03	0.39	2.16	2.55	0.36	0.93	1.29	—	3,292	3,292	0.11	0.18	1.50	3,349
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.27	0.22	1.99	2.47	< 0.005	0.07	0.39	0.47	0.07	0.17	0.24	—	545	545	0.02	0.03	0.25	554

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	2.54	2.13	19.0	21.8	0.04	0.77	7.59	8.35	0.71	3.56	4.27	—	4,787	4,787	0.16	0.26	5.49	4,864

2027	1.75	1.48	12.7	17.9	0.04	0.39	0.80	1.19	0.36	0.20	0.56	—	4,509	4,509	0.15	0.26	4.90	4,594
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	2.52	2.12	19.1	21.5	0.04	0.77	7.59	8.35	0.71	3.56	4.27	—	4,770	4,770	0.16	0.26	0.14	4,843
2027	1.72	1.45	12.9	17.3	0.04	0.39	0.80	1.19	0.36	0.20	0.56	—	4,467	4,467	0.14	0.26	0.13	4,547
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	1.47	1.23	10.9	13.5	0.03	0.39	2.16	2.55	0.36	0.93	1.29	—	3,292	3,292	0.11	0.18	1.50	3,349
2027	0.51	0.43	3.71	5.23	0.01	0.12	0.20	0.32	0.11	0.05	0.16	—	1,209	1,209	0.04	0.06	0.51	1,228
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.27	0.22	1.99	2.47	< 0.005	0.07	0.39	0.47	0.07	0.17	0.24	—	545	545	0.02	0.03	0.25	554
2027	0.09	0.08	0.68	0.95	< 0.005	0.02	0.04	0.06	0.02	0.01	0.03	—	200	200	0.01	0.01	0.08	203

3. Construction Emissions Details

3.1. Site Prep/Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.38	2.00	17.5	20.3	0.03	0.75	—	0.75	0.69	—	0.69	—	3,375	3,375	0.14	0.03	—	3,386
Dust From Material Movement	—	—	—	—	—	—	7.09	7.09	—	3.43	3.43	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.38	2.00	17.5	20.3	0.03	0.75	—	0.75	0.69	—	0.69	—	3,375	3,375	0.14	0.03	—	3,386
Dust From Material Movement	—	—	—	—	—	—	7.09	7.09	—	3.43	3.43	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.56	0.47	4.12	4.78	0.01	0.18	—	0.18	0.16	—	0.16	—	795	795	0.03	0.01	—	798
Dust From Material Movement	—	—	—	—	—	—	1.67	1.67	—	0.81	0.81	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.09	0.75	0.87	< 0.005	0.03	—	0.03	0.03	—	0.03	—	132	132	0.01	< 0.005	—	132
Dust From Material Movement	—	—	—	—	—	—	0.30	0.30	—	0.15	0.15	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.11	0.11	0.07	1.16	0.00	0.00	0.15	0.15	0.00	0.04	0.04	—	167	167	0.01	0.01	0.63	170
Vendor	0.01	< 0.005	0.16	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	127	127	< 0.005	0.02	0.33	133
Hauling	0.04	0.02	1.32	0.29	0.01	0.02	0.31	0.33	0.02	0.08	0.11	—	1,118	1,118	0.01	0.18	2.66	1,175
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.09	0.89	0.00	0.00	0.15	0.15	0.00	0.04	0.04	—	149	149	0.01	0.01	0.02	151
Vendor	0.01	< 0.005	0.17	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	128	128	< 0.005	0.02	0.01	133
Hauling	0.04	0.02	1.41	0.29	0.01	0.02	0.31	0.33	0.02	0.08	0.11	—	1,119	1,119	0.01	0.18	0.07	1,173
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	36.2	36.2	< 0.005	< 0.005	0.06	36.8
Vendor	< 0.005	< 0.005	0.04	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	30.1	30.1	< 0.005	< 0.005	0.03	31.4
Hauling	0.01	< 0.005	0.33	0.07	< 0.005	0.01	0.07	0.08	0.01	0.02	0.02	—	264	264	< 0.005	0.04	0.27	277
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.99	5.99	< 0.005	< 0.005	0.01	6.09
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.98	4.98	< 0.005	< 0.005	0.01	5.19
Hauling	< 0.005	< 0.005	0.06	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	43.6	43.6	< 0.005	0.01	0.04	45.8

3.3. Pipeline Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	1.49	1.24	11.2	14.6	0.03	0.41	—	0.41	0.38	—	0.38	—	2,605	2,605	0.11	0.02	—	2,614
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.49	1.24	11.2	14.6	0.03	0.41	—	0.41	0.38	—	0.38	—	2,605	2,605	0.11	0.02	—	2,614
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.71	0.59	5.35	7.00	0.01	0.20	—	0.20	0.18	—	0.18	—	1,249	1,249	0.05	0.01	—	1,253
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.11	0.98	1.28	< 0.005	0.04	—	0.04	0.03	—	0.03	—	207	207	0.01	< 0.005	—	207
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.28	0.26	0.17	2.90	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	417	417	0.02	0.02	1.58	424
Vendor	0.09	0.05	1.97	0.74	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,530	1,530	0.02	0.22	3.91	1,599
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.24	0.22	0.22	2.21	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	372	372	0.03	0.02	0.04	378
Vendor	0.08	0.05	2.10	0.75	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,532	1,532	0.02	0.22	0.10	1,597
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.12	0.11	0.09	1.10	0.00	0.00	0.18	0.18	0.00	0.04	0.04	—	184	184	0.01	0.01	0.33	187
Vendor	0.04	0.03	0.98	0.35	0.01	0.01	0.20	0.21	0.01	0.05	0.06	—	734	734	0.01	0.10	0.81	766
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.20	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	30.5	30.5	< 0.005	< 0.005	0.05	31.0
Vendor	0.01	< 0.005	0.18	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	122	122	< 0.005	0.02	0.13	127
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Pipeline Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.42	1.19	10.7	14.6	0.03	0.37	—	0.37	0.34	—	0.34	—	2,605	2,605	0.11	0.02	—	2,613
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.42	1.19	10.7	14.6	0.03	0.37	—	0.37	0.34	—	0.34	—	2,605	2,605	0.11	0.02	—	2,613
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	0.25	2.27	3.11	0.01	0.08	—	0.08	0.07	—	0.07	—	556	556	0.02	< 0.005	—	557
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.41	0.57	< 0.005	0.01	—	0.01	0.01	—	0.01	—	92.0	92.0	< 0.005	< 0.005	—	92.3
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.25	0.24	0.15	2.68	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	406	406	0.02	0.02	1.44	413
Vendor	0.08	0.05	1.89	0.69	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,498	1,498	0.02	0.22	3.46	1,567
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	2.05	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	363	363	0.01	0.02	0.04	368
Vendor	0.07	0.05	2.01	0.70	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,500	1,500	0.02	0.22	0.09	1,565
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.05	0.05	0.04	0.45	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	79.8	79.8	< 0.005	< 0.005	0.13	81.1
Vendor	0.02	0.01	0.42	0.15	< 0.005	< 0.005	0.09	0.09	< 0.005	0.02	0.03	—	320	320	< 0.005	0.05	0.32	334
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.08	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	13.2	13.2	< 0.005	< 0.005	0.02	13.4
Vendor	< 0.005	< 0.005	0.08	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	52.9	52.9	< 0.005	0.01	0.05	55.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.79	0.66	6.09	8.83	0.01	0.24	—	0.24	0.22	—	0.22	—	1,350	1,350	0.05	0.01	—	1,355
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.10	0.95	1.38	< 0.005	0.04	—	0.04	0.03	—	0.03	—	211	211	0.01	< 0.005	—	212
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.17	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	—	34.9	34.9	< 0.005	< 0.005	—	35.0
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	0.06	1.07	0.00	0.00	0.15	0.15	0.00	0.04	0.04	—	163	163	0.01	0.01	0.58	165
Vendor	0.01	< 0.005	0.16	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	125	125	< 0.005	0.02	0.29	131
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.13	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	23.4	23.4	< 0.005	< 0.005	0.04	23.8
Vendor	< 0.005	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	19.5	19.5	< 0.005	< 0.005	0.02	20.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.87	3.87	< 0.005	< 0.005	0.01	3.93
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.23	3.23	< 0.005	< 0.005	< 0.005	3.37
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Prep/Grading	Grading	1/1/2026	4/30/2026	5.00	86.0	—
Pipeline Construction	Building Construction	5/1/2026	4/19/2027	5.00	252	—
Paving	Paving	4/20/2027	7/7/2027	5.00	57.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Prep/Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Site Prep/Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Prep/Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Site Prep/Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Site Prep/Grading	Trenchers	Diesel	Average	2.00	8.00	40.0	0.50
Pipeline Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Pipeline Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20
Pipeline Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74

Pipeline Construction	Tractors/Loaders/Back	Diesel	Average	3.00	7.00	84.0	0.37
Pipeline Construction	Welders	Diesel	Average	2.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	6.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	6.00	36.0	0.38
Paving	Cement and Mortar Mixers	Diesel	Average	2.00	6.00	10.0	0.56
Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Prep/Grading	—	—	—	—
Site Prep/Grading	Worker	20.0	10.9	LDA,LDT1,LDT2
Site Prep/Grading	Vendor	5.00	8.27	HHDT,MHDT
Site Prep/Grading	Hauling	16.5	20.0	HHDT
Site Prep/Grading	Onsite truck	—	—	HHDT
Pipeline Construction	—	—	—	—
Pipeline Construction	Worker	50.0	10.9	LDA,LDT1,LDT2
Pipeline Construction	Vendor	60.0	8.27	HHDT,MHDT
Pipeline Construction	Hauling	0.00	20.0	HHDT
Pipeline Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	20.0	10.9	LDA,LDT1,LDT2
Paving	Vendor	5.00	8.27	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Prep/Grading	—	11,362	86.0	0.00	—
Paving	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	453	0.03	< 0.005
2027	0.00	453	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	25.1	annual days of extreme heat
Extreme Precipitation	1.90	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A

Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	72.5
AQ-PM	88.9
AQ-DPM	75.0
Drinking Water	62.8
Lead Risk Housing	88.3
Pesticides	51.6
Toxic Releases	15.4
Traffic	66.7
Effect Indicators	—
CleanUp Sites	58.5
Groundwater	95.2

Haz Waste Facilities/Generators	67.0
Impaired Water Bodies	23.9
Solid Waste	0.00
Sensitive Population	—
Asthma	97.1
Cardio-vascular	99.5
Low Birth Weights	95.2
Socioeconomic Factor Indicators	—
Education	72.9
Housing	88.3
Linguistic	53.4
Poverty	79.5
Unemployment	97.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	15.64224304
Employed	4.516874118
Median HI	4.504042089
Education	—
Bachelor's or higher	31.19466188
High school enrollment	100
Preschool enrollment	1.873476197
Transportation	—
Auto Access	4.18324137
Active commuting	30.89952521

Social	—
2-parent households	43.38508918
Voting	9.624021558
Neighborhood	—
Alcohol availability	53.49672783
Park access	46.72141666
Retail density	80.59797254
Supermarket access	75.45232901
Tree canopy	51.62325164
Housing	—
Homeownership	31.90042346
Housing habitability	60.51584756
Low-inc homeowner severe housing cost burden	85.02502246
Low-inc renter severe housing cost burden	50.78916977
Uncrowded housing	66.9190299
Health Outcomes	—
Insured adults	65.67432311
Arthritis	15.6
Asthma ER Admissions	0.5
High Blood Pressure	8.1
Cancer (excluding skin)	32.7
Asthma	19.7
Coronary Heart Disease	12.2
Chronic Obstructive Pulmonary Disease	13.3
Diagnosed Diabetes	29.7
Life Expectancy at Birth	10.9
Cognitively Disabled	4.9
Physically Disabled	3.3

Heart Attack ER Admissions	0.4
Mental Health Not Good	27.0
Chronic Kidney Disease	10.6
Obesity	17.5
Pedestrian Injuries	93.6
Physical Health Not Good	24.5
Stroke	17.3
Health Risk Behaviors	—
Binge Drinking	54.2
Current Smoker	24.8
No Leisure Time for Physical Activity	26.6
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	28.6
Elderly	32.8
English Speaking	52.8
Foreign-born	7.6
Outdoor Workers	86.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	68.3
Traffic Density	57.5
Traffic Access	0.0
Other Indices	—
Hardship	69.6
Other Decision Support	—
2016 Voting	28.8

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	98.0
Healthy Places Index Score for Project Location (b)	7.00
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	See AQ Memo for assumptions.
Land Use	See AQ Memo for assumptions.
Construction: Off-Road Equipment	See AQ Memo for assumptions.
Construction: Trips and VMT	See AQ Memo for assumptions.
Construction: Architectural Coatings	See AQ Memo for assumptions.
Operations: Fleet Mix	See AQ Memo for assumptions.
Operations: Refrigerants	See AQ Memo for assumptions.

B.5 2022 WCSMP- WWTF IMPROVEMENTS (3- TO 4-MGAL/D) DETAILED REPORT

2022 WCSMP - WWTF Improvements (3- to 4-Mgal/d) Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	2022 WCSMP - WWTF Improvements (3- to 4-Mgal/d)
Construction Start Date	1/1/2026
Operational Year	2030
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.80
Precipitation (days)	23.4
Location	37.30190428288776, -120.48696695622269
County	Merced
City	Merced
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2303
EDFZ	14
Electric Utility	Merced Irrigation District
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.26

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	50.0	1000sqft	22.5	50,000	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.85	0.72	5.95	7.18	0.02	0.24	2.19	2.43	0.22	0.92	1.14	—	2,512	2,512	0.06	0.26	5.79	2,596
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.83	0.71	5.97	6.98	0.02	0.24	2.19	2.43	0.22	0.92	1.14	—	2,469	2,469	0.06	0.26	0.15	2,548
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.50	0.42	3.56	4.25	0.01	0.11	0.92	1.03	0.10	0.33	0.43	—	1,540	1,540	0.04	0.13	1.26	1,581
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.09	0.08	0.65	0.78	< 0.005	0.02	0.17	0.19	0.02	0.06	0.08	—	255	255	0.01	0.02	0.21	262

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.85	0.72	5.95	7.18	0.02	0.24	2.19	2.43	0.22	0.92	1.14	—	2,512	2,512	0.06	0.26	5.79	2,596

2027	0.61	0.52	4.19	6.46	0.02	0.16	0.83	0.93	0.15	0.21	0.31	—	2,466	2,466	0.06	0.26	5.18	2,550
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.83	0.71	5.97	6.98	0.02	0.24	2.19	2.43	0.22	0.92	1.14	—	2,469	2,469	0.06	0.26	0.15	2,548
2027	0.58	0.49	4.36	5.10	0.02	0.10	0.83	0.93	0.09	0.21	0.31	—	2,424	2,424	0.05	0.26	0.13	2,503
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.50	0.42	3.56	4.25	0.01	0.11	0.92	1.03	0.10	0.33	0.43	—	1,540	1,540	0.04	0.13	1.26	1,581
2027	0.31	0.27	2.14	2.90	0.01	0.06	0.24	0.30	0.06	0.06	0.12	—	871	871	0.03	0.07	0.63	894
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.09	0.08	0.65	0.78	< 0.005	0.02	0.17	0.19	0.02	0.06	0.08	—	255	255	0.01	0.02	0.21	262
2027	0.06	0.05	0.39	0.53	< 0.005	0.01	0.04	0.05	0.01	0.01	0.02	—	144	144	< 0.005	0.01	0.10	148

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	53.5	48.8	133	123	0.23	7.00	0.07	7.07	7.00	0.02	7.02	55.6	25,673	25,728	6.69	0.29	0.43	25,981
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	53.1	48.4	133	121	0.23	6.99	0.07	7.06	6.99	0.02	7.01	55.6	25,664	25,720	6.69	0.29	0.01	25,972
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.98	1.88	2.27	2.90	0.01	0.12	0.07	0.19	0.12	0.02	0.14	55.6	1,766	1,822	5.73	0.10	0.19	1,995
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.36	0.34	0.41	0.53	< 0.005	0.02	0.01	0.03	0.02	< 0.005	0.03	9.20	292	302	0.95	0.02	0.03	330

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01	< 0.005	0.24	0.04	< 0.005	< 0.005	0.07	0.07	< 0.005	0.02	0.02	—	226	226	< 0.005	0.04	0.43	237
Area	1.52	1.49	0.02	2.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.94	8.94	< 0.005	< 0.005	—	8.97
Energy	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	1,213	1,213	0.10	0.01	—	1,218
Water	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Waste	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Stationary	51.9	47.3	132	121	0.23	6.95	0.00	6.95	6.95	0.00	6.95	0.00	24,178	24,178	0.97	0.19	0.00	24,259
Total	53.5	48.8	133	123	0.23	7.00	0.07	7.07	7.00	0.02	7.02	55.6	25,673	25,728	6.69	0.29	0.43	25,981
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01	< 0.005	0.26	0.04	< 0.005	< 0.005	0.07	0.07	< 0.005	0.02	0.02	—	226	226	< 0.005	0.04	0.01	237
Area	1.13	1.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	1,213	1,213	0.10	0.01	—	1,218
Water	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Waste	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Stationary	51.9	47.3	132	121	0.23	6.95	0.00	6.95	6.95	0.00	6.95	0.00	24,178	24,178	0.97	0.19	0.00	24,259
Total	53.1	48.4	133	121	0.23	6.99	0.07	7.06	6.99	0.02	7.01	55.6	25,664	25,720	6.69	0.29	0.01	25,972
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01	< 0.005	0.25	0.04	< 0.005	< 0.005	0.07	0.07	< 0.005	0.02	0.02	—	226	226	< 0.005	0.04	0.19	237
Area	1.32	1.31	0.01	1.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	4.41	4.41	< 0.005	< 0.005	—	4.43
Energy	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	1,213	1,213	0.10	0.01	—	1,218

Water	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Waste	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Stationary	0.59	0.54	1.51	1.38	< 0.005	0.08	0.00	0.08	0.08	0.00	0.08	0.00	276	276	0.01	< 0.005	0.00	277
Total	1.98	1.88	2.27	2.90	0.01	0.12	0.07	0.19	0.12	0.02	0.14	55.6	1,766	1,822	5.73	0.10	0.19	1,995
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	< 0.005	< 0.005	0.05	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	37.4	37.4	< 0.005	0.01	0.03	39.2
Area	0.24	0.24	< 0.005	0.20	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.73	0.73	< 0.005	< 0.005	—	0.73
Energy	0.01	< 0.005	0.09	0.08	< 0.005	0.01	—	0.01	0.01	—	0.01	—	201	201	0.02	< 0.005	—	202
Water	—	—	—	—	—	—	—	—	—	—	—	3.67	7.75	11.4	0.38	0.01	—	23.5
Waste	—	—	—	—	—	—	—	—	—	—	—	5.53	0.00	5.53	0.55	0.00	—	19.4
Stationary	0.11	0.10	0.28	0.25	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	45.7	45.7	< 0.005	< 0.005	0.00	45.8
Total	0.36	0.34	0.41	0.53	< 0.005	0.02	0.01	0.03	0.02	< 0.005	0.03	9.20	292	302	0.95	0.02	0.03	330

3. Construction Emissions Details

3.1. Site Prep/Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.76	0.63	5.71	6.25	0.01	0.23	—	0.23	0.22	—	0.22	—	1,284	1,284	0.05	0.01	—	1,289
Dust From Material Movement	—	—	—	—	—	—	2.04	2.04	—	0.88	0.88	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.76	0.63	5.71	6.25	0.01	0.23	—	0.23	0.22	—	0.22	—	1,284	1,284	0.05	0.01	—	1,289
Dust From Material Movement	—	—	—	—	—	—	2.04	2.04	—	0.88	0.88	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	0.16	1.41	1.54	< 0.005	0.06	—	0.06	0.05	—	0.05	—	317	317	0.01	< 0.005	—	318
Dust From Material Movement	—	—	—	—	—	—	0.50	0.50	—	0.22	0.22	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.26	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	52.4	52.4	< 0.005	< 0.005	—	52.6
Dust From Material Movement	—	—	—	—	—	—	0.09	0.09	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	0.05	0.87	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	125	125	0.01	< 0.005	0.47	127
Vendor	0.01	< 0.005	0.16	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	127	127	< 0.005	0.02	0.33	133
Hauling	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	15.0	15.0	< 0.005	< 0.005	0.04	15.8
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.06	0.66	0.00	0.00	0.11	0.11	0.00	0.03	0.03	—	112	112	0.01	< 0.005	0.01	113
Vendor	0.01	< 0.005	0.17	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	128	128	< 0.005	0.02	0.01	133
Hauling	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	15.0	15.0	< 0.005	< 0.005	< 0.005	15.8
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.01	0.17	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	28.4	28.4	< 0.005	< 0.005	0.05	28.9
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.5	31.5	< 0.005	< 0.005	0.03	32.8
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.71	3.71	< 0.005	< 0.005	< 0.005	3.89
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	4.70	4.70	< 0.005	< 0.005	0.01	4.78
Vendor	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.21	5.21	< 0.005	< 0.005	0.01	5.44
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.61	0.61	< 0.005	< 0.005	< 0.005	0.64

3.3. Facility Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.28	0.23	2.07	2.32	< 0.005	0.08	—	0.08	0.07	—	0.07	—	437	437	0.02	< 0.005	—	438
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.28	0.23	2.07	2.32	< 0.005	0.08	—	0.08	0.07	—	0.07	—	437	437	0.02	< 0.005	—	438
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.11	0.97	1.09	< 0.005	0.04	—	0.04	0.03	—	0.03	—	204	204	0.01	< 0.005	—	205
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.18	0.20	< 0.005	0.01	—	0.01	0.01	—	0.01	—	33.8	33.8	< 0.005	< 0.005	—	33.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.28	0.26	0.17	2.90	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	417	417	0.02	0.02	1.58	424
Vendor	0.09	0.05	1.97	0.74	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,530	1,530	0.02	0.22	3.91	1,599
Hauling	< 0.005	< 0.005	0.15	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	128	128	< 0.005	0.02	0.30	134

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.24	0.22	0.22	2.21	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	372	372	0.03	0.02	0.04	378
Vendor	0.08	0.05	2.10	0.75	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,532	1,532	0.02	0.22	0.10	1,597
Hauling	< 0.005	< 0.005	0.16	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	128	128	< 0.005	0.02	0.01	134
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.12	0.11	0.09	1.08	0.00	0.00	0.18	0.18	0.00	0.04	0.04	—	180	180	0.01	0.01	0.32	183
Vendor	0.04	0.02	0.96	0.34	0.01	0.01	0.19	0.20	0.01	0.05	0.06	—	716	716	0.01	0.10	0.79	747
Hauling	< 0.005	< 0.005	0.07	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	59.9	59.9	< 0.005	0.01	0.06	62.8
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.20	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	29.7	29.7	< 0.005	< 0.005	0.05	30.2
Vendor	0.01	< 0.005	0.18	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	119	119	< 0.005	0.02	0.13	124
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.91	9.91	< 0.005	< 0.005	0.01	10.4

3.5. Facility Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.27	0.23	2.01	2.32	< 0.005	0.07	—	0.07	0.07	—	0.07	—	437	437	0.02	< 0.005	—	438
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.27	0.23	2.01	2.32	< 0.005	0.07	—	0.07	0.07	—	0.07	—	437	437	0.02	< 0.005	—	438
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.51	0.59	< 0.005	0.02	—	0.02	0.02	—	0.02	—	112	112	< 0.005	< 0.005	—	112
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.09	0.11	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	18.5	18.5	< 0.005	< 0.005	—	18.6
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.25	0.24	0.15	2.68	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	406	406	0.02	0.02	1.44	413
Vendor	0.08	0.05	1.89	0.69	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,498	1,498	0.02	0.22	3.46	1,567
Hauling	< 0.005	< 0.005	0.15	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	125	125	< 0.005	0.02	0.28	131
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.23	0.21	0.19	2.05	0.00	0.00	0.38	0.38	0.00	0.09	0.09	—	363	363	0.01	0.02	0.04	368
Vendor	0.07	0.05	2.01	0.70	0.01	0.02	0.42	0.44	0.02	0.11	0.14	—	1,500	1,500	0.02	0.22	0.09	1,565
Hauling	< 0.005	< 0.005	0.16	0.03	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	125	125	< 0.005	0.02	0.01	131
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.06	0.06	0.04	0.54	0.00	0.00	0.10	0.10	0.00	0.02	0.02	—	95.9	95.9	0.01	< 0.005	0.16	97.5
Vendor	0.02	0.01	0.50	0.18	< 0.005	0.01	0.11	0.11	0.01	0.03	0.03	—	384	384	< 0.005	0.06	0.38	401
Hauling	< 0.005	< 0.005	0.04	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	32.1	32.1	< 0.005	0.01	0.03	33.6
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	15.9	15.9	< 0.005	< 0.005	0.03	16.1
Vendor	< 0.005	< 0.005	0.09	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	63.6	63.6	< 0.005	0.01	0.06	66.5
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.31	5.31	< 0.005	< 0.005	0.01	5.57

3.7. Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	0.40	3.88	5.87	0.01	0.16	—	0.16	0.14	—	0.14	—	896	896	0.04	0.01	—	899
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	0.64	0.96	< 0.005	0.03	—	0.03	0.02	—	0.02	—	147	147	0.01	< 0.005	—	148
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.12	0.18	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	24.4	24.4	< 0.005	< 0.005	—	24.5
Paving	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.03	0.54	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	81.3	81.3	< 0.005	< 0.005	0.29	82.7
Vendor	0.01	< 0.005	0.16	0.06	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	125	125	< 0.005	0.02	0.29	131
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	11.1	11.1	< 0.005	< 0.005	0.02	11.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.07	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.02	12.5
Vendor	< 0.005	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	20.5	20.5	< 0.005	< 0.005	0.02	21.4
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.82	1.82	< 0.005	< 0.005	< 0.005	1.90
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.04	2.04	< 0.005	< 0.005	< 0.005	2.07
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.40	3.40	< 0.005	< 0.005	< 0.005	3.55
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.30	0.30	< 0.005	< 0.005	< 0.005	0.32

3.9. Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.37	0.30	2.22	3.00	< 0.005	0.05	—	0.05	0.05	—	0.05	—	356	356	0.01	< 0.005	—	357
Architectural Coatings	0.08	0.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.37	0.30	2.22	3.00	< 0.005	0.05	—	0.05	0.05	—	0.05	—	356	356	0.01	< 0.005	—	357
Architectural Coatings	0.08	0.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.05	0.36	0.49	< 0.005	0.01	—	0.01	0.01	—	0.01	—	58.5	58.5	< 0.005	< 0.005	—	58.7
Architectural Coatings	0.01	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	9.69	9.69	< 0.005	< 0.005	—	9.72
Architectural Coatings	< 0.005	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.02	0.01	0.27	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	40.6	40.6	< 0.005	< 0.005	0.14	41.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.20	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	36.3	36.3	< 0.005	< 0.005	< 0.005	36.8
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	6.15	6.15	< 0.005	< 0.005	0.01	6.25
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.02	1.02	< 0.005	< 0.005	< 0.005	1.03

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	623	623	0.05	0.01	—	626
Total	—	—	—	—	—	—	—	—	—	—	—	—	623	623	0.05	0.01	—	626
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	623	623	0.05	0.01	—	626
Total	—	—	—	—	—	—	—	—	—	—	—	—	623	623	0.05	0.01	—	626
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	103	103	0.01	< 0.005	—	104

Total	—	—	—	—	—	—	—	—	—	—	—	—	103	103	0.01	< 0.005	—	104

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	590	590	0.05	< 0.005	—	592
Total	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	590	590	0.05	< 0.005	—	592
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	590	590	0.05	< 0.005	—	592
Total	0.05	0.03	0.49	0.42	< 0.005	0.04	—	0.04	0.04	—	0.04	—	590	590	0.05	< 0.005	—	592
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.01	< 0.005	0.09	0.08	< 0.005	0.01	—	0.01	0.01	—	0.01	—	97.7	97.7	0.01	< 0.005	—	98.0
Total	0.01	< 0.005	0.09	0.08	< 0.005	0.01	—	0.01	0.01	—	0.01	—	97.7	97.7	0.01	< 0.005	—	98.0

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	1.07	1.07	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	0.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.39	0.36	0.02	2.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.94	8.94	< 0.005	< 0.005	—	8.97
Total	1.52	1.49	0.02	2.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.94	8.94	< 0.005	< 0.005	—	8.97
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	1.07	1.07	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	0.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	1.13	1.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.20	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Landscape	0.03	0.03	< 0.005	0.20	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.73	0.73	< 0.005	< 0.005	—	0.73
Total	0.24	0.24	< 0.005	0.20	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.73	0.73	< 0.005	< 0.005	—	0.73

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Total	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Total	—	—	—	—	—	—	—	—	—	—	—	22.2	46.8	69.0	2.28	0.05	—	142
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	3.67	7.75	11.4	0.38	0.01	—	23.5
Total	—	—	—	—	—	—	—	—	—	—	—	3.67	7.75	11.4	0.38	0.01	—	23.5

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Total	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Total	—	—	—	—	—	—	—	—	—	—	—	33.4	0.00	33.4	3.34	0.00	—	117
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	5.53	0.00	5.53	0.55	0.00	—	19.4
Total	—	—	—	—	—	—	—	—	—	—	—	5.53	0.00	5.53	0.55	0.00	—	19.4

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	51.9	47.3	132	121	0.23	6.95	0.00	6.95	6.95	0.00	6.95	0.00	24,178	24,178	0.97	0.19	0.00	24,259
Total	51.9	47.3	132	121	0.23	6.95	0.00	6.95	6.95	0.00	6.95	0.00	24,178	24,178	0.97	0.19	0.00	24,259
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	51.9	47.3	132	121	0.23	6.95	0.00	6.95	6.95	0.00	6.95	0.00	24,178	24,178	0.97	0.19	0.00	24,259
Total	51.9	47.3	132	121	0.23	6.95	0.00	6.95	6.95	0.00	6.95	0.00	24,178	24,178	0.97	0.19	0.00	24,259
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.11	0.10	0.28	0.25	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	45.7	45.7	< 0.005	< 0.005	0.00	45.8
Total	0.11	0.10	0.28	0.25	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	45.7	45.7	< 0.005	< 0.005	0.00	45.8

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Prep/Grading	Grading	1/1/2026	5/6/2026	5.00	90.0	—
Facility Construction	Building Construction	5/7/2026	5/11/2027	5.00	264	—
Paving	Paving	5/12/2027	8/3/2027	5.00	60.0	—
Architectural Coating	Architectural Coating	8/4/2027	10/26/2027	5.00	60.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Prep/Grading	Excavators	Diesel	Average	3.00	2.00	36.0	0.38
Site Prep/Grading	Graders	Diesel	Average	1.00	2.00	148	0.41

Site Prep/Grading	Rubber Tired Dozers	Diesel	Average	1.00	2.00	367	0.40
Site Prep/Grading	Scrapers	Diesel	Average	2.00	1.00	423	0.48
Site Prep/Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	2.00	84.0	0.37
Facility Construction	Cranes	Diesel	Average	1.00	1.00	367	0.29
Facility Construction	Forklifts	Diesel	Average	2.00	1.00	82.0	0.20
Facility Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Facility Construction	Tractors/Loaders/Backhoes	Diesel	Average	2.00	2.00	84.0	0.37
Facility Construction	Welders	Diesel	Average	1.00	1.00	46.0	0.45
Paving	Pavers	Diesel	Average	1.00	4.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	4.00	4.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	4.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	4.00	4.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Prep/Grading	—	—	—	—
Site Prep/Grading	Worker	15.0	10.9	LDA,LDT1,LDT2
Site Prep/Grading	Vendor	5.00	8.27	HHDT,MHDT
Site Prep/Grading	Hauling	0.22	20.0	HHDT
Site Prep/Grading	Onsite truck	—	—	HHDT
Facility Construction	—	—	—	—
Facility Construction	Worker	50.0	10.9	LDA,LDT1,LDT2
Facility Construction	Vendor	60.0	8.27	HHDT,MHDT
Facility Construction	Hauling	1.89	20.0	HHDT
Facility Construction	Onsite truck	—	—	HHDT

Paving	—	—	—	—
Paving	Worker	10.0	10.9	LDA,LDT1,LDT2
Paving	Vendor	5.00	8.27	HHDT,MHDT
Paving	Hauling	0.17	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	5.00	10.9	LDA,LDT1,LDT2
Architectural Coating	Vendor	0.00	8.27	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	1,000	1,000	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Prep/Grading	—	—	45.0	0.00	—
Paving	0.00	0.00	0.00	0.00	0.00

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	453	0.03	< 0.005
2027	0.00	453	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Total all Land Uses	1.70	1.70	1.70	621	74.8	74.8	74.8	27,302

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	75,000	25,000	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
General Light Industry	501,721	453	0.0330	0.0040	1,841,547

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
General Light Industry	11,562,500	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
General Light Industry	62.0	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
Emergency Generator	Diesel	1.00	24.0	100	600	0.73

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	25.1	annual days of extreme heat
Extreme Precipitation	1.90	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	72.5
AQ-PM	88.9
AQ-DPM	75.0
Drinking Water	62.8
Lead Risk Housing	88.3
Pesticides	51.6
Toxic Releases	15.4
Traffic	66.7
Effect Indicators	—
CleanUp Sites	58.5
Groundwater	95.2
Haz Waste Facilities/Generators	67.0
Impaired Water Bodies	23.9
Solid Waste	0.00
Sensitive Population	—
Asthma	97.1
Cardio-vascular	99.5
Low Birth Weights	95.2
Socioeconomic Factor Indicators	—

Education	72.9
Housing	88.3
Linguistic	53.4
Poverty	79.5
Unemployment	97.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	15.64224304
Employed	4.516874118
Median HI	4.504042089
Education	—
Bachelor's or higher	31.19466188
High school enrollment	100
Preschool enrollment	1.873476197
Transportation	—
Auto Access	4.18324137
Active commuting	30.89952521
Social	—
2-parent households	43.38508918
Voting	9.624021558
Neighborhood	—
Alcohol availability	53.49672783
Park access	46.72141666
Retail density	80.59797254
Supermarket access	75.45232901

Tree canopy	51.62325164
Housing	—
Homeownership	31.90042346
Housing habitability	60.51584756
Low-inc homeowner severe housing cost burden	85.02502246
Low-inc renter severe housing cost burden	50.78916977
Uncrowded housing	66.9190299
Health Outcomes	—
Insured adults	65.67432311
Arthritis	15.6
Asthma ER Admissions	0.5
High Blood Pressure	8.1
Cancer (excluding skin)	32.7
Asthma	19.7
Coronary Heart Disease	12.2
Chronic Obstructive Pulmonary Disease	13.3
Diagnosed Diabetes	29.7
Life Expectancy at Birth	10.9
Cognitively Disabled	4.9
Physically Disabled	3.3
Heart Attack ER Admissions	0.4
Mental Health Not Good	27.0
Chronic Kidney Disease	10.6
Obesity	17.5
Pedestrian Injuries	93.6
Physical Health Not Good	24.5
Stroke	17.3
Health Risk Behaviors	—

Binge Drinking	54.2
Current Smoker	24.8
No Leisure Time for Physical Activity	26.6
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	28.6
Elderly	32.8
English Speaking	52.8
Foreign-born	7.6
Outdoor Workers	86.0
Climate Change Adaptive Capacity	—
Impervious Surface Cover	68.3
Traffic Density	57.5
Traffic Access	0.0
Other Indices	—
Hardship	69.6
Other Decision Support	—
2016 Voting	28.8

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	98.0
Healthy Places Index Score for Project Location (b)	7.00
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	See AQ Memo for assumptions.
Land Use	See AQ Memo for assumptions.
Construction: Off-Road Equipment	See AQ Memo for assumptions.
Construction: Trips and VMT	See AQ Memo for assumptions.
Construction: Architectural Coatings	See AQ Memo for assumptions.
Operations: Fleet Mix	See AQ Memo for assumptions.
Operations: Refrigerants	See AQ Memo for assumptions.

Appendix C BIOLOGICAL RESOURCES

C.1 SPECIAL STATUS SPECIES POTENTIAL FOR OCCURRENCE ASSESSMENT

SPECIAL STATUS SPECIES POTENTIAL FOR OCCURRENCE ASSESSMENT

The table below lists the special status plant and wildlife species identified to occur within the Biological Study Area (BSA) (within five miles of the Program Study Area) or in database queries as described in the Draft EIR environmental setting (Section 3.4.3) and evaluated for potential impacts in the Draft EIR impact analysis (Section 3.4.4).

Appendix C.1 Special Status Species Determined to Have a Low or Very Low to Nonexistent Potential to Occur within the Program Study Area.

Common name Scientific name	Legal status			Geographic distribution/ Floristic province	Preferred habitat	Identification period	Level of potential to occur within the Program Study Area
	Federal	State	CNPS				
Plants							
Alkali milk-vetch *Astragalus tener var. tener*	–	–	1B.2	5–195 feet (1–60 meters)	Playas; valley and foothill grassland; vernal pools.	March–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Alkali-sink goldfields *Lasthenia chrysantha*	–	–	1B.1	0–655 feet (0–200 meters)	Vernal pools.	February–April	**Very Low to Nonexistent.** Limited to no suitable habitat within the Program Study Area. One known occurrence (1936) within the BSA five miles south of Merced in an area where the majority of the land has since been converted for agricultural purposes (CDFW 2024f).
Beaked clarkia *Clarkia rostrata*	–	–	1B.3	196–1,641 feet (60–500 meters)	Cismontane woodland; valley and foothill grassland.	April–May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	–	E	1B.2	32–7,791 feet (10–2,375 meters)	Vernal pools; marshes, swamps; lake margins; clay.	April–August	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
California alkali grass *Puccinellia simplex*	–	–	1B.2	7–3,051 feet (2–930 meters)	Chenopod scrub; meadows and seeps; valley and foothill grassland; vernal pools; alkaline, vernally mesic; sinks, flats, and lake margins.	March–May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. One known occurrence (1935) within the BSA.
Colusa grass *Neostapfia colusana*	T, X	E	1B.1	16–656 feet (5–200 meters)	Large vernal pools; adobe.	May–August	**Low**. Limited to no suitable habitat within the Program Study Area. Known occurrences (1986, 2008, 2011, 2016) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Coulter's goldfields *Lasthenia glabrata ssp. coulteri*	–	–	1B.1	5–4,005 feet (1–1,220 meters)	Marshes and swamps (coastal salt); playas; vernal pools.	February–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Crownscale *Atriplex coronata var. coronata*	–	–	4.2	5–1,935 feet (1–590 meters)	Chenopod scrub; valley and foothill grassland; vernal pools.	March–October	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Delta button-celery *Eryngium racemosum*	–	E	1B.1	10–98 feet (3–30 meters)	Riparian scrub; vernally mesic clay depressions.	June–October	**Very Low to Nonexistent**. No suitable habitat within the Program Study Area. No known occurrences within the BSA.
Dwarf downingia *Downingia pusilla*	–	–	2B.2	3–1,459 feet (1–445 meters)	Valley and foothill grassland; vernal pools; mesic.	March–May	**Low**. Limited suitable habitat within the Program Study Area. Two known occurrences (1999) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Ewan's larkspur *Delphinium hansenii ssp. ewanianum*	–	–	4.2	197–1,968 feet (60–600 meters)	Cismontane woodland; valley and foothill grassland; rocky	March–May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Ferris' goldfields *Lasthenia ferrisiae*	–	–	4.2	65–2,295 feet (20–700 meters)	Vernal pools (alkaline, clay).	February–May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Fleshy owl's-clover *Castilleja campestris ssp. succulenta*	T	CE	1B.2	165–2,460 feet (50–750 meters)	Vernal pools (often acidic).	March–May	**Very Low to Nonexistent.** Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.

Common name Scientific name	Legal status			Geographic distribution/ Floristic province	Preferred habitat	Identification period	Level of potential to occur within the Program Study Area
	Federal	State	CNPS				
Forked hareleaf *Lagophylla dichotoma*	–	–	1B.1	147–1,100 feet (45–335 meters)	Cismontane woodland; valley and foothill grassland; clay.	April–May	**Low**. Limited suitable habitat within the Program Study Area. One known occurrence (1915) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Greene's Tuctoria *Tuctoria greenei*	E, X	R	1B.1	98–3,510 feet (30–1,070 meters)	Vernal pools.	May–September	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Hairy Orcutt grass *Orcuttia pilosa*	E	E	1B.1	151–656 feet (46–200 meters)	Vernal pools.	May–September	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. One known occurrence (1938) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Hartweg's golden sunburst *Pseudobahia bahiifolia*	E	E	1B.1	49–492 feet (15–150 meters)	Cismontane woodland; valley and foothill grassland; clay, acidic.	March–April	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Heartscale *Atriplex cordulata* var. *cordulata*	–	–	1B.2	0–1,837 feet (0–560 meters)	Chenopod scrub; meadows and seeps; valley and foothill grassland; sandy, saline, alkaline.	April–October	**Low**. Limited suitable habitat within the Program Study Area. One known occurrence (1988) within the BSA (CDFW 2024f).
Heckard's pepper-grass *Lepidium latipes* var.*heckardii*	–	–	1B.2	5–655 feet (2–200 meters)	Valley and foothill grassland (alkaline flats).	March–May	**Low.** Limited suitable habitat within the Program Study Area. No known occurrences within the BSA.
Henderson's bent grass *Agrostis hendersonii*	–	–	3.2	230–1,001 feet (70–305 meters)	Valley and foothill grassland; vernal pools; mesic.	April–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. One known occurrence (1937) within the BSA (CDFW 2024f).
Hogwallow starfish *Hesperevax caulescens*	–	–	4.2	0–1,656 feet (0–505 meters)	Valley and foothill grassland; shallow vernal pools; mesic, clay, alkaline.	March–June	**Low**. Limited suitable habitat within the Program Study Area. No known occurrences within the BSA. However, there are documented occurrences within the Merced Quad.
Hoover's calycadenia *Calycadenia hooveri*	–	–	1B.3	213–984 feet (65–300 meters)	Cismontane woodland; valley and foothill grassland; rocky.	July–September	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Hoover's spurge *Euphorbia hooveri*	T, X	–	1B.2	80–820 feet (25–250 meters)	Vernal pools.	July–October	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Keck's checkerbloom *Sidalcea keckii*	E	–	1B.1	246–2,132 feet (75–650 meters)	Cismontane woodland; valley and foothill grassland; serpentinite, clay.	April–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. Two known occurrences (2005, 2016) within the BSA (CDFW 2024f).
Lesser saltscale *Atriplex minuscula*	–	–	1B.1	49–656 feet (15–200 meters)	Chenopod scrub; playas; valley and foothill grassland; alkaline, sandy.	May–October	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Little mousetail *Myosurus minimus* ssp. *apus*	–	–	3.1	65–2,100 feet (20–640 meters)	Valley and foothill grassland; vernal pools (alkaline).	March–June	**Low.** Limited suitable habitat within the Program Study Area. No known occurrences within the BSA.
Merced phacelia *Phacelia ciliata* var. *opaca*	–	–	3.2	196–492 feet (60–150 meters)	Valley and foothill grassland; clay, alkaline.	February–May	**Low**. Limited suitable habitat within the Program Study Area. Three known occurrences (1929, 1937, and 1977) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Parry's rough tarplant *Centromadia parryi* ssp. *rudis*	–	–	4.2	0–100 feet (0–300 meters)	Valley and foothill grassland; vernal pools.	May –October	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Pincushion navarretia *Navarretia myersii* ssp. *myersii*	–	–	1B.1	66–1,083 feet (20–330 meters)	Vernal pools; acidic.	April–May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Prostrate vernal pool navarrentia *Navarretia prostrata*	–	–	1B.2	10–3,970 feet (3–1,210 meters)	Coastal scrub; meadows and seeps; valley and foothill grassland (alkaline); vernal pools.	April–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.

Common name Scientific name	Legal status			Geographic distribution/ Floristic province	Preferred habitat	Identification period	Level of potential to occur within the Program Study Area
	Federal	State	CNPS				
Recurved larkspur *Delphinium recurvatum*	–	–	1B.2	10–2,592 feet (3–790 meters)	Valley and foothill grassland; chenopod scrub; cismontane woodland; alkaline.	March–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
San Joaquin spearscale *Extriplex joaquinana*	–	–	1B.2	5–2,740 feet (1–835 meters)	Chenopod scrub; meadows and seeps; playas; valley and foothill grassland.	April–October	**Very Low to Nonexistent.** Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
San Joaquin Valley Orcutt grass *Orcuttia inaequalis*	T, X	E	1B.1	33–2,478 feet (10–755 meters)	Vernal pools.	April–September	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. Known occurrences (1980, 1987, 2001, 2016) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Sanford's arrowhead *Sagittaria sanfordii*	–	–	1B.2	0–2,133 feet (0–650 meters)	Marshes and swamps; shallow freshwater.	May–November	**Low**. Limited suitable habitat within the Program Study Area. Three known occurrences (1980, 2010, 2012) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Shining navarretia *Navarretia nigelliformis ssp. radians*	–	–	1B.2	249–3,280 feet (76–1,000 meters)	Cismontane woodland; valley and foothill grassland; vernal pools; clay.	March–July	**Low**. Limited suitable habitat within the Program Study Area. Known occurrences (1999, 2001, 2006, 2009, 2017) within the BSA and documented occurrences within the Merced Quad. However, the Program Study Area is not within the elevation range for this species (CDFW 2024f).
Small-flowered morning-glory *Convolvulus simulans*	–	–	4.2	95–2,430 feet (30–740 meters)	Chaparral; openings; coastal scrub; valley and foothill grassland; clay; serpentinite seeps.	March–July	**Low**. Limited suitable habitat within the Program Study Area. No known occurrences within the BSA. However, there are documented occurrences within the Merced Quad.
Spiny-sepaled button-celery *Eryngium spinosepalum*	–	–	1B.2	262–3,198 feet (80–975 meters)	Valley and foothill grassland; vernal pools.	April–June	**Very Low to Nonexistent**. Limited suitable habitat within the Program Study Area. Known occurrences (2001) within the BSA (CDFW 2024f). However, the Program Area is not within the elevation range for this species.
Stinkbells *Fritillaria agrestis*	–	–	4.2	35–5,100 feet (10–1,555 meters)	Chaparral; Cismontane woodland; pinyon and juniper woodland; valley and foothill grassland.	March–June	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Subtle orache *Atriplex subtilis*	–	–	1B.2	131–328 feet (40–100 meters)	Valley and foothill grassland; alkaline.	June–October	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Succulent owl's-clover *Castilleja campestris ssp. succulenta*	T, X	E	1B.2	164–2,461 feet (50–750 meters)	Vernal pools; acidic.	March–May	**Low**. Limited suitable habitat within the Program Study Area. Known occurrences (1997, 1999, 2001, 2004, 2008) within the BSA and documented occurrences within the Merced Quad (CDFW 2024f).
Vernal pool smallscale *Atriplex persistens*	–	–	1B.2	33–377 feet (10–115 meters)	Vernal pools; alkaline.	June–October	**Low**. Limited suitable habitat within the Program Study Area. Two known occurrences (1926, 2011) within the BSA (CDFW 2024f).
Watershield *Brasenia*	–	–	2B.3	95–7,220 feet (30–2,200 meters)	Freshwater marshes and swamp.	June–September	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. One known occurrence (1915) within the BSA (CDFW 2024f).
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	–	–	2B.1	15–1,425 feet (5–435 meters)	Meadows and seeps; marshes and swamps; riparian forest; vernal pools.	May–September	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Invertebrates							
American bumble bee *Bombus pensylvanicus*	–	–	N/A	Absent from much of the U.S. Mountain West, this species is found in the Desert West and adjacent areas of California and Oregon.	Farmlands and open fields where they nest below the grass or underground. Pollinate on various native plants including crops.	Spring–Summer	**Low.** Limited suitable foraging and nesting habitat exists within the Program Study Area; however, suitable habitat may exists within the agricultural fields in the eastern part of Merced County and in areas within and adjacent to the Program Study Area. According to the desktop review, there are multiple records of collected individuals in the vicinity of Merced from 1943 through 1975 (CDFW 2024f).
California linderiella *Linderiella occidentalis*	–	–	N/A	California's Central Valley and up to elevations as high as 3,770 feet (1,150 meters).	Vernal pools.	December–May	**Very Low to Nonexistent.** Limited to no suitable habitat within the Program Study Area. Multiple known occurrences within the BSA from 1999 through 2017 (CDFW 2024f).

Common name Scientific name	Legal status			Geographic distribution/ Floristic province	Preferred habitat	Identification period	Level of potential to occur within the Program Study Area
	Federal	State	CNPS				
Conservancy fairy shrimp *Branchinecta conservatio*	E, X	–	N/A	Six disjoint populations in Tehama, Butte, Jepson, Solano, Sacramento, Glenn, Merced, and Ventura Counties.	Vernal pools.	November–April	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. Two known occurrences within the BSA from 2000 and 2019 (CDFW 2024f).
Midvalley fairy shrimp *Branchinecta mesovallensis*	–	–	N/A	California's Central Valley; Southeastern Sacramento, Southern Sierra Foothill, San Joaquin, and Solano-Colusa Vernal Pool Regions.	Vernal pools.	Winter–Spring	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. Multiple known occurrences within the BSA (CDFW 2024f).
Molestan blister beetle *Lytta moesta*	–	–	N/A	Central California.	Associated with *Lupinus,* and *Trifolium wormskioldii* in dry vernal pools, and *Eriodium.*	April–July	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. One known occurrence (unknown date) within the BSA (CDFW 2024f).
Monarch butterfly *Danaus plexippus*	C	–	N/A	Throughout North America to southern Canada as well as Hawaii and other Pacific islands, Australia, New Zealand, Spain, and Portugal.	Fields, roadsides, open areas, wet areas, or urban gardens including their only hostplant, milkweed, and various other nectar-producing flowering plants.	Spring−early Fall	**Low.** Limited to no suitable habitat (host plants) observed within the Program Study Area. No known occurrences within the BSA.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T	–	N/A	California Central Valley and foothills, majority below 500 feet (152 meters) elevation.	Elderberry shrubs (*Sambucus* sp.), with stems at least about one inch in diameter, along rivers and streams.	March–July	**Low**. Limited suitable habitat within the Program Study Area. No known occurrences within the BSA.
Vernal pool fairy shrimp *Branchinecta lynchi*	T, X	–	N/A	Scattered throughout Central Valley, Coast Range, and Southern California.	Vernal pools.	December–May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. Multiple known occurrences within the BSA (CDFW 2024f).
Vernal pool tadpole shrimp *Lepidurus packardi*	E, X	–	N/A	Scattered throughout Central Valley. Shasta through Tulare Counties, and Alameda and Contra Costa Counties.	Ephemeral freshwater habitats. Alkaline pools; clay flats; vernal lakes; vernal pools; vernal swales; seasonal wetlands.	Winter–Spring	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. Four known occurrences within the BSA from 1999 through 2013 (CDFW 2024f).
Reptiles and Amphibians							
California red-legged frog *Rana draytonii*	T	SSC	N/A	Coastal Range of California, foothill range of Sierra Nevada mountains.	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Require animal burrows or other moist refuges for estivation.	Year-round, breed November–April	**Low**. No suitable breeding habitat within the Program Study Area. No known occurrences within the BSA.
Giant gartersnake *Thamnophis gigas*	T	T	N/A	Central Valley from Glenn County to the southern edge of San Francisco Bay Delta, and from Merced County to northern Fresno County. 0–400 feet (0–122 meters)	Highly aquatic, found in marshes, sloughs, irrigation ditches, canals, rice fields, slow-moving creeks with nearby vegetation.	Active March−October, breed in spring	**Low**. Limited suitable habitat within the Program Study Area. One known occurrence (1908) within the BSA (CDFW 2024f).
Northwestern pond turtle *Actinemys marmorata*	PT	SSC	N/A	West of the Sierra and Cascade Mountains and desert regions. 0–4,690 feet (0–1,430 meters)	Slow moving streams, marshes, wetlands, and ponds, at least 1.6 feet deep with overhanging vegetation and rock outcrops, and associated upland habitat, usually grasslands.	Year-round, breed April−May	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. One known occurrence (2006) within the BSA (CDFW 2024f).
Western spadefoot *Spea hammondii*	PT	SSC	N/A	California Central Valley and adjacent foothills, southern Coastal Range. 0–4,460 feet (0–1,360 meters)	Occurs primarily in grassland habitats but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	Active October −May, breed January–May	**Low**. Limited suitable habitat within the Program Study Area. Two known occurrences (2018) within the BSA specifically at the Deadman Creek Conservation Bank (CDFW 2024f).
Birds							
Bald eagle *Haliaeetus leucocephalus*	D	E, FP	N/A	Breeds in northern California, Sierra Nevada mountains and foothills, central coast range, inland southern California, and Santa Catalina Island. Winters throughout California except in arid southeastern areas.	Foraging areas include rivers, reservoirs, lakes, estuaries, and coastal marine ecosystems. Nests in large, old-growth, or dominant trees within one mile of foraging habitat.	Year-round	**Very Low to Nonexistent**. No suitable habitat within the Program Study Area. One known occurrence within the BSA at Yosemite Lake northeast of the Program Study Area (CDFW 2024f).

Common name Scientific name	Legal status			Geographic distribution/ Floristic province	Preferred habitat	Identification period	Level of potential to occur within the Program Study Area
	Federal	State	CNPS				
Ferruginous hawk *Buteo regalis*	BCC	WL	N/A	Modoc Plateau, Central Valley, Coast Ranges, and the deserts of southwestern California.	Open grasslands, agricultural areas, sagebrush, desert scrub, low foothills, and pinyon-juniper woodland.	Wintering (September–April)	**Low**. No suitable nesting habitat and limited to no suitable foraging habitat within the Program Study Area. One known occurrence (2006) within the BSA (CDFW 2024f).
Mountain plover *Charadrius montanus*	BCC	SSC	N/A	Central Valley, San Joaquin foothills, southern California.	Valley and foothill or other short grasslands, agricultural fields, grazed areas, chenopod scrub.	Wintering (September–March)	**Low**. Limited suitable nesting habitat within the Program Study Area. One known occurrence (1999) within the BSA (CDFW 2024f).
Mammals							
Fresno kangaroo rat *Dipodomys nitratoides exilis*	E	E, SH	N/A	San Joaquin Valley floor, 200–1,800 feet (60–550 meters). Fresno County.	Chenopod scrub, alkali sink, dry, sandy grassland.	Year-round	**Very Low to Nonexistent**. Limited to no suitable habitat within the Program Study Area. No known occurrences within the BSA.
Merced kangaroo rat *Dipodomys heermanni dixoni*	–	–	N/A	San Joaquin Valley, eastern Merced and Stanislaus counties.	Valley and foothill grassland with fine, deep, well-drained soil.	Year-round	**Low**. Limited suitable habitat within the Program Study Area. However, there are five known occurrences within the BSA from 1999 within the UC Merced planning area northeast of the Program Study Area (CDFW 2024f).
Western mastiff bat *Eumops perotis californicus*	–	SSC	N/A	Central Valley, Coastal Range, southern and eastern California.	Open semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, trees and tunnels.	Year-round	**Low**. Limited suitable habitat within the Program Study Area. There is one known occurrence (from 1991) within 5 miles of the Program Study Area (CDFW 2024f). During the field surveys conducted on February 11, 2019 and May 23–24, 2024, no evidence of special status bat species was observed within or immediately adjacent to the Program Study Area or proposed Project areas. However, limited potential foraging habitat as well as potential roosting habitat such as tree foliage and human-made structures were observed within areas immediately adjacent to the proposed Project areas and within the Program Study Area.

Key

Federal

C = Candidate under federal Endangered Species Act

T = Threatened under federal Endangered Species Act

E = Tndangered under federal Endangered Species Act

BCC = Bird of Conservation Concern

MBTA = Migratory Bird Treaty Act

– = No Listing

CNPS = California Native Plant Society

NWR = National Wildlife Refuge

State

T = Threatened under the California Endangered Species Act

CE = Candidate Endangered

SSC = Species of Special Concern

FGC = Fish and Game Code

– = no listing

Source: Calflora 2024. CDFW 2020, CDFW 2021, CDFW 2024f, CDFW 2024g, CDFW 2024h, CDFW 2024i, CDFW 2024j, CDFW 2024l, CDPR 2024, CNPS 2024b, CornellLab 2024, iNaturalist 2024, Nafis 2024, UC Davis 2022, UC Davis 2024, USDA 2019, USFS 2024, USEPA 2010, USFWS 2006, USFWS 2017b, USFWS 2024f, USFWS 2024g, USFWS 2024i, USFWS 2024k, and WBWG 2024.

C.2 FIELD SURVEY PHOTOGRAPHS

CIP 1

CIP 1 Photographic Record

Photograph 1: Field Survey CIP 1. Fahrens Creek. 5/23/24.

Photograph 2: Field Survey CIP 1. Fahrens Creek. 5/23/24.

Photograph 3: Field Survey CIP 1. Fahrens Creek. 5/23/24.

Photograph 4: Field Survey CIP 1. Dirt road adjacent to Fahrens Creek. 5/23/24.

CIP 2

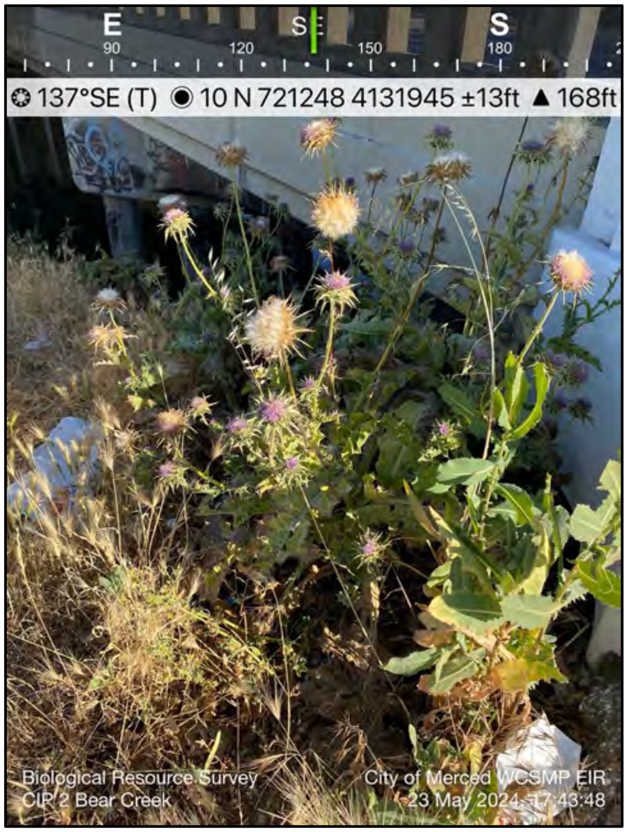
CIP 2 Photographic Record

Photograph 1: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

Photograph 2: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

Photograph 3: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

Photograph 4: Field Survey CIP 2. Bear Creek crossing. 5/23/24.



Photograph 5: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

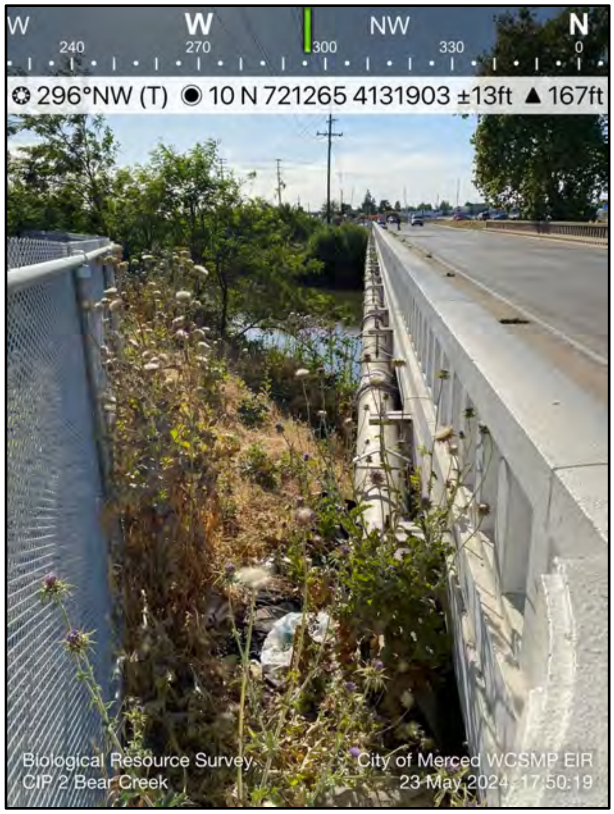
Photograph 6: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

Photograph 7: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

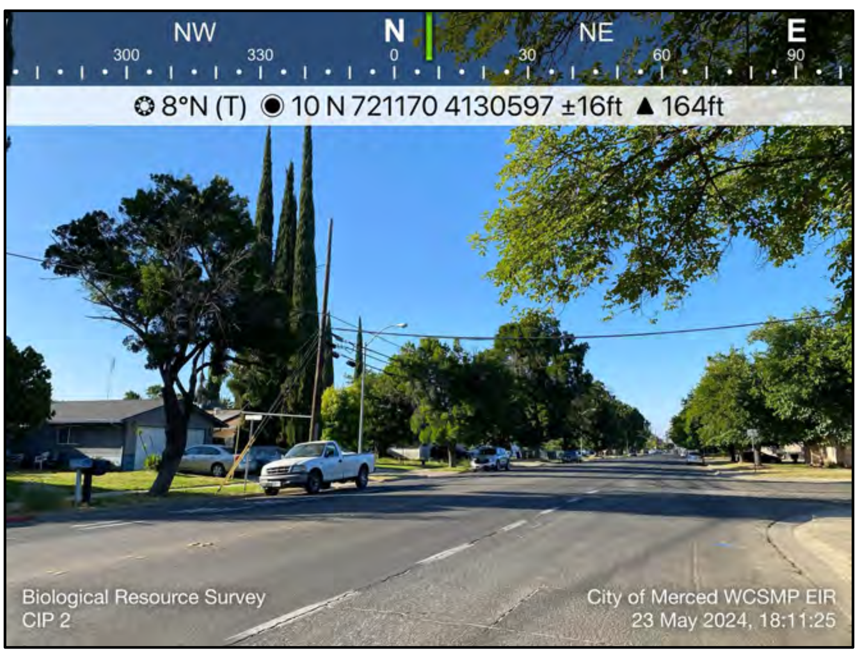
Photograph 8: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

Photograph 9: Field Survey CIP 2. Area just north of Bear Creek crossing. 5/23/24.

Photograph 10: Field Survey CIP 2. Bear Creek crossing. 5/23/24.

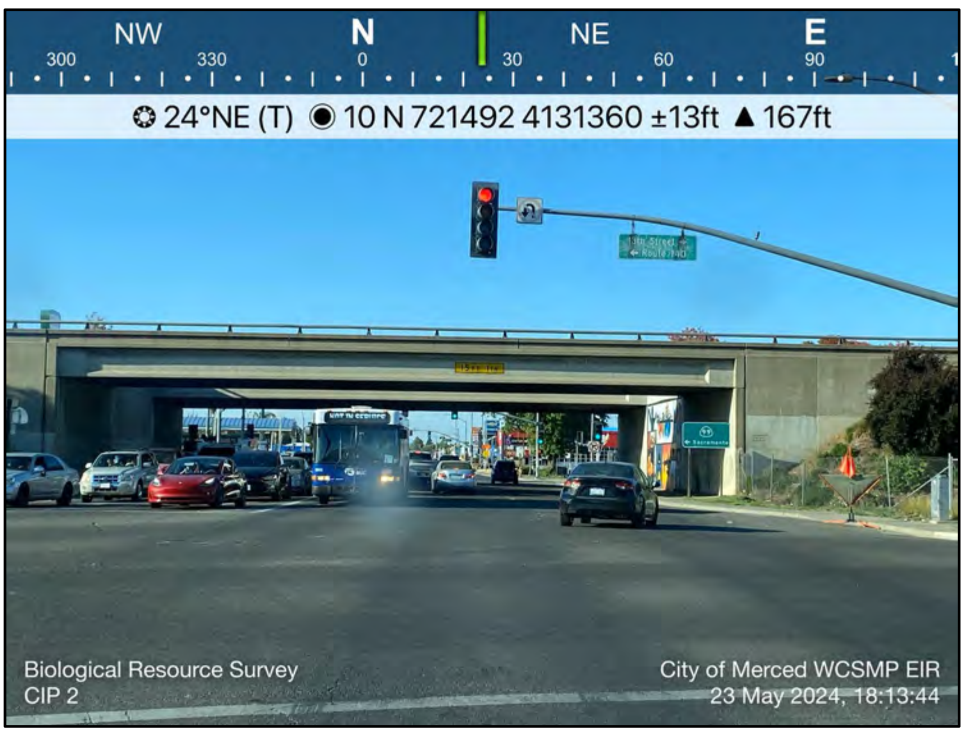


Photograph 11: Field Survey CIP 2. Bear Creek crossing. 5/23/24.



Photograph 12: Field Survey CIP 2. V Street. 5/23/24.

Photograph 13: Field Survey CIP 2. V Street. 5/23/24.



Photograph 14: Field Survey CIP 2. V Street at Hwy 140 overpass. 5/23/24.

CIP 3

CIP 3 Photographic Record

Photograph 1: Field Survey CIP 3. West Street. 5/23/24.

Photograph 2: Field Survey CIP 3. West Street. 5/23/24.

Photograph 3: Field Survey CIP 3. West Street. 5/23/24.

CIP 4

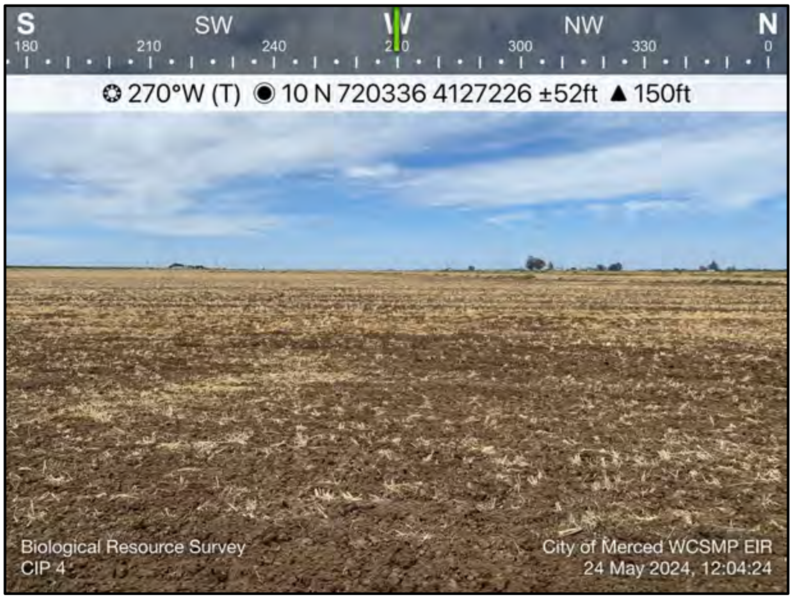
CIP 4 Photographic Record

Photograph 1: Field Survey CIP 4. Hartley Slough adjacent to Hartley Road. 5/24/24.

Photograph 2: Field Survey CIP 4. Hartley Slough adjacent to Hartley Road. 5/24/24.

Photograph 3: Field Survey CIP 4. Hartley Slough. 5/24/24.

Photograph 4: Field Survey CIP 4. Hartley Slough just west of S West Avenue. 5/24/24.



Photograph 5: Field Survey CIP 4. Agricultural fields. 5/24/24.

Photograph 6: Field Survey CIP 4. Hartley Slough. 5/24/24.

Photograph 7: Field Survey CIP 4. Hartley Slough north of West Dickenson Ferry Road. 5/24/24.

Photograph 8: Field Survey CIP 4. Hartley Slough north of West Dickenson Ferry Road. 5/24/24.

CIP 5

CIP 5 Photographic Record

Photograph 1: Field Survey CIP 5. West Yosemite Avenue and El Redondo Drive intersection. 5/23/24.

Photograph 2: Field Survey CIP 5. West Yosemite Avenue. 5/23/24.

Photograph 3: Field Survey CIP 5. West Yosemite Avenue. 5/23/24.

Photograph 4: Field Survey CIP 5. West Yosemite Avenue and Compass Pointe Avenue. 5/23/24.

Photograph 5: Field Survey CIP 5. Fahrens Creek crossing. 5/23/24.

Photograph 6: Field Survey CIP 5. Fahrens Creek crossing. 5/23/24.

Photograph 7: Field Survey CIP 5. Pedestrian underpass beneath West Yosemite Avenue. 5/23/24.

Photograph 8: Field Survey CIP 5. Fahrens Creek crossing under West Yosemite Avenue. 5/23/24.

Photograph 9: Field Survey CIP 5. Fahrens Creek crossing West Yosemite Avenue. 5/23/24.

Photograph 10: Field Survey CIP 5. West Yosemite Avenue. 5/23/24.

Photograph 11: Field Survey CIP 5. West Yosemite Avenue and M Street intersection. 5/23/24.

Photograph 12: Field Survey CIP 5. West Yosemite Avenue and R Street intersection. 5/23/24.

Photograph 13: Field Survey CIP 5. West Yosemite Avenue. 5/23/24.

Photograph 14: Field Survey CIP 5. West Yosemite Avenue and M Street intersection. 5/23/24.

CIP 6

CIP 6 Photographic Record

Photograph 1: Field Survey CIP 6. G Street. 5/23/24.

Photograph 2: Field Survey CIP 6. Roadside ditech along G Street. 5/23/24.

Photograph 3: Field Survey CIP 6. G Street and Bellevue Road intersection. 5/23/24.

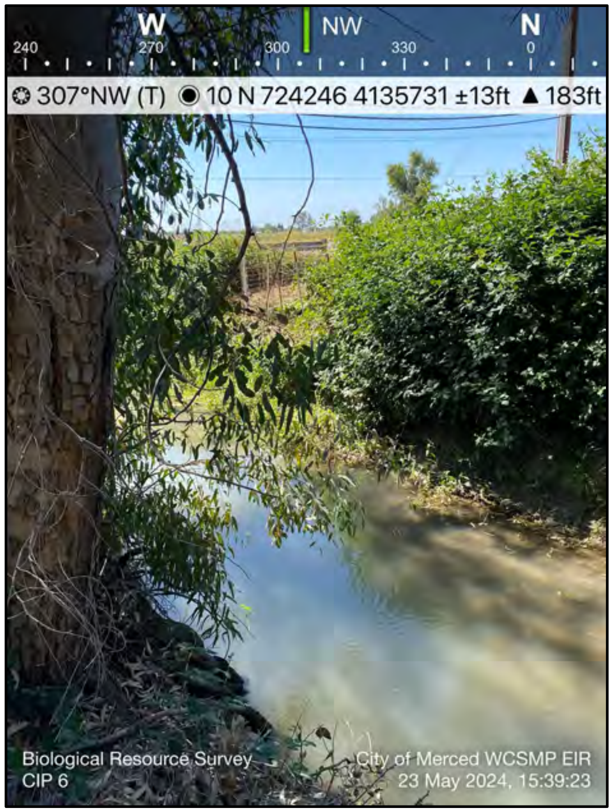
Photograph 4: Field Survey CIP 6. G Street and Foothill Drive intersection. 5/23/24.

Photograph 5: Field Survey CIP 6. G Street and East Cardella Road intersection. 5/23/24.

Photograph 6: Field Survey CIP 6. G Street and adjacent orchard. 5/23/24.

Photograph 7: Field Survey CIP 6. G Street at East Cardella Road intersection. 5/23/24.

Photograph 8: Field Survey CIP 6. Bike path heading west from G Street south of East Cardella Road intersection. 5/23/24.



Photograph 9: Field Survey CIP 6. Cottonwood Creek crossing on east side of G Street. 5/23/24.

Photograph 10: Field Survey CIP 6. Cottonwood Creek crossing. 5/23/24.

Photograph 11: Field Survey CIP 6. Cottonwood Creek crossing on west side of G Street. 5/23/24.

Photograph 12: Field Survey CIP 6. G Street. 5/23/24.

Appendix D CULTURAL RESOURCES

This is a confidential appendix that contains sensitive information and is not available for public release or distribution, and therefore is not included here.

Appendix E ALTERNATIVE DEVELOPMENT BACKGROUND

E.1 CITY OF MERCED WASTEWATER COLLECTION SYSTEM MASTER PLAN 2022 UPDATE

City of Merced
Wastewater Collection System Master Plan 2022 Update

February 9, 2023

Prepared for:
City of Merced

Prepared by:
Stantec Consulting Services Inc.
3875 Atherton Road
Rocklin CA 95765-3716

Stantec

Stantec

Wastewater Collection System Master Plan

2022 Update

February 9, 2023

Prepared for:
City of Merced

Prepared by:
Stantec Consulting Services, Inc.

Project Number:
184030360

02/09/2023

This document entitled Wastewater Collection System Master Plan was prepared by Stantec Consulting Services Inc. (“Stantec”) for the account of City of Merced (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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Prepared by ______________________
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Steven L. Beck, PE

Reviewed by ______________________
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Mike Van Doorn, PE

Executive Summary

Stantec Consulting Services Inc. (Stantec) was retained by the City of Merced (City) to prepare an update to the Wastewater Collection System Master Plan (WCSMP) using updated per capita wastewater flow design criteria.

ES-1 Revised Sewage Generation Rates

The per capita flows have been analyzed and revised based on data collected from the 2021 sewer flow monitoring program (V&A 2021) at 18 flow monitoring sites and three pump station locations, discussed in detail in Chapter 4.0. The 2021 flow monitoring investigation found that the average wastewater per capita flow in the City of Merced equates to approximately 60 gallons per capita per day (gpcd). In consultation with the City, a factor of safety of 5 gpcd was added to this value to establish a revised recommended dry weather flow (DWF) per capita rate of **65 gpcd**. This value is approximately 24 percent less than the previously established unit rate of 85 gpcd that was used in previous assessments.

Using the updated per capita value, the unit wastewater generation rate per equivalent dwelling unit (EDU) was adjusted to 208 gpd/EDU from 257 gpd/EDU used in previous planning efforts. The per EDU unit flow rate is based on residential densities identified in the City's General Plan. The recommended per capita and per EDU average dry weather flow (ADWF) rates used in this updated WCSMP are shown in **Table ES-1**.

Table ES-1. Wastewater Generation Rate Per Equivalent Dwelling Unit Summary

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

Notes:
[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 and Planning Systems, Inc.
[3] The 2030 General Plan defines the average residential density within the City's Specific Urban Development Plan as 3.02 persons/unit.

Key:
DWF = dry weather flow
EDU = equivalent dwelling unit
gpcd = gallons per capita per day
gpd/EDU = gallons per day per equivalent dwelling unit

ES-2 Wastewater Master Plan Updates

Recent planning documents, including the *City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis* (South Trunk Alternatives Analysis) and the 2017 Draft Wastewater Collection System Master Plan (Draft 2017 WCSMP) considered many alternatives, but ultimately presented two basic plans for building the wastewater collection system infrastructure needed to serve the 2030 General Plan growth projections. The two alternatives included upgrading the City's existing wastewater treatment facility to handle full build-out flow or build a new wastewater treatment facility in North Merced to serve the northern service area. As discussed in the Draft 2017 WCSMP, the City has chosen to not build a new wastewater facility in the north and will focus on alternatives that deliver wastewater to the existing wastewater treatment facility (WWTF) located southwest of Merced. This WCSMP update provides recommendations consistent with this decision.

The hydraulic model was updated using the flow monitoring data and the revised per capita flow to calculate the average dry weather flows for the existing and future development areas (based on 2030 General Plan). Infiltration and Inflow (I/I) parameters were calibrated under existing conditions and applied to the existing and interim areas to simulate PWWF conditions in the existing and interim models. The build out system model expanded the existing collection system and added flow from build out development areas to the interim system model. The PWWFs from build-out development areas are simulated using a peaking factor of 2.3 as opposed to the calibrated I/I parameters used for existing and interim development. A summary of these modeled scenarios and the associated model results are presented below.

Table ES-2. Development Scenarios

Model Scenario	Description	Cumulative Development Areas	Service Area (acres)	Simulated ADWF (MGD)	Simulated PWWF (MGD)
Existing System Model	Existing Service Area and PWWF Conditions	Existing Service Area	6,697	7.0	19.5
Interim System Model	Near-Term Development and PWWF Conditions	Planned Sewer Service Commitments	10,235	12.4	31.6
Build-out System Model	Build-out of the City's General Plan and PWWF Conditions	Remaining Parcels within City's General Plan	22,364	27.3	66.7

Key:
ADWF = average dry weather flow
MGD = million gallons per day
PWWF = peak wet weather flow

Existing System Model

The existing model of the trunk sewer system was used to evaluate the extent of hydraulic deficiencies within the system under peak flow conditions. The model simulates an ADWF of 7.02 million gallons per day (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 Model – Existing System Plus Committed Service Areas

The interim model simulates flow conditions in the existing sewer system with the addition of flow from the City's sewer service commitments without any improvements or new infrastructure added to the existing system. The interim system model includes flow from the committed development areas identified in Section 3.3. The flow projected to be contributed from entitled parcels will add approximately 5.3 MGD to the existing ADWF, bringing the total ADWF up to 12.4 MGD under interim conditions. The interim model was used to evaluate the extent of hydraulic deficiencies within the system under PWWF conditions. The interim model predicts a PWWF of 31.6 MGD will occur at the WWTF under 10-year, 24-hour design storm conditions without considering any improvements to the existing collection system.

The results of the interim system model predict 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 sanitary sewer overflows (SSOs) are predicted to occur within the system under interim conditions.

Six improvement projects are recommended to bring the City's existing collection system within the recommended LOS criteria under interim conditions, discussed in detail in Chapter 6. The recommended interim system improvements are shown in **Figure ES-1**.

- **Capital Improvement Project (CIP) 1 – Bellevue Ranch Pump Station Discharge:** Operational modifications to FM discharge location.
- **CIP 2 – Parallel Sewer and Bear Creek Crossing:** New 36-inch parallel sewer and creek crossing to expand the capacity of the existing system to convey flow from North Merced.
- **CIP 3s and 4 –Replace 48-inch Interceptor and West Ave Sewer:** Replacing the 48-inch interceptor and West Avenue sewers are recommended to increase capacity and address poor physical condition. It is also recommended that the remaining portion of the 42-inch North Merced West Avenue trunk be upsized along with the 48-inch interceptor to facilitate the conjunction of the new Bear Creek Crossing parallel sewer and existing North Merced West Avenue trunk.
- **CIP 5 – Yosemite Avenue Extension:** A new 27-inch extension of the Yosemite Avenue sewer from G Street to R Steet and further extending to El Redondo Drive connecting to the Highway 59 pump station sewer shed will provide additional capacity to serve the City's sewer service commitments and some of the pre-annexation areas.
- **CIP 6 – Parallel G Street Sewer:** A new parallel 27-inch sewer in G Street from Bellevue Road to Community College Drive. This sewer will be tied into the new Cardella Sewer recommended to provide additional capacity for North Merced under build-out conditions.

The Interim CIPs will give the City the capacity to serve an additional 34,628 EDUs, including 9,000 EDUs from the identified pre-annexation areas as discussed in Section 3.3 (**Table 3.7**).

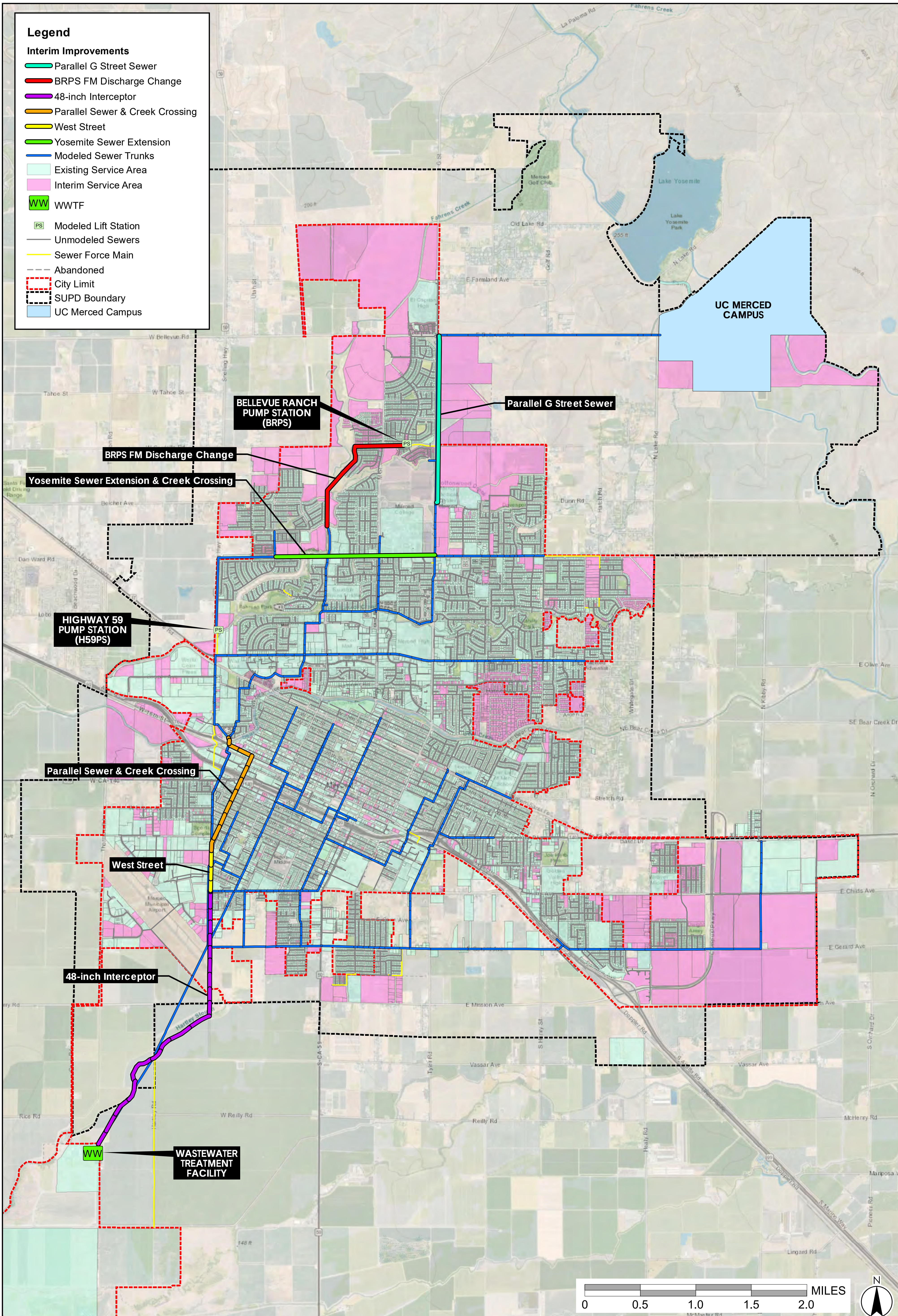

Figure ES-1
Recommended Interim Improvements

Build-Out System Model – Future Collection System with Full Development of the Specific Urban Development Plan

The build-out system model includes the existing collection system and the future trunk network that will be needed to serve the extended service area. The interim system model was used as the starting point for developing the build-out system model and included recommended near-term system improvements as noted above to provide the existing system sufficient capacity to serve interim development. After adding flow from build-out development areas, these interim improvement recommendations were resized to provide sufficient build-out capacity, as noted below in as **Table ES-3**.

Table ES-3. Interim Improvements Sized for Build-Out

CIP No	Name	Existing Pipe Size (in)	Slope (feet/feet)	Length (feet)	Interim Pipe Size (in)	Build-out Pipe Size (in)
1	BRPS FM Discharge Change [1]	NA	NA	NA	NA	NA
2	Parallel Sewer and Creek Crossing	NA	0.00067	6,491	36	48
3	West Street	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
6	Parallel G Street Sewer	27	0.0008	8,000	27	27

Notes:
[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

Key:
BRPS FM = Bellevue Ranch Pump Station Force main
CIP = Capital Improvement Project
NA = Not Applicable
WWTF = wastewater treatment facility

The build-out system model simulates flow conditions in the City's collection system upon full development of the City's General Plan service area. The flow projected to be generated from remaining parcels within the City Specific Urban Development Plan (SUDP) will add approximately 14.9 MGD to the interim ADWF, bringing the total ADWF up to 27.3 MGD under build-out conditions. The build-out model was used to identify the best approach to expanding the system to provide service to the ultimate service area under PWWF conditions. The projected build-out flow at the WWTF equals 66.7 MGD under PWWF conditions.

Opinions of probable costs were developed for each of the recommended interim system improvements at their pipe size required for build-out. These projects and their associated opinions of probable costs are presented in **Table ES-4**.

Table ES-4. Interim Improvement Project Costs

Item	Description	Opinion of Capital Cost [1]
1	BRPS FM Discharge Change [2]	$0
2	Parallel Sewer and Creek Crossing	$4,634,000
3	West Street [2]	$1,207,000
4	48-inch Interceptor [2]	$10,869,000
5	Yosemite Sewer Extension	$1,793,000
6	Parallel G Street Sewer	$1,979,000
	Subtotal	***$20,482,000***
	5% Mobilization/Demobilization	$1,025,000
	Construction Cost Subtotal	***$21,507,000***
	30% Contingency	$6,453,000
	Estimated Construction Cost	***$27,960,000***
	20% Engineering, Environmental, and Admin	$5,592,000
	Total Project Cost	**$33,552,000**

Notes:
[1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.
[2] Bellevue Ranch Pump Station has two existing force mains, this project changes operations of the pump station to discharge through the larger force main conveying flow to R Street.
[3] It is recommended that the West Street sewer project and the 48-inch Interceptor project are done together. Both of the improvements should be constructed at a slope of 0.0006 feet/feet, lowering the existing invert at the downstream end of the existing 48-inch trunk at the influent junction box near the WWTF.

Key:
BRPS FM = Bellevue Ranch Pump Station Force main
ENRCCI = Engineering News Record Construction Cost Index
WWTF = wastewater treatment facility

Summary of Recommended Build-Out Improvements

A proposed future trunk network was developed to service future growth areas under build-out conditions assuming the interim improvements (i.e., sized for build-out) are completed. This WCSMP update breaks down the required improvements by region and classifies improvements as major or minor improvement needs. The two main regions of the collection system are the North and South Merced service areas. Major system improvements mirror those considered in the Draft 2017 WCSMP and generally include future trunks 18-inches in diameter or larger, while minor system improvements include budgets for smaller sewers and extensions to the existing system.

A figure showing the proposed interim, major, and minor improvements is provided as **Figure ES-2**. Opinions of probable costs were developed for the wastewater collection system infrastructure needed to provide service to North and South Merced at build-out, these costs are summarized in **Table ES-5**.

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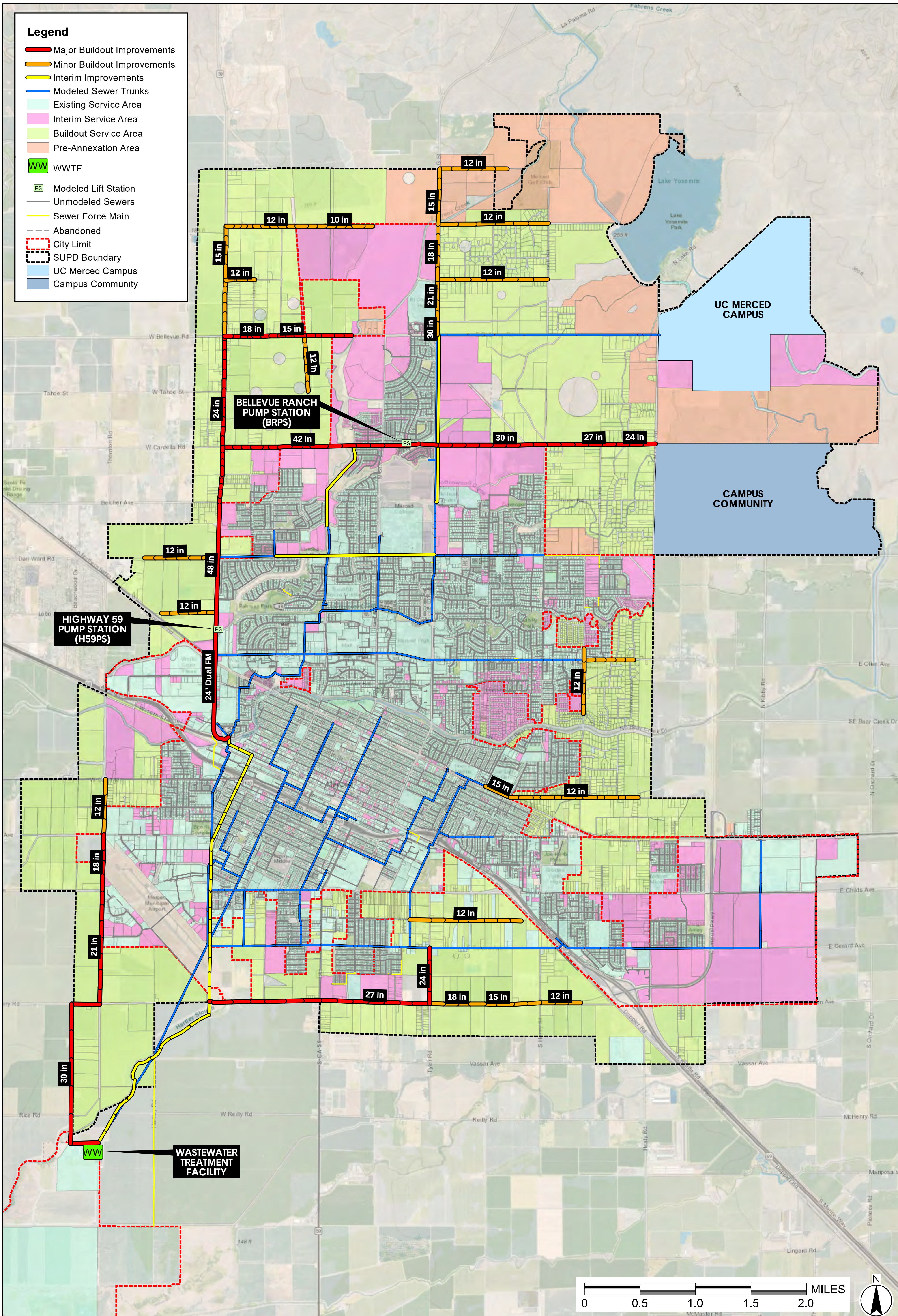

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Wastewater Collection System
Master Plan 2022 Update

Figure ES-2
2022 Merced Master Plan Recommended Improvements

Table ES-5. Summary of Proposed Improvement Costs

Item	Area of Improvements	Total Cost [1]
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**

Note:
[1] Costs based on Engineering News Record Construction Cost Index (20 Cities Index) = 13,175, October 2022.

ES-3 Conclusions and Recommendations

The updated hydraulic modeling and capacity analysis completed for this master plan update confirms that the existing wastewater collection system does not have the capacity to convey the projected flows from interim development projects without exceeding the City's LOS criteria in several reaches of the trunk system. Without improvements, the existing system does not have the capacity to service the build-out of the pre-annexation areas and the City's remaining SUDP. These conclusions are generally consistent with the previous Draft 2017 WCSMP findings.

Several improvements focused on increasing the capacity of the existing trunk system were discussed with the City and noted in the Draft 2017 WCSMP, but they were determined to be less cost-effective than constructing new trunk sewers around the perimeter of the City to service future growth. The previous study also contemplated reserving the limited capacity within the existing 48-inch interceptor in order to fully utilize the G Street Trunk and that no flow beyond that be added until future large trunks are constructed to convey the ultimate SUDP flows from North Merced to the existing WWTF. This meant that many projects ready for development would have to wait until the new infrastructure was completed due to the significant length and cost of these trunk extensions.

However, the condition of the existing concrete 48-inch interceptor is severely corroded and should be replaced as soon as possible given its criticality in the system. Taking this into consideration, and the desire to provide near-term capacity for interim development projects, it is recommended that the City implement the improvement projects sized for build-out capacity (presented in Table ES-3) and the proposed major and minor future trunk network as a preferred strategy versus the alternatives initially identified in the Draft 2017 WCSMP. This strategy will provide a phased approach for capacity improvements that address both near-term and build-out developments that can be constructed and funded in manageable projects to better accommodate the rate of development.

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Abbreviations

ADWF	average dry weather flow (observed during the dry season)
BRPS	Bellevue Ranch Pump Station
CHI	Computational Hydraulics International
CIP	capital improvement project
City	City of Merced
DWF	dry weather flow
EDU	equivalent dwelling unit
ENRCCI	Engineering News Record Construction Cost Index
gpd	gallons per day
gpcd	gallons per capita per day
H59PS	Highway 59 pump station
HGL	hydraulic grade line
HLR	hydraulic loading ratio
ICM	international computer management
I/I	inflow and infiltration
LOS	level of service
MGD	million gallons per day
NMWWTF	North Merced Wastewater Treatment Facility
OS	open space
PCSWMM	Personal Computer Storm Water Management Model
PF	peaking factor
PWWF	peak wet weather flow
R&R	repair and replacement
RDI	rainfall dependent infiltration
RDII	rainfall dependent inflow and infiltration
RGN	rain gauge north
RGS	rain gauge south
ROW	right-of-way
SMSAD	South Merced Sewer Assessment District
SSO	sanitary sewer overflow
Stantec	Stantec Consulting Services Inc.
SUDP	specific urban development plan
TSAM	tentative subdivision activity map
UC Merced	University of California Merced
V&A	V&A Consulting Engineers, Inc.
WCSMP	Wastewater Collection System Master Plan (Stantec 2017)
WWTF	wastewater treatment facility

1.0 Introduction

The City of Merced (City) retained Stantec Consulting Services Inc. (Stantec) to update the City's Wastewater Collection System Master Plan (WCSMP). This WCSMP update addresses existing and future wastewater collection system capacity needs, and alternative solutions based on 1) providing sewer service to planned community growth and 2) eliminating known system deficiencies. This plan recommends locations, sizes, and/or mitigation measures for trunk sewers to serve areas within the existing City limits and areas within the City's Specific Urban Development Plan (SUDP) boundary as identified in the City of Merced Vision 2030 General Plan (2030 General Plan). "Trunk sewers" are the main sewers of a wastewater collection system to which other smaller, collector and neighborhood sewers drain. In the case of the City's system, the trunk sewers have diameters ranging in size from 12 inches up to 60 inches.

This chapter is divided into the following sections:

- 1.1 Purpose
- 1.2 Study Area
- 1.3 Background

1.1 Purposes of this Document

The purposes of this WCSMP are to:

1. Update the City's wastewater design criteria by reviewing specific flow monitoring data collected for various land uses and establishing a per capita wastewater generation rate for planning purposes.

2. Update future wastewater flow projections using the updated wastewater design criteria and the latest ongoing planning information.

3. Provide the City with an updated evaluation of options for serving the wastewater collection system needs of the 2030 General Plan.

4. Update the WCSMP to include the existing system capacity evaluation results presented in the Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis (June 2020).

5. Re-assess the capacity of existing trunk sewers within the City limits and SUDP, including consideration of sewer performance under future development conditions.

6. Provide recommendations for upsizing existing trunk sewers or other means to address deficiencies identified as part of the assessment of the current and interim sewer system's capacity design conditions.

7. Revisit the assessment of major future trunk alignment alternatives originally considered as part of the draft 2017 Wastewater Collection System Master Plan.

8. Provide recommendations for sewer projects that would fulfill the City's desire to serve growth envisioned in the 2030 General Plan.

9. Prepare a list of capital improvement projects (CIPs) with planning-level cost estimates to address existing system deficiencies and projects that will be needed to serve new growth.

This master plan document is divided into the following chapters:

- Chapter 1.0: Introduction
- Chapter 2.0: Overview and Basis of Planning Wastewater Service
- Chapter 3.0: Existing Wastewater Collection System
- Chapter 4.0: Sewer Flow Estimates
- Chapter 5.0: Hydraulic Model
- Chapter 6.0: Collection System Model Results
- Chapter 7.0: Capital Improvement Program
- Chapter 8.0: Conclusions and Recommendations

1.2 Study Area

The study area for this WCSMP is as described in the 2030 General Plan, and shown in **Figure 1-1**, which covers the entire City and its planned growth areas. However, much of the sewer system for the City is in place and performing satisfactorily. The focus of this WCSMP is developing wastewater collection system alternatives to serve the SUDP area, relative to the existing City, its existing sewers, and the City's existing wastewater treatment facility (WWTF).

In planning the wastewater collection system ("sewer system") for an area like the SUDP that is largely undeveloped, the 2030 General Plan serves as the basis for projecting build-out development conditions and the level of sewer service (i.e., flow capacity) that may ultimately be needed.

In addition to the General Plan, the City provided Stantec with information for planned land uses within the University of California Merced (UC Merced) campus and adjoining campus community. Both areas are in the SUDP and were described in separate documents including:

- UC Merced and University Community Project Final EIS/EIR, (March 2009)
- 2020 UC Merced Long Range Development Plan Recirculated Draft Subsequent Environmental Impact Report, (December 2019)

To accommodate the actual rate of development, an interim or near-term level of development scenario is also considered. The sewer system capacity needs are evaluated considering build-out of the City's ongoing planning and development areas for which the City has provided specific planning information. Considering the interim needs of the collection system allows for a phased approach in planning the ultimate build-out needs. Collectively, this information forms the basis for the analyses described in this WCSMP.

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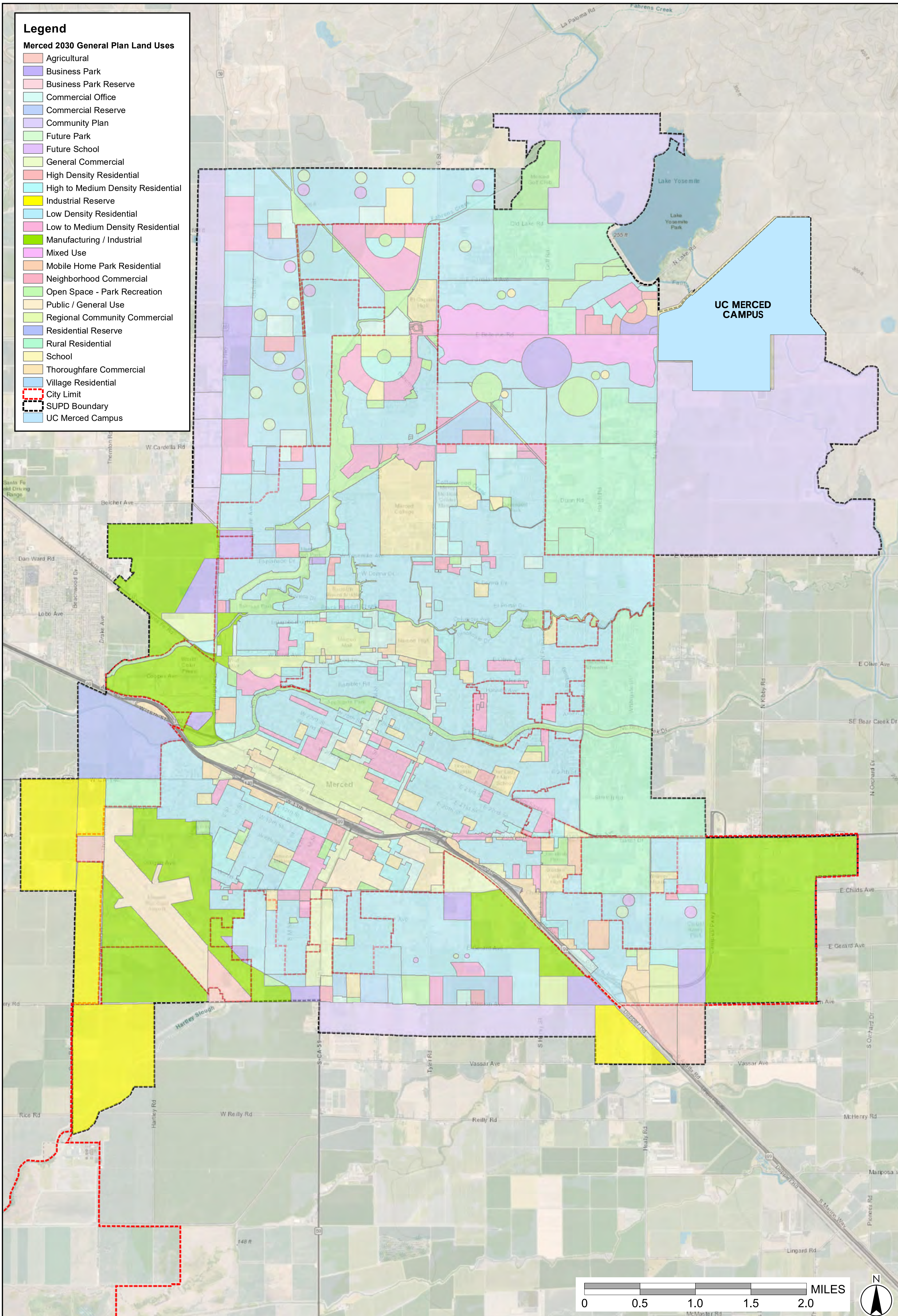

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City of Merced
Wastewater Collection System
Master Plan 2022 Update

Figure 1-1
2030 General Plan

1.3 Background

This WCSMP builds off previous City sewer planning documents, including:

- City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis (Stantec, June 2020)
- City of Merced Wastewater Collection System Draft (Stantec, December 2017)
- City of Merced Sewer Master Plan Draft (ECO:LOGIC Engineering, January 2007)
- City of Merced North Merced Sewer Master Plan Draft (ECO:LOGIC Engineering, 2002)

The most recent planning document, City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis, and the executive summary of the 2017 City of Merced Wastewater Collection System Draft are included in Appendix A. Throughout the development of these past planning documents, several sewer service alternatives have been considered for build-out of the City's planning area. The City of Merced Sewer Master Plan Draft (ECO:LOGIC Engineering, January 2007) was prepared in the context of serving the City's Vision 2015 General Plan growth projections, and the City of Merced North Merced Sewer Master Plan Draft (ECO:LOGIC Engineering 2002) was prepared to identify sewer needs in the North Merced area.

The 2017 Draft Wastewater Collection System Master Plan (2017 WCSMP) considered many alternatives, but ultimately presented two basic plans for building the wastewater collection system infrastructure needed to serve the 2030 General Plan growth projections. The foundation of the two alternatives included upgrading the City's existing wastewater treatment facility to handle full build-out flow or build a new wastewater treatment facility in North Merced to serve the northern service area. The 2017 WCSMP also considered the effluent disposal needs of these two alternatives.

As discussed in the 2017 WCSMP, the City has chosen not to build a new wastewater facility in the north and will continue to consider alternatives presented in the City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis (Stantec, June 2020) (Appendix A).

2.0 Overview and Basis of Planning Wastewater Service

This WCSMP is focused on developing plans for building new trunk sewers necessary to serve planned City growth. This plan also discusses known deficiencies with existing trunk sewers and recommends mitigation measures when feasible. The purpose of this chapter is to present an overview of the wastewater servicing strategy, basis of collection system planning, present alternatives previously considered, design conditions and criteria, and guiding principles.

This chapter is divided into the following sections:

- 2.1 Overview of Wastewater Service Planning
- 2.2 Basis of Collection System Planning
- 2.3 Alternatives Previously Considered
- 2.4 Design Conditions and Criteria

2.1 Overview of Wastewater Service Planning

The City retained Stantec to prepare an engineering analysis of probable wastewater collection system needs (a.k.a., “sewer needs”) to serve near-term and long-term City growth and development. Based on past evaluations of the City’s system, there is currently insufficient service capacity in the City’s existing sewer system to serve near-term or long-term growth.

Part of the analyses provided herein includes consideration of feasible alternative approaches to providing the needed sewer service, evaluation of those alternative approaches, recommendation of the best apparent plan for expanding the City’s sewer system to serve new growth based on information provided to Stantec by the City, and based on Stantec’s experience with planning and evaluating sewer systems like the City’s in the Central Valley.

A basic overview of the wastewater service planning approach is provided below:

1. **Update Design Criteria**: Update unit flow rates, design criteria, and future wastewater flow projections.

2. **Update Hydraulic Model:** Update the hydraulic model to reflect the updated design criteria and future flow projections.

3. **Update Capacity Needs Assessment:** Re-evaluate interim (near-term) and build-out (long-term) capacity needs based on updated model results.

4. **Develop Alternative Improvements:** Identify and recommend alternative system improvements which provide interim and build-out capacity required to serve future development. Three alternatives will be evaluated for interim and build-out levels of development.

5. **Alternatives Analysis and Recommendations:** Develop opinions of probable costs for each alternative and evaluate the feasibility of each alternative. Based on the results of alternatives analysis, recommend the best apparent alternative.

2.2 Basis of Collection System Planning

This WCSMP establishes an updated per capita design flow for use in projecting future wastewater flows. The basis of this master plan is to evaluate the impacts of these updated flow projections, identify solutions to serving the near-term and long-term capacity needs of the collection system, and develop alternative improvement recommendations that will provide capacity for interim development needed to serve North Merced under build-out conditions.

This WCSMP also identifies solutions for interim capacity improvements that also serve the needs of build-out development through an integrated approach that allows for phased capacity improvements. Providing a phased approach to capacity improvements needed for future development allows portions of the overall build-out system needs to be built and funded in increments corresponding to the actual rate of development.

Another important piece of updating this master plan includes incorporating the system capacity evaluation results presented in the Model Update and South Trunk Alternatives Analysis report prepared by Stantec in June 2020. These results include re-calibration of the existing system model, existing system model results, and alternatives presented for serving build-out development in South Merced.

2.3 Alternatives Previously Considered

The Model Update and South Trunk Alternatives Analysis (Stantec 2020) report updated the City's hydraulic model and evaluated alternative alignments to serve the South Merced service area at build-out, referred to as the south trunk sewer. Given the results of the existing system model, the objective of the south trunk analysis reevaluated the south trunk sewer proposed in the Draft 2017 WCSMP and evaluated alternatives that considered maximizing the available residual capacity in the existing collection system.

The updated hydraulic model was used to reevaluate the sizing of the WCSMP south trunk improvements and presented an alternative that leverages available residual capacity. Two alternatives were presented:

1. Alternative 1 refined the south trunk alignment as it was presented in the 2017 WCSMP, eliminating excess capacity by adjusting recommended pipe diameters and slopes. This alternative considered refinement of the proposed south trunk to eliminate excess capacity that exists due to the refined flow distribution within the model. The alignment is the same, but pipe sizes and slopes were adjusted to eliminate excess capacity within the proposed sewers while maintaining ground elevations along the proposed alignment.

2. Alternative 2 considered collection system improvements that the City intended on implementing in the near-term and limited the extent of new infrastructure by taking advantage of residual capacity in the existing system. The proposed South Merced trunk under Alternative 2 is reduced

to approximately 2.5 miles of 36-inch sewer and connects to the existing 48-inch interceptor sewer at the intersection of West Dickenson Ferry Road and South West Avenue. The proposed improvements provide a parallel relief trunk for the downstream end of the Gerard Avenue trunk and take advantage of additional capacity that would be provided by City planned improvements to address concerns with the condition (i.e., hydrogen sulfide damage) of the existing 48-inch and 42-inch trunks which deliver influent to the WWTF.

The 2017 WCSMP considered several alternatives for providing sewer service for build-out of the City's General Plan and several options; e.g., on-site wastewater systems, satellite wastewater treatment and reuse facilities, and flow equalization. The 2017 WCSMP eventually narrowed the alternatives down with the following parameters:

- Either all sewage flowing to the existing WWTF, or North Merced sewage flowing largely to a new North Merced WWTF (NMWWTF) with the remainder of the City being served by the existing WWTF.
- Gravity flow sewers are to be used to the maximum extent feasible. When trunk sewers become very deep, lift stations may be used to lift the sewage so that gravity flow can continue but at a shallower depth.
- Where topography or other factors are not conducive to cost effective use of gravity sewers, pump stations and force mains will be used with features, as may be necessary, to control odors and corrosion and to provide reliable operation during outages.
- New North Merced trunk sewers will flow in an overall westerly and southerly direction to follow topography and to minimize disruption of existing developments. This conceptual plan is compatible to either of the WWTF options being considered herein.

The 2017 WCSMP notes the design, financing, and construction of the new trunk sewer system will take several years. Members of the community would like new development to occur now, rather than years from now when the new permanent trunk sewer system is completed. There are many ways to facilitate these developments that involve use of the existing infrastructure before a new trunk sewer system is constructed.

The primary difference in the approach taken in this WCSMP update compared to the 2017 WCSMP is that the goal of this master plan is to provide an integrated phased approach (i.e., interim and build-out) to collection system planning that allows implementing the ultimate capacity needs of the community and minimizing the need for temporary facilities.

The 2017 WCSMP ultimately presented two alternatives:

- **Plan A:** The collection system takes all municipal wastewater to the City's existing WWTF located southwest of the City. The existing WWTF would be expanded, as needed, to handle 2030 General Plan flows. The effluent disposal and reuse facilities needed by the planned expansions largely exist; however, developers still need to buy their fair shares of all existing City facilities they use, including the land on which that infrastructure is located. The existing WWTF site is believed to have sufficient land and disposal potential to serve "reasonable build-out" design flow estimates of 34 to 35 million gallons per day (MGD), when needed.

- **Plan B:** The collection system takes most municipal wastewater generated by growth in North Merced to a new NMWWTF located on industrially zoned land west of the intersection of West Yosemite Avenue and Highway 59 (a.k.a. Snelling Highway). The NMWWTF site would be planned for under the 2030 General Plan with build-out capacities of approximately 14 to 15 MGD. The existing WWTF would serve the remainder of the City and its growth and would have approximate planned capacities for the 2030 General Plan, and build-out conditions of 20 MGD. Both the new NMWWTF and existing WWTF would be built and expanded in stages, or phases, as needed. The NMWWTF would also need new effluent disposal and reuse facilities planned for in the 2030 General Plan and the build-out flow conditions. This is because there are no existing effluent facilities or related effluent discharge permits for the NMWWTF site; whereas, they do exist at the WWTF site.

As discussed in the 2017 WCSMP, the City selected Plan A and will not build a new NMWWTF and will continue to expand its existing WWTF as necessary to accommodate growth. This WCSMP update considers alternative new trunk alignments and existing system improvements that will ultimately convey wastewater to the City's existing WWTF.

2.4 Design Conditions and Criteria

Chapters 4 and 5 discuss the design conditions and criteria used in evaluating and sizing the sewer system. These design conditions and criteria include:

- **The design storm:** What rainfall condition is the sewer system designed to handle without exceeding sewer performance design criteria.
- **Sewer performance design criteria:** How high the hydraulic grade line (HGL) of the water in the sewer is allowed to rise under design conditions. Also, the design hydraulic friction coefficient "C" used in the sewer flow analyses.
- **Design hydraulic peaking factor (PF):** By what multiplier do typical sewer flow rates increase above typical flow conditions under design storm conditions occurring during the day when peak sewer flows naturally occur (i.e., sewage flow is not constant during the day).
- **Design wastewater flows**: flows from various types of urban development/land use zoning.

3.0 Existing Wastewater Collection System

This chapter presents a summary of the existing collection system, planning information, and the updated data that was collected, reviewed, and incorporated into the model as part of this effort. Wastewater flow data was collected in 2019 and used to redistribute flow and calibrate the model of the existing collection system along with current information related to existing sewer service accounts and service commitments. Inputs for the future system service areas were updated using recent development and land use information provided by the City to simulate future system wastewater flows.

This chapter is divided into the following sections:

- 3.1 Existing Trunk Network
- 3.2 Existing Wastewater Flow
- 3.3 Land Use Data and Service Area

3.1 Existing Trunk Network

The City owns and operates a sewer collection system serving a population of about 83,700 people. The City's customer base includes residential, commercial, industrial, and public users, including UC Merced. The wastewater is conveyed by the collection system to the City's WWTF located southwest of the current extents of the City. The collection system consists of over 400 miles of gravity flow sewers that are 6-inch diameter and larger. The system is commonly described as having two geographical regions, North Merced and South Merced, delineated by Bear Creek which runs approximately east to west through the middle of the City.

The only major pumping facilities that exist within the trunk sewer system are the Highway 59 Pump Station (H59PS) and the Bellevue Ranch Pump Station (BRPS). The H59PS is located north of Fahren's Creek near Highway 59, and the BRPS is located north of Black Rascal Creek in the Bellevue Ranch development. There are several smaller pump stations within the system that serve small portions of the service area, such as individual subdivisions. These smaller pump stations are not considered part of the trunk sewer system and are excluded from the hydraulic model.

The City's existing system contains no raw sewage equalization basins, on-site sewage systems[1], septic tank effluent pump systems, nor any "unusual" sewer systems, e.g., vacuum, grind, or pump systems.

The focus of this evaluation is on the existing large primary trunk sewers within the existing collection system which are included within the skeletonized model. Trunk sewers are the large main branches of the collection system conveying flow from smaller collector sewers to the WWTF. The existing collection system and primary trunk sewers within the northern and southern regions of the system are shown on **Figure 3-1** and listed in **Table 3-1.**

[1] On-site sewage systems include septic/leach field systems serving rural residences within the City limits, which are operated by the property owner or resident, but none that are owned or operated by the City.

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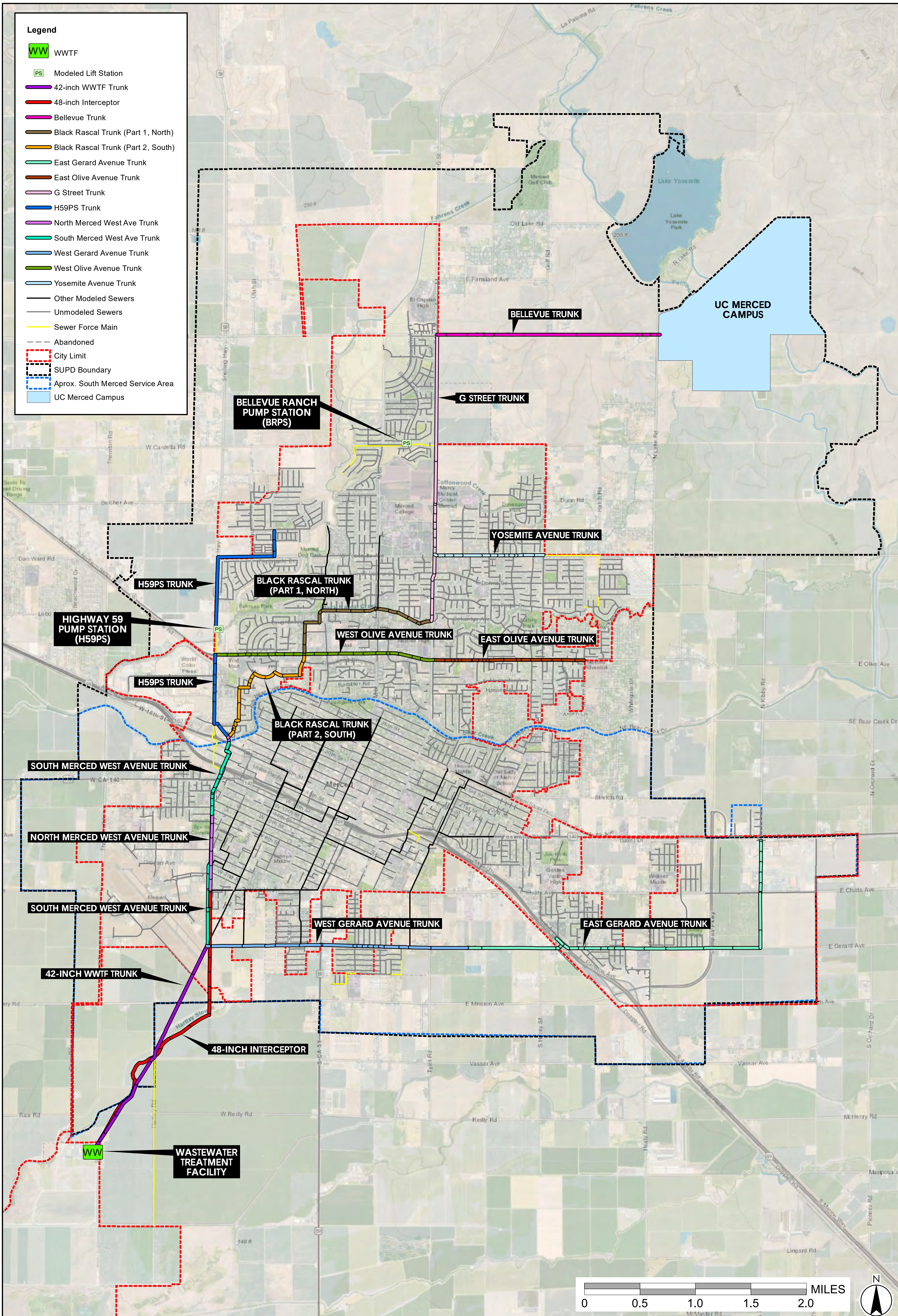

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Figure 3-1
Existing Wastewater Collection System

Table 3-1. City of Merced Primary Trunk Sewers

Trunk Sewer	Diameter Range (in)	Location/Description	Vicinity
Bellevue Trunk	18 to 24	Bellevue Road from UC Merced to G Street	North Merced
G Street Trunk	27 to 30	G Street between Bellevue Road and Black Rascal Ravine/Campus Drive	North Merced
Yosemite Avenue Trunk	18	Yosemite Avenue between Parsons and G Street	North Merced
Black Rascal Trunk (Part 1, North)	30 to 43	Following Black Rascal Ravine near Campus Drive from G Street to West Olive Avenue Trunk	North Merced
East Olive Avenue Trunk	12 to 18	Olive Avenue between McKee Road and G Street	North Merced
West Olive Avenue Trunk	18 to 21	Olive Avenue G Street and Hwy 59	North Merced
Black Rascal Trunk (Part 2, South)	42	Devonwood / Stoneybrook Drive between Olive Avenue and Bear Creek	North Merced
H59PS Trunk	18 to 27	Hwy 59 from the H59PS to Bear Creek	North Merced
North Merced West Ave Trunk	36 to 42	West Avenue between Bear Creek and West Childs Avenue	North Merced
48-inch Interceptor	48	Interceptor pipeline from West Childs Ave to the WWTF	North Merced
East Gerard Avenue Trunk	18 to 36	Kibby Road from Hwy 140 to East Gerard Avenue continuing west in Gerard Avenue to Tyler Road	South Merced
West Gerard Avenue Trunk	36	Remaining portion of the Gerard Avenue trunk from Tyler Road to West Avenue	South Merced
South Merced West Ave Trunk	18 to 27	West Avenue from Hwy 59 to Gerard Avenue running parallel to the North Merced West Avenue Trunk	South Merced
42-inch WWTF Trunk Sewer	42	Trunk sewer conveying flow from the intersection of Gerard Avenue and West Avenue to the WWTF	South Merced

Key:
H59PS = Highway 95 Pump Station; UC = University of California; WWTF = wastewater treatment facility

Several creeks flow through the City and were factors in the configuration of the City's trunk sewer system. To the extent feasible, the City has constructed sewers that allow gravity flow at creek crossing locations. This minimizes the number of pump stations and associated operation and maintenance costs that would otherwise be required in the system.

In addition to the main trunks of the City's domestic sewer system, a portion of the Western Industrial Area located west of Highway 59, northeast of Highway 99, and between Bear Creek and Black Rascal Creek is also served by a dedicated 14-inch force main originally constructed for use by a single user (the City refers to this as the "Old Ragu Line"). This conveyance runs south, all the way to the City's WWTF where it previously discharged waste to existing agricultural fields. This line is not currently used and was not modeled as part of this master planning effort. A separate assessment of the dedicated industrial line was summarized in a document entitled Merced WWTF Industrial Waste Acceptance Evaluation (Stantec, May 2014). This dedicated line is reserved by the City for potential future industrial uses which may be located within the Western Industrial Area.

The current wastewater needs of the Western Industrial Area are served via a collector sewer which flows by gravity east along Cooper Avenue to a trunk sewer along Highway 59. The trunk at Highway 59 conveys flow from the Western Industrial Area, the Highway 59 pump station located north of Black Rascal Creek, and the trunk at West Olive Avenue, south to the City's 48-inch interceptor, which then conveys combined flows to the WWTF.

3.2 Existing Wastewater Flow

Wastewater sources in the City of Merced include residential customers, commercial users, industrial users, and public uses; i.e., City administrative offices and public service facilities that include libraries, parks, and schools. A majority of the wastewater generated within the service area originates from residential customers.

Infiltration and inflow (I/I) of rainwater and/or shallow groundwater into the City's wastewater collection system also contributes to the volume of water that must be conveyed by the collection system. I/I can enter the collection system through different mechanisms. Infiltration is non-wastewater that enters the collection system via subsurface means such as damaged pipes, leaky pipe joints, leaky service connections and manholes. Inflow is non-wastewater that enters the collection system via more direct routes, such as leaky manhole lids, roof gutters, or yard drains inappropriately connected to the sewer system, sewer clean-outs, etc. Peak volumes of I/I generally occur during rainy weather.

The Merced wastewater collection system is designed to provide flow capacity to meet the level of service (LOS) to accommodate a peak flow resulting from a 10-year, 24-hour design storm event. A 10-year, 24-hour design storm in the City of Merced has a total rainfall depth of 2.31 inches (NOAA Atlas 14, Volume 6, Version 2, point precipitation frequency estimates for the City of Merced). Until Water Year 2017, the lack of significant rainfall prevented accurate forecasts of peak wet weather flow (PWWF) conditions in the existing wastewater collection system. The water year 2017 wastewater collection system flow and performance data provided by the City were incorporated into the analyses presented in the 2017 WCSMP, but the hydraulic model used in the assessment had not been recalibrated from its original development in 2007.

New flow monitoring data was collected as part of the Model Update and South Trunk Alternatives Analysis (Stantec 2020). V&A Consulting Engineers (V&A) monitored flows within the wastewater collection system between November 22, 2019, and December 25, 2019. During this period, the system experienced rainfall equal to 2- to 5-year, 24-hour events and 5- to 10-year events which provided sufficient system response for model calibration.

Open channel flow monitoring was performed at ten locations to provide sanitary flow data which allowed detailed definition of sewersheds within the model during the conversion and recalibration. The specific flow monitoring locations provide a higher resolution of flow distribution within the hydraulic model than existed in the previous international computer management (ICM) model used in the analysis presented in the 2017 WCSMP. The Flow Monitoring Site Reports provided by V&A, including data, graphs and information, are included in Appendix B.

A summary of the flow monitoring locations, sewershed characteristics, and flow data provided by V&A is presented in **Table 3-2**. The measured average dry weather flow (ADWF) and PWWF are presented for each monitoring site, along with the calculated wet weather PF. The PF is defined as the ratio of PWWF to ADWF for each monitoring location. The City's trunk sewers are designed using a PF of 2.3 per City design standards. PFs that exceed this design criteria were observed at Site 1 and Site 9 during the flow monitoring study. Discussions with City staff indicate that ongoing construction in these areas may have contributed to the high wet weather response in these sewersheds.

Table 3-2. V&A Flow Monitoring Data

V&A FM ID	FM MH ID	Pipe Size (in)	Trunk Sewer	Location/ Description	Area (Acres)	ADWF (MGD)	PWWF (MGD)	PF
1	1M149	18	Yosemite	East Yosemite Ave	444	0.38	1.12	2.95
2	5M040	30	G Street	Camp Drive West of G St	590 [1]	1.03	2.34	2.27
3	6M376	21/24	Hwy 59	Hwy 59 near Olive South of RR	386	0.90	1.89	2.10
4	6M125	43	Black Rascal (North)	Meadows Ave, North of Olive	521	1.48	3.15	2.12
5	6M161	21	Olive	Olive Ave, East of Meadows	873	0.67	1.46	2.18
6	16M071	39	Black Rascal (South)	North of Hwy 99 Crossing	391	3.43	6.59	1.92
7	16M050	42	42-inch Trunk	Near Airport LS discharge	482	3.36	7.29	2.17
8	16M192	36	Gerard Trunk West	Gerard Avenue trunk at West Avenue	2,122	2.76	6.00	2.17
9	[39729]	36	Gerard Trunk East	Gerard Avenue trunk East of Tyler Rd	754	0.52	1.37	2.63
10	16M097	48	48-inch Interceptor	Interceptor Sewer along Gerard Avenue	22	3.52	6.71	1.90

Note:
[1] Only 200 acres of UC Merced campus is included in the sewershed area presented for Site 2.
Key:
FM = Flow Monitor, ID = Identification Number, LS = lift station, MGD = million gallons per day
MH = manhole, PF = Peaking Factor, V&A = V&A Consulting Engineers, Inc.

V&A noted that Site 8 and Site 10 are in proximity to each other, and both had a large amount of sediment build-up. High amounts of sediment at the monitoring location can impact the quality of the associated flow monitoring data. They also noted that generally, there was a noticeable decrease in observed flows during the Thanksgiving and Christmas holidays. This presumably may be due to UC Merced student population and holiday travel. V&A cautions that ADWF rates and wet weather flow responses may not have been at full strength and further noting that the data may not be representative of average conditions due to the timing of the study, which took place during the holiday season. The existing collection system and flow monitoring locations from this study are presented in **Figure 3-2**.

As discussed, additional flow monitoring data was collected as part of this effort. This flow data is further described in **Chapter 4.0** as part of the per capita flow analysis.

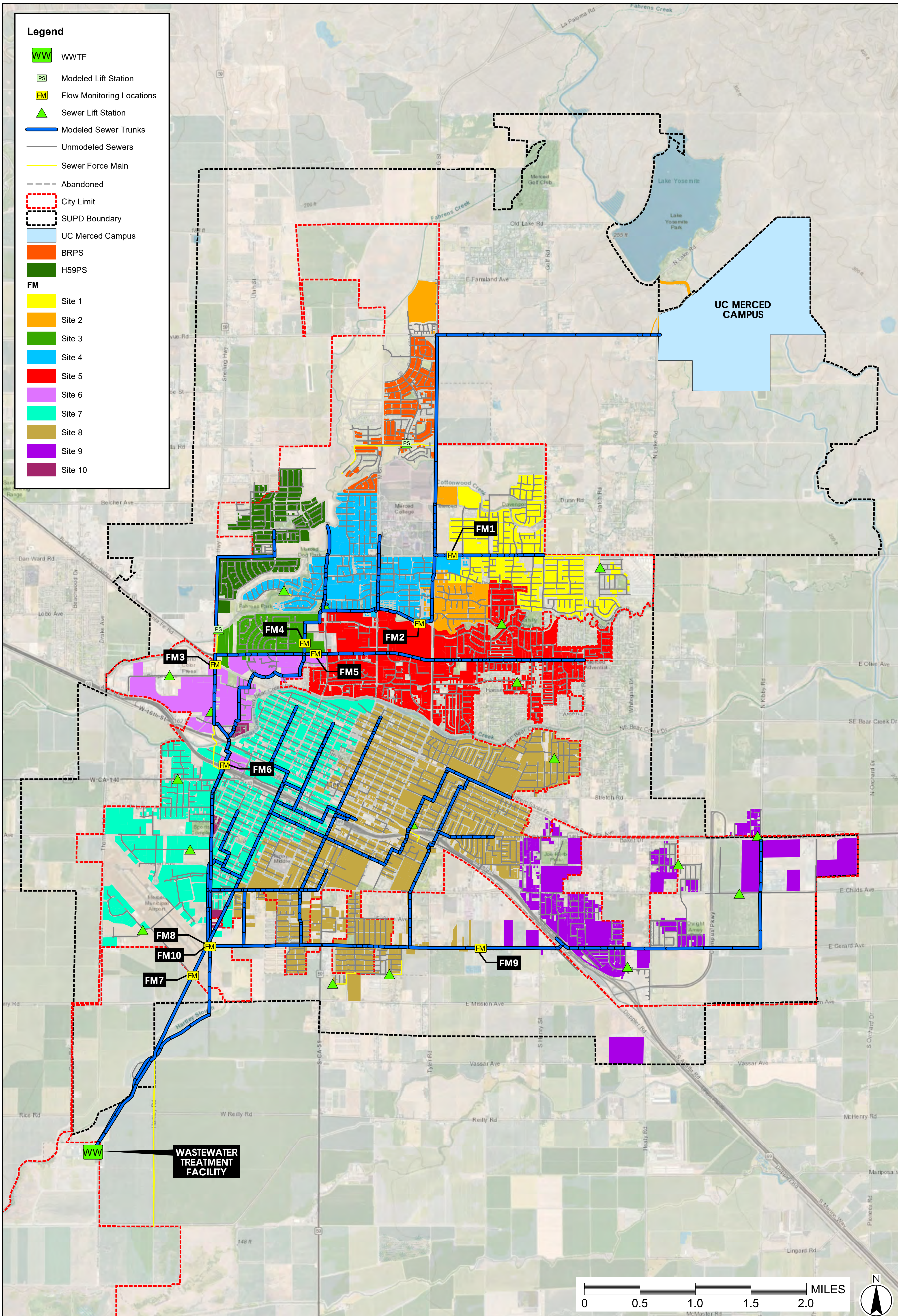

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Figure 3-2
Flow Monitoring Locations – V&A Flow Monitoring Study (Nov-Dec 2019)

3.3 Land Use Data and Service Area

The purpose of this section is to present the City's land use data and service area divisions and how they relate to the collection system capacity analysis.

3.3.1 GENERAL PLAN LAND USE DATA

Land uses from the 2030 General Plan, supplemental specific plan, and pre-annexation information provided by the City were used in projecting wastewater flows at build-out of the City limits and the SUDP. The 2030 General Plan is shown in **Figure 1-1**. Land use planning areas applicable to this WCSMP update is described in detail in this section and presented in **Figure 3-3**. These land uses constitute the planning area for this document.

3.3.2 EXISTING SEWER SERVICE CONNECTIONS

The City provided account information for each of its existing sewer service connections, including the address, assessor's parcel number, and the number of equivalent dwelling units (EDU) associated with each service account. An EDU is a unit of measure that normalizes all land use types to the equivalent wastewater demand of one single-family residential unit. For example, if a commercial service account has five EDUs, it produces wastewater equivalent to that of five single-family residential service accounts.

The existing system model was updated as part of the City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis (Stantec, June 2020) and is still considered to be representative of existing system conditions. This evaluation included updating the existing sewer service account parcel file for use in the existing system model. The updated file reflects parcels, based on data provided by City staff in early 2020, with connected accounts during the time of the flow monitoring study (November–December 2019).

Existing service area information is summarized in **Table 3-3**. The number of existing EDUs was approximated by the City and should not be considered an exact number, and flow for the existing system was determined based on actual recorded flows.

Table 3-3. Existing Service Area Data

Service Area	Total Area (Acres)	Total EDUs
Total Existing Service Area	6,697	33,029

Key:
EDU = equivalent dwelling unit

3.3.3 PLANNED SEWER SERVICE COMMITMENTS AND INTERIM DEVELOPMENT

Planned sewer service commitments consist of parcels that have anticipated future sewer services but are not currently connected to the system. This includes the service commitment associated with UC Merced, areas identified in the City's tentative subdivision map database, properties which have received entitlements to develop and are only partially built or have not yet been started, vacant parcels within City limits, and other parcels identified by City staff.

Wastewater flow assumed to be generated from parcels with service commitments is projected using an EDU count assigned to each parcel. The number of EDUs is converted to a flow projection using the City's standard flow per EDU unit factor. Where refined planning information is available, a specific EDU count is estimated considering the planned number of dwellings and more refined plans for non-residential areas. Where this information is not available, the number of EDUs assigned to each parcel is estimated using its associated land use and the EDU density for each land use designation listed in **Table 3-4**.

Wastewater flow projections for parcels with sewer service commitments (committed parcels) are estimated using one of the following criteria:

- **General Plan Land Use**: Land use outlined in the City's General Plan is used along with the associated land use-based wastewater generation rates, described in the following chapter.
- **City Specified Land Use**: City provided updated land use or EDU information that is used along with the associated land use-based wastewater generation rates, described in the following chapter.
- **Single Lot/1 EDU:** Single residential lots were identified and counted as one EDU by the City.
- **Specific Development Plan:** City provided specific development plans. Single lots were counted as one EDU, and specific land use information was used in conjunction with wastewater generation rates.
- **Open Space/ No Flow Areas:** These parcels are not expected to contribute wastewater to the collection system and were removed from the model.
- **UC Merced:** The committed ADWF from the University beyond their existing flow.

Table 3-4. Interim Service Area Data

Service Area	Total Area (Acres)	Total EDUs
General Plan Land Use Parcels	2,737	19,669
City Specified Land Use Parcels	82	788
Single Lot Parcels/ 1 EDU	407	2,129
Specific Development Plan Parcels	311	2,417
UC Merced (ADWF exceeding existing)	380	0.13 MGD [1]
Total Interim Commitments	**3,918**	**25,004**

Note:
[1] UC Merced estimate from the 2020 UC Merced Long Range Development Plan Recirculated Draft Subsequent Environmental Impact Report, (December 2019).
Key:
ADWF = Average Dry Weather Flow (observed during the dry season)
EDU = equivalent dwelling unit
MGD = million gallons per day

3.3.4 FUTURE BUILD-OUT MERCED SERVICE AREA

The City must also plan how to serve the remaining parcels within the SUDP. These areas do not have an existing sewer service connection and have not been identified as part of planned interim development. The full development of these future parcels represents build-out of the City's planning area and sewer service area.

The City provided planning information for its current annexation project applications. Pre-annexation applications were reviewed to determine the number of EDUs associated with each development area for purposes of this master plan. A summary of pre-annexation areas and specific EDUs is presented in **Table 3-5**. This information was used to approximate wastewater flow for these areas and build-out development phasing.

Table 3-5. Pre-annexation Areas, Application EDU Summary

Annexation	Gross Area	Single-Family Units	Multi-family Units	Commercial /BP/Hospital	Mixed Use	Total EDUs
	(Acres)	(EDU)	(EDU)	(EDU)	(EDU)	(EDU)
M and Bellevue	30.9	323	0	94	0	417
Rogina	148.5	545	270	211	0	1,026
Yosemite and Gardner–MU Area	64.3	570	0	58	0	628
Yosemite and Gardner–Church/School	17.3	0	0	67	0	67
Yosemite and Gardner–R1		4	0	0	0	4
Yosemite and Gardner–UT		8	0	0	0	8
Yosemite Lake Estates	1,022.9	2,689	0	0	0	2,689
University Vista	286.4	210	2,272	1,218	1,694	5,394
UC Village	34.2	922	0	109	60	1,091
Branford Point	45.9	347	127	1,074	1,157	2,705
Virginia Smith Trust	646.0	3,857	0	0	0	3,857
Parrish	4.3	0	0	25	0	25
Total:	**2,300**					**17,912**

Key:
BP = Business Professional
EDU = equivalent dwelling unit
MU = Mixed Use

After completing the hydraulic model of the interim system and recommended improvements, the amount of available capacity for pre-annexation areas was evaluated to identify the threshold of EDUs that could be added by implementing the proposed improvements.

The Draft 2017 WCSMP included specific wastewater flow estimates for UC Merced and the north and south campus community. As previously discussed, the estimate for UC Merced has been updated with the most recent information provided in the UC Merced Long Range Development Plan. The north campus community is included within the pre-annexation areas as the Virginia Smith Trust with updated specific planning formation.

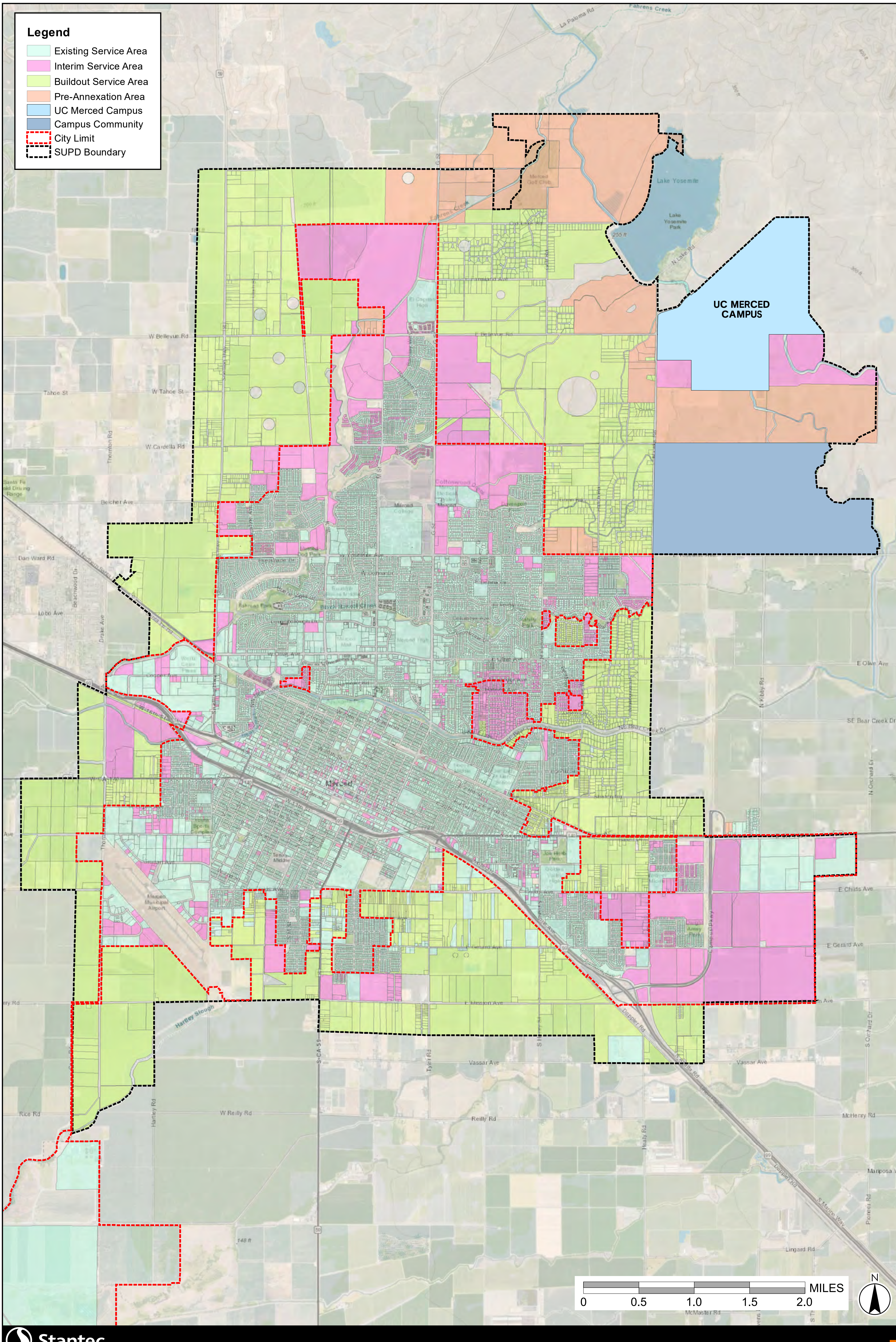
No updated planning information has been provided for the south campus community. Therefore, the previous ADWF estimate from Table 2.0-8 of the UC Merced and University Community Project Final EIS/EIR (March 2009) has been used as the basis. The previous south campus community flow estimate, 1.04 MGD, was scaled using the ratio of the updated wastewater unit rate to the previous wastewater unit rate (208/257), resulting in an updated ADWF projection of 0.84 MGD. The updated per capita wastewater unit rate and details regarding the per capita analysis are provided in **Section 4.1**. Flow from the remaining SUDP parcels is estimated based on General Plan land use designations and wastewater generation rates presented in the following chapter.

Table 3-6. Build-out Service Area Data

Service Area	Total Area (Acres)	Total EDUs
Pre-annexation Areas	1,710 [1]	17,912
South Campus Community	1,106	0.84 MGD [2]
Remaining Parcels within SUDP (General Plan) Boundary	9,313	49,642
Total	**12,129**	**67,554**

Notes:
[1] Net area listed here excludes open spaces and non-wastewater contributing areas, which are included in the total area listed in **Table 3-5**.
[2] 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.
Key:
EDU = equivalent dwelling unit
EIS/EIR = Environmental Impact Statement/Environmental Impact Report
MGD = million gallons per day
SUDP = Specific Urban Development Plan
UC = University of California

The existing, planned, and future service areas are shown in **Figure 3-3**.



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City of Merced
Wastewater Collection System
Master Plan 2022 Update

Figure 3-3
Existing, Planned, and Future Sewer Service Areas

3.3.5 UPDATED STUDY AREA LAND USE DATA SUMMARY

Land use data in the form of EDU projections for entitled, pre-annexation, and future development areas is summarized below in **Table 3-7**.

Table 3-7. Summary of Planning Area Land Use Data

Service Area	Total Area (Acres)	Total EDUs
Total Existing Service Area [1]	6,497	33,029
UC Merced [2]	200	673
Total Existing	**6,697**	**33,702**
Interim Service Area		
General Plan Land Use Parcels	2,737	19,669
City Specified Land Use Parcels	82	788
Single Lot Parcels/ 1 EDU	407	2,129
Specific Development Plan Parcels	311	2,417
UC Merced (committed ADWF exceeding existing, 0.13 MGD) [2]	380	625
Pre-Annexation Areas [5]	155	9,000
Subtotal Interim	**4,072**	**34,628**
Build-out Service Area		
Pre-Annexation Areas (Remaining)	1,555	8,912
Remaining Parcels within SUDP (General Plan) Boundary [3]	9,313	49,642
Campus Community (planning ADWF estimate, 0.84 MGD) [4]	1,106	4,038
Subtotal Build-out	**11,974**	**62,592**
Total Interim Service Area	**10,769**	**68,330**
Total Build-out Service Area	**22,743**	**130,922**

Notes:
[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 future wastewater flow equates to the projection 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 are listed here and are not reflected in model results. Additional information is provided in **Section 6.3.3.4**.

Key:
ADWF = average dry weather flow (observed during the dry season)
EDU = equivalent dwelling unit
EIS/EIR = Environmental Impact Statement/Environmental Impact Report
MGD = million gallons per day
SUDP = Specific Urban Development Plan
UC = University of California

4.0 Sewer Flow Estimates

The purposes of this chapter are to present the future wastewater flow projection methodology and design criteria and to describe the City's per capita flow investigation and analysis. To project future wastewater flows from undeveloped area land use data and demographics are correlated with wastewater flow unit rates; and from that correlation, average wastewater flows for future development are forecasted under design conditions. The information presented is used to model existing system performance, size near-term system improvements, and size system improvements needed to serve the needs at build-out of the 2030 General Plan.

Average design wastewater flows were estimated for future City development conditions by multiplying residential development acreages and population estimates, commercial or industrial acreage, and public use acreages (such as schools) by unit flow generation rates. PFs from future development areas were estimated by applying PFs to average flows, as described in more detail in this chapter.

This chapter is divided into the following sections:

- 4.1 2021 Per Capita Flow Investigation
- 4.2 Wastewater Generation Rates
- 4.3 Peak Flow Estimates and Methodology
- 4.4 Future Flow Projections Summary

4.1 2021 Per Capita Flow Investigation

V&A was retained by the City to perform sanitary sewer flow monitoring within the City. Flow monitoring was performed from September 27, 2021, to November 1, 2021, at eighteen flow monitoring sites and three pump station locations. The purposes of the study were as follows:

1. Establish the baseline sanitary sewer flows at the flow monitoring sites.
2. Measure the peak flow characteristics of the subject pipes during the flow monitoring period.
3. Establish flow rates for the various land use categories.

The flow monitoring locations and collection areas are summarized in **Table 4-1** and shown in **Figure 4-1**.

Table 4-1. Flow Monitoring Locations and Areas

FM Site ID	Site Name	Basin Area (Acres)	Land Use Designation	Sewer Accounts (EDU)			
				Single Family	Multi-Family	Non-Residential	Total
1_1	LowDen-1	849.6	Low Density Residential	2,641	0	-	2,641
1_2	LowDen-2	47.4	Low Density Residential	170	184	-	354
1_3	LowDen-3	84.5	Low Density Residential	267	142	-	409
1_4	LowDen-4	274.4	Low Density Residential	749	251	-	1,000
1_5	LowDen-5	55.9	Low Density Residential	342	0	-	342
1_6	LowDen-6	122.7	Low Density Residential	400	0	-	400
1_7	LowDen-7	76.8	Low Density Residential	254	0	-	254
1_8	LowDen-8	44.9	Low Density Residential	328	0	-	328
1_9	LowDen-9	37.7	Low Density Residential	149	0	-	149
1_10	HiMedDen-2	33.8	High to Medium Density Residential	0	296	-	296
2_1	Mobile-1	26.3	Mobile Home Park Residential	215	0	-	215
2_2	Mobile-2	26.3	Mobile Home Park Residential	155	0	-	155
2_3	HIDen-1	31.4	High Density Residential	0	315	-	315
2_4	PlanDev-1	257.3	Planned Development Residential	1,083	96	-	1,179
2_5	PlanDev-2	309.9	Planned Development Residential	1,694	0	-	1,694
2_6	Industrial-1	1,065.9	Industrial	-	-	5	5
2_7	Industrial-2	157.2	Industrial	-	-	41	41
2_8	Industrial-3	265.9	Industrial	-	-	12	12
2_9	OfficeComm-2	41.1	Commercial Office	-	-	4	4
2_10	UCMerced	#N/A	University of CA–Merced Campus	-	-	-	-
2_11	WWTF	#N/A	Wastewater Treatment Plant Influent	-	-	-	-

Key:
EDU = equivalent dwelling unit
FM = Flow Monitor
ID = Identification Number
N/A = Not Applicable
WWTF = wastewater treatment facility

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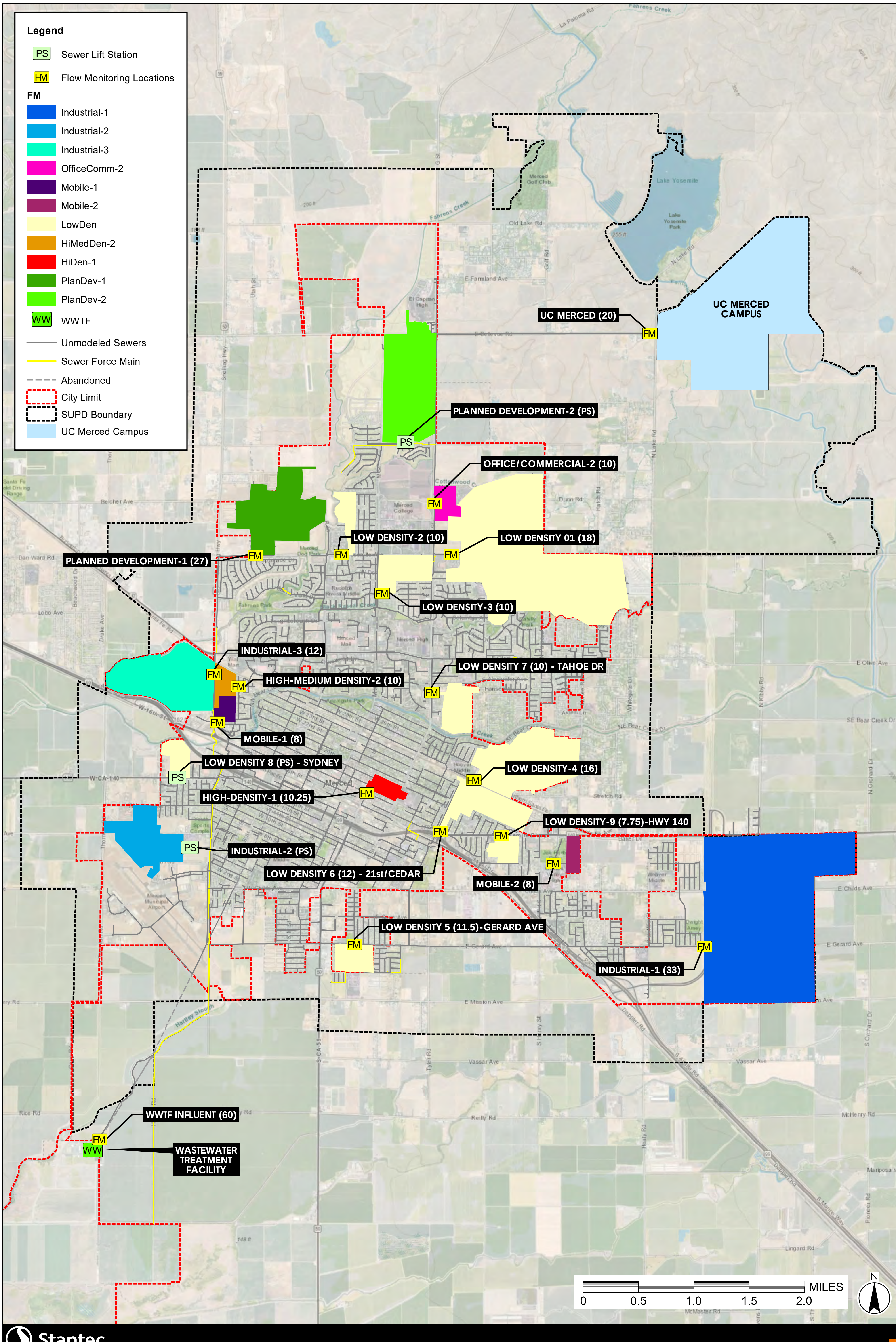

Stantec

City of Merced
Wastewater Collection System
Master Plan 2022 Update

Figure 4-1
Flow Monitoring Locations – V&A Flow Monitoring Study (Sept-Nov 2021)

4.1.1 FLOW MONITORING DATA

V&A produced a flow monitoring report that summarized the ADWF, peak measured flow, PF, pipe diameter, max reported flow depth, and the depth over diameter ratio for each flow monitoring location. The data reported by V&A is summarized in **Table 4-2**. The full V&A Flow Monitoring Report can be found in **Appendix B**.

Table 4-2. 2021 Flow Monitoring Data

FM Site ID	Site Name	ADWF (MGD)	Peak Measured Flow (MGD)	Peaking Factor	Pipe Diameter (in)	Max Depth (n)	Max d/D Ratio
1_1	LowDen-1	0.43	0.84	1.9	18	7.18	0.4
1_2	LowDen-2	0.05	0.17	3.2	10	4.14	0.41
1_3	LowDen-3	0.04	0.12	2.8	10	2.78	0.28
1_4	LowDen-4	0.18	0.33	1.9	16	5.61	0.35
1_5	LowDen-5	0.09	0.21	2.5	11.5	2.99	0.26
1_6	LowDen-6	0.08	0.19	2.2	12	5.74	0.48
1_7	LowDen-7	0.05	0.15	3.1	10	4.26	0.43
1_8	LowDen-8	0.12	0.31	2.6	N/A [1]	N/A [1]	N/A [1]
1_9	LowDen-9	0.02	0.07	3.6	7.75	2.31	0.3
1_10	HiMedDen-2	0.06	0.16	2.8	10	3.22	0.32
2_1	Mobile-1	0.03	0.06	2.1	8	2.19	0.27
2_2	Mobile-2	0.02	0.08	3.8	8	6.33	0.79
2_3	HIDen-1	0.05	0.25	4.8	10.25	3.64	0.36
2_4	PlanDev-1	0.35	0.69	1.9	27	6.5	0.24
2_5	PlanDev-2	0.28	0.54	1.9	N/A [1]	N/A [1]	N/A [1]
2_6	Industrial-1	0.16	1.39	8.8	33	4.95	0.15
2_7	Industrial-2	0.03	0.16	5.3	N/A [1]	N/A [1]	N/A [1]
2_8	Industrial-3	0.35	0.89	2.6	12	7.74	0.65
2_9	OfficeComm-2	0.01	0.02	4.1	10	3.13	0.31
2_10	UC Merced	0.12	0.56	4.9	21	4.47	0.21
2_11	WWTF	6.88	9.78	1.4	60	13.64	0.23

Note:
[1] Stations 1_8, 2_5, and 2_7 were monitored using pump station loggers, therefore there is no pipe diameter or depth information associated with these monitoring locations.

Key:
ADWF = Average Dry Weather Flow (observed during the dry season)
d/D = depth over diameter ratio
FM = Flow Monitor
ID = Identification Number
MGD = million gallons per day
n = Manning's Roughness
N/A = Not Applicable
UC = University of California
WWTF = wastewater treatment facility

4.1.2 PER CAPITA ANALYSIS

The City's flow per capita was calculated using the V&A reported flow data and the number of sewer accounts contributing to each flow monitoring location as provided by the City. The results of the per capita analysis are shown in **Table 4-3**. The current per capita density of single-family and multi-family units was extracted from the City's most recent Financing Plan and Impact Fee Update Report (December 2021) prepared by Economic and Planning Systems, Inc., for use in determining population per sewershed in this analysis:

> *"Based on the U.S. Census Bureau's American Community Survey, single-family units average 3.20 persons per household and multi-family units average 2.54 units per household."*

Table 4-3. Wastewater Flow Per Capita Results

FM Site ID	Site Name	Population			ADWF	Per capita
		Single Family (3.20 persons/EDU)	Multi-Family (2.54 persons/EDU)	Total	(MGD)	(gpcd)
1_1	LowDen-1	8,452	0	8,452	0.43	51
1_2	LowDen-2	544	468	1,012	0.05	51
1_3	LowDen-3	855	361	1,216	0.04	N/A [1]
1_4	LowDen-4	2,397	638	3,035	0.18	59
1_5	LowDen-5	1,095	0	1,095	0.09	78
1_6	LowDen-6	1,280	0	1,280	0.08	66
1_7	LowDen-7	813	0	813	0.05	62
1_8	LowDen-8	1,050	0	1,050	0.12	N/A [1]
1_9	LowDen-9	477	0	477	0.02	42
1_10	HiMedDen-1	0	752	752	0.06	76
2_1	Mobile-1	688	0	688	0.03	41
2_2	Mobile-2	496	0	496	0.02	40
2_3	HIDen-1	0	801	801	0.05	65
2_4	PlanDev-1	3,466	244	3,710	0.35	95
2_5	PlanDev-2	5,421		5,421	0.28	52
					Average Per Capita Flow: [2]	**60**

Notes:

[1] Flow measured by lift station loggers was omitted from this analysis due to the level of error associated with flow measurement associated with wet-well volume. The average wastewater flow per capita in the City of Merced equates to 60 gpd. Two of the residential sewershed areas were excluded from the assessment due to inconsistencies in flow recording. Flow from these monitoring locations was calculated based on pump station loggers, which have a higher level of error associated with them due to the accuracy of the calculated wet-well volume.

[2] Please note that a 5 gpcd factor of safety is applied to this value to give the final per capita flow rate of 65 gpcd used in this master plan.

Key:
ADWF = average dry weather flow (observed during the dry season)
EDU = equivalent dwelling unit
FM = flow monitor
gpcd = gallons per capita per day
gpd = gallons per day
ID = identification number
MGD = million gallons per day

The average wastewater flow per capita in the City of Merced equates to 60 gpd, as shown in **Table 4-3**. Two of the residential sewer shed areas were excluded from the assessment due to inconsistencies in flow recording. Flows from these monitoring locations were calculated based on pump station loggers, which have a higher level of error associated with them due to the accuracy of the calculated wet-well volume.

4.1.3 RECOMMENDED PER CAPITA WASTEWATER GENERATION RATE

The recommended per capita wastewater generation rate adds 5 gallons per capita per day (gpcd) factor of safety to the average value determined in the per capita flow analysis. This updates the City's standard per capita flow to 65 gpcd from 85 gpcd used in previous master planning efforts. The EDU density (the number of persons per EDU) was also adjusted to reflect the most recent census data recorded in the City's Financing Plan and Impact Fee Update Report (December 2021).

Using these updated values, the unit wastewater generation rate is adjusted to 208 gpd/EDU from 257 gpd/EDU used in previous planning efforts. This adjustment also impacts the land-use based wastewater generation rates used to project wastewater flows from future developments within the planning area. These unit flow rates are based on residential densities discussed in the City's General Plan and discussed in more detail in section 4.2.

The recommended per capita wastewater generation rate and updated average residential density is used to update the City's standard wastewater unit rate per EDU as shown in **Table 4-4**.

Table 4-4. Unit Rate Update Summary

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

Notes:
[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 and Planning Systems, Inc.
[3] The 2030 General Plan defines the average residential density within the City's SUDP as 3.02 persons/unit.
Key:
EDU = equivalent dwelling unit
gpcd = gallons per capita per day
gpd = gallons per day
SUDP = Specific Urban Development Plan

4.2 Wastewater Generation Rates

Land uses within the City's planning area are established by the City's 2030 General Plan, and supplemental specific plan information provided by the City serves as the basis to estimate future wastewater flow rates for future planning scenarios evaluated in this master plan. This section presents the unit rates used to project flow from this data.

4.2.1 RESIDENTIAL UNIT DENSITIES

Average wastewater flow estimates for land uses described in the City's General Plan are derived using land use-based unit densities and wastewater generation rates. For undeveloped residential lands within the planning area, specific residential land uses were assigned by the 2030 General Plan. Dwelling unit density factors (units/acre) applied to the various types of residential land uses are unchanged from the 2017 WCSMP and summarized in **Table 4-5**.

Table 4-5. General Plan Residential Density Definitions

Residential Land Use	General Plan Residential Density (units/acre) [1]	Residential Density Used in this Master Plan (units/acre) [1]
Rural	1.0 to 3.0	2
Low Density	2.0 to 6.0	4.5
Low-Medium Density	6.1 to 12.0	8.5
High-Medium Density	12.1 to 24.0	18
High Density	24.1 to 36.0	28
Mobile Home Park	6.0 to 10.0	8
Village Core Residential	7.0 to 30.0	12
Residential Reserve	2.0 to 6.0	4.5
Community Plan	-	4.5 [2]

Notes:
[1] For purposes of this report a "unit" is defined as one housing unit with an average of 3.20 persons (See Note 2 in Table 4-4).
[2] City staff indicated that for Community Plan land use, this WCSMP was to assume 4.5 units/acre, which is consistent with the density assumption utilized for the Residential Reserve land use.
[3] These dwelling unit densities were multiplied by the 2030 General Plan acreage allocated to each specific land use to estimate the total number of residential units needing sewer service. The number of residential units in a trunk sewer's service area multiplied by the unit wastewater generation rate and represents an estimate of the average residential wastewater flow that needs to be handled by the serving trunk sewer.
[4] Specific estimates are provided for UC Merced and other specific planning areas were provided by the City. Specific developments, identified by City staff as either currently under construction or expected to develop in the near future, were evaluated based on development-specific information provided by the City.
Key:
UC = University of California
WCSMP = Wastewater Collection System Master Plan

These dwelling unit densities were multiplied by the 2030 General Plan acreage allocated to each specific land use to estimate the total number of residential units needing sewer service.

4.2.2 LAND USE DESIGNATIONS

The total estimation of average wastewater flows for planning purposes is based on the unit factors presented in **Table 4-6**. The wastewater generation rates were equated to their equivalent number of EDUs and scaled appropriately by the per capita flow analysis. These wastewater generation rates were cross checked using the wastewater flow data collected by V&A.

Table 4-6. Wastewater Generation Rates

Land Use Code	Description	Density (EDU/acre)	Updated Generation Rate (gpd/acre)
CG	General Commercial	5.8	1,214
BP	Business Park	5.8	1,214
BP-R	Business Park Reserve	5.8	1,214
CO	Commercial Office	5.8	1,214
CT	Thoroughfare Commercial	5.8	1,214
RC	Regional Community Commercial	5.8	1,214
COM-R	Commercial Reserve	5.8	1,214
CN	Neighborhood Commercial	5.8	1,214
IND	Manufacturing/Industrial	7.8	1,619
IND-R	Industrial Reserve	7.8	1,619
FSCH	Future School	14.6	3,047
SCH	School	14.6	3,047
P/G	Public General Use	5.8	1,214
AG	Agricultural	0.0	0
OS-PK	Open Space–Park Recreation	0.0	0
FPK	Future Park	0.0	0
RR	Rural Residential	2.0	415
LD	Low Density Residential	4.5	935
LMD	Low To Medium Density Residential	8.5	1,766
HMD	High To Medium Residential	18.0	3,740
HD	High Density Residential	28.0	5,818
RMH	Mobile Home Park Residential	8.0	1,662
VR	Village Residential	12.0	2,493
RES-R	Residential Reserve	4.5	935
CP	Community Plan	4.5	935
MU	Mixed Use	11.9	2,474

Key:
EDU = equivalent dwelling unit
gpd = gallons per day

4.3 Peak Flow Estimates and Methodology

PWWFs simulated in the hydraulic model are used to evaluate the LOS of the collection system and provide recommendations for future servicing and improvement strategies.

Two methods were used to determine peak flows within the hydraulic model:

1. **Existing and Interim Flows:** Use simulated design storms to predict PWWFs in the existing system.
2. **Build-out Flows:** Use City design criteria and PF method, to predict PWWFs that may result from build-out development.

Each method of estimating PWWF in the system is further described below.

4.3.1 DESIGN STORM

PWWFs are determined by computational models by simulating design rainfall events representing a reasonable worst-case condition. During rainfall conditions considered more severe than the input design storm, exceedances of LOS criteria would be expected to occur, which may result in sanitary sewer overflow (SSO). The design storm selected for many Central Valley collection systems has a statistical 10-year return frequency and a 24-hour duration. PWWFs in the collection system, originating from the existing sewer sheds, were evaluated using a 10-year, 24-hour design storm with a Huff Distribution (distributing rainfall by the hour). The 10-year, 24-hour design storm in the City of Merced has a total rainfall depth of 2.31 inches.

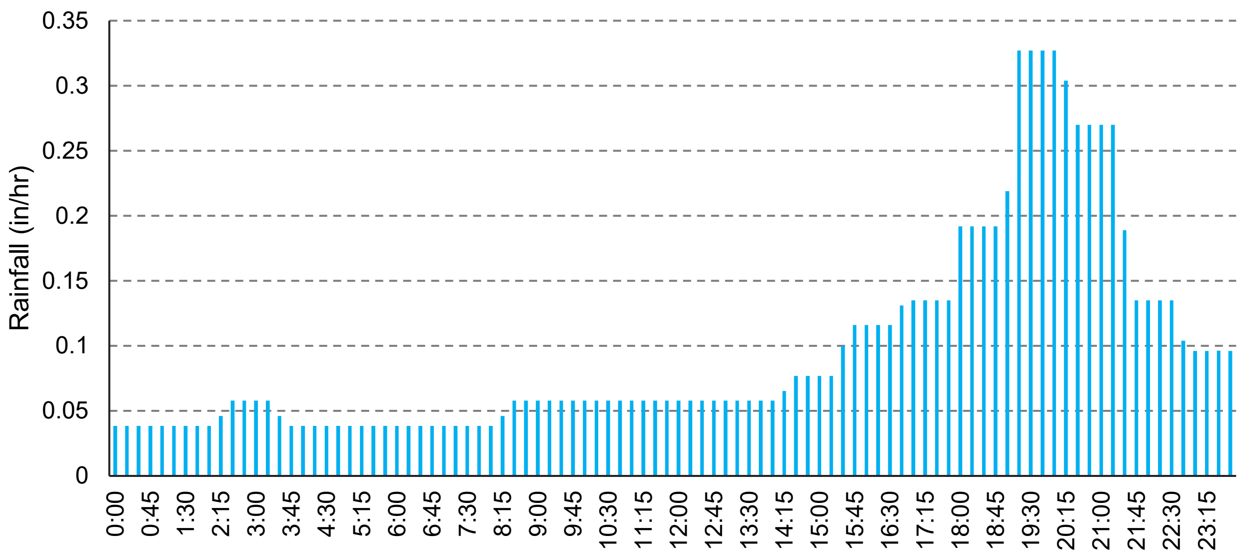

Figure 4-2. City of Merced 10-year, 24-hour Design Storm

4.3.2 PEAKING FACTOR METHOD

A PF of 2.3 is used to estimate peak flows from future build-out development areas. PWWFs contributing to proposed build-out infrastructure are calculated using the City's design standard, which applies a PF of 2.3 to the projected ADWF.

4.4 Future Flow Projections Summary

The land use data presented in **Table 4-7** was correlated with the updated wastewater generation rates.

Table 4-7. Future Wastewater Flow Projections Summary

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	0.5
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***
Build-out 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 Build-out	***11,974***	***62,592***	***13.03***
Total Interim Service Area	**10,769**	**68,330**	**14.21**
Total Build-out Service Area	**22,743**	**130,922**	**27.24**

Notes:

[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.

Key:
ADWF = Average Dry Weather Flow (observed during the dry season)
EDU = equivalent dwelling unit
gpd = gallons per day
MGD = million gallons per day
SUDP = Specific Urban Development Plan
UC = University of California

5.0 Hydraulic Model

The purpose of this chapter is to outline details of the sewer collection system model background, use, and approach. The most recent version of the City's existing system model was updated and calibrated as part of the Model Update and South Trunk Alternatives Analysis (Stantec 2020). This existing system model is used as the foundation of this master plan update and analysis.

This chapter is divided into the following sections:

- 5.1 Modeling Software
- 5.2 Model Background
- 5.3 Model Calibration
- 5.4 Model Scenarios

5.1 Modeling Software

The City's wastewater collection system model uses the latest version of Personal Computer Storm Water Management Model (PCSWMM) software (version 7.4.3240) developed by Computational Hydraulics International (CHI).

5.2 Model Background

A fully dynamic hydraulic model of the City of Merced's (City) wastewater collection system was initially developed using InfoWorks ICM software (version 6.5.5.13016) for use in preparing the WCSMP (Stantec 2017). This model was updated and converted from ICM to PCSWMM software as part of the most recent update performed as part of the Model Update and South Trunk Alternatives Analysis (Stantec 2020) report.

As part of the 2020 effort, the model was updated using flow monitoring data collected within the sewer system and the most recent information on existing sewer accounts, sewer service commitments, and land use planning information provided by the City. After completing the hydraulic model update, the new model was used to perform an alternatives assessment which considered servicing options for the future southeast portion of the City, originally proposed to be served by the future south trunk in the City's 2017 WCSMP. The proposed alternatives include sizing and alignment variations of what had been previously proposed and considered the potential of utilizing residual capacity within the existing system.

5.3 Model Calibration

As previously discussed, the model was most recently updated and calibrated as part of the City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis (Stantec, June 2020) report. Wastewater flow was monitored at ten strategic locations within the collection system for a four-week period from November 22, 2019, to December 25, 2019. The flow monitoring data was used to redistribute flow and calibrate the existing system model after the physical system data was reconstructed in PCSWMM. This calibration was validated using the flow data collected by V&A as part of the per capita analysis discussed in **Section 4.1**. The validation process included running the existing system model under the conditions experienced during the 2021 flow monitoring study and comparing the overall system flow results with the recorded data. The validation results showed that the error between monitored and simulated flows was less than 10 percent for the maximum, minimum, mean, and total system flow. All recorded versus observed flow values fell within the 30 percent envelope.

5.4 Model Scenarios

The following model scenarios were included as part of this WCSMP update to evaluate the collection system under existing, near-term, and future build-out development conditions. Simulated scenarios are summarized below.

5.4.1 EXISTING SYSTEM MODEL

This modeled scenario simulates flow in the existing collection system during a 10-year, 24-hour design storm event. This model was constructed using the calibrated wet weather flow model and applying a 10-year, 24-hour rainfall event. The results of this simulation evaluate the existing collection system under PWWF conditions.

5.4.2 INTERIM SYSTEM MODEL

This modeled scenario is the existing wet weather flow model evaluated in previous scenario with the addition of flow from planned sewer service commitments described in **Section 3.3.3**. Sanitary flow from these parcels was approximated using methods described in **Section 3.3.5**. Sewershed unit hydrographs corresponding to the location of the infill have been applied to estimate PWWFs under design storm conditions. The results of this simulation represent PWWF in the collection system if all committed parcels were to be developed. It should be noted that these results do not reflect the addition of flow from pre-annexation areas, which was considered after identifying the recommended system improvements.

5.4.3 BUILD-OUT SYSTEM MODEL

This modeled scenario represents build-out of the entire City planning area. PWWF from these build-out areas was approximated using a PF of 2.3. The results of this simulation represent the maximum build-out flow through the existing collection system and the trunk extensions required to accommodate the added flow. The results of this simulation represent the approximate PWWF from all planning areas and the new trunk sewers needed to accommodate this flow.

A summary of the modeled scenarios is provided in **Table 5-1**.

Table 5-1. Summary of Modeled Scenarios

Model Scenario	Description	Cumulative Development Areas	Service Area (Acres)	Simulated ADWF (MGD)	Simulated PWWF (MGD)
Existing System Model	Existing Service Area and PWWF Conditions	Existing Service Area	6,697	7.02	19.47
Interim System Model	Near-Term Development and PWWF Conditions	Planned Sewer Service Commitments	10,235	12.36	31.56
Build-out System Model	Build-out of the City's General Plan and PWWF Conditions	Remaining Parcels within City's General Plan	22,364	27.25	66.70

Key:
ADWF = Average Dry Weather Flow (observed during the dry season)
MGD = million gallons per day
PWWF = peak wet weather flow

6.0 Collection System Model Results

The purpose of this chapter is to summarize and present the results of the model simulations described in **Chapter 5.0**.

This chapter is divided into the following sections:

- 6.1 Recommended Level of Service Evaluation Criteria
- 6.2 Existing System Results
- 6.3 Interim System Results
- 6.4 Build-Out System Results

6.1 Recommended Level of Service Evaluation Criteria

The LOS criteria used to assess capacity of sewers include the extent of surcharging in manholes, minimum and maximum velocity predicted in pipelines, and pipe capacity metrics.

6.1.1 SURCHARGING CRITERIA

The primary criteria used to evaluate the collection system is level of surcharge. Surcharging in a manhole is defined in terms of the distance between the top of the sewer pipe leaving the manhole (i.e., the pipe crown elevation) and the HGL of water flowing through the manhole. A manhole is surcharged when the HGL exceeds the exit pipe's crown elevation.

Two surcharging design criteria are applied to capacity assessments of the existing trunk sewer system:

- Manhole rim elevation is less than 8-feet above the exit pipe crown elevation: no surcharging allowed.

- Manhole rim elevation is greater than or equal to 8-feet above the exit pipe crown elevation: 1-foot of surcharging is acceptable.

Proposed sewer improvements and new sewers are designed to have no surcharging allowed under peak design flow conditions.

6.1.2 VELOCITY

Velocities within the collection system will be rendered in plan view. Typical LOS criteria define an acceptable velocity range of 2–7 feet per second.

6.1.3 PIPE CAPACITY

The following metrics for evaluating pipe capacity will be used to describe model results in the following sections along with the parameters described above.

6.1.3.1 Depth to Diameter (d/D) Ratio

New gravity flow trunk sewers will conform to the following capacity criteria under design peak flow conditions (where d = depth of flow in pipe, and D = pipe diameter):

- d/D will be a maximum of 0.70 for gravity flow trunk sewers with diameters up to 24 inches.
- d/D will be a maximum of 1.00 for gravity flow trunk sewers with diameters greater than 24 inches.

6.1.3.2 Hydraulic Loading Ratio and Residual Capacity

The hydraulic loading ratio (HLR) is mathematically defined as the peak modeled flow divided by the full pipe capacity derived from Manning's equation. The residual capacity is the remaining capacity within a sewer when subjected to PWWF conditions. The residual capacity is mathematically defined as Manning's full pipe flow capacity minus the peak modeled flow. This performance indicator is useful for illustrating the relative remaining capacity throughout the collection system for use in evaluating future servicing strategies.

6.2 Existing System Results

The existing model of the trunk sewer system 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. This is within the range of peak observed flows recorded during significant historical storm events.

This model scenario is essentially the same as what had been evaluated as part of the Model Update and South Trunk Alternatives Analysis (Stantec 2020). The only change to the existing system model as part of this WCSMP update is the existing wastewater flow associated with UC Merced. The flow estimate was adjusted to reflect the updated flow estimates presented in the 2020 UC Merced Long Range Development Plan Recirculated Draft Subsequent Environmental Impact Report (December 2019). A factor of safety had previously been included in the flow recorded from UC Merced in the existing system model simulation. The resulting changes to the UC Merced flow estimate are presented in **Table 6-1**.

Table 6-1. UC Merced Model Existing System Model Changes

Parameter	Existing System Model Assumptions UC Merced Contribution		Units
	2020	2022	
ADWF	0.35	0.14	MGD
Area	200	200	Acres
PWWF	0.76	0.49	MGD

Key:
ADWF = Average Dry Weather Flow (observed during the dry season)
MGD = million gallons per day
PWWF = peak wet weather flow
UC = University of California

No significant system deficiencies were identified in the existing system model. No significant surcharging is predicted to occur under existing PWWF conditions. The existing system model results, showing residual system capacity are depicted in **Figure 6-1**.

6.3 Interim System Results

The interim model simulates flow conditions in the existing sewer system with the addition of flow from the City's sewer service commitments without any improvements or new infrastructure added to the existing system. The interim system model includes flow from the committed development areas identified in **Section 3.3**. The flow projected to be contributed from entitled parcels will add approximately 5.3 MGD to the existing ADWF, bringing the total ADWF up to 12.4 MGD under interim conditions. It should be noted that these results do not reflect the addition of flow from pre-annexation areas, which was considered after identifying the recommended system improvements.

The interim model was used to evaluate the extent of hydraulic deficiencies within the system under PWWF conditions. The interim model predicts a PWWF of 31.6 MGD will occur at the WWTF under 10-year, 24-hour design storm conditions without considering any improvements to the existing collection system.

6.3.1 HYDRAULIC CONSTRAINTS

The results of the interim system model predict 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 SSOs are predicted to occur within the system under interim conditions.

6.3.1.1 G Street/Rascal Trunk (Part 1, North)

The most concerning hydraulic restriction predicted in the interim system model exists along the Rascal Trunk (Part 1, North) between G Street and M Street, where it parallels Black Rascal Creek and Campus Drive. The sewer is predicted to flow at approximately 150 percent where it crosses M Street and has a limiting capacity of approximately 5.1 MGD. The average slope of this 30-inch sewer is approximately 0.0006 feet/feet with a minimum of 0.0003 feet/feet in some segments. The limited capacity in this stretch of sewer causes surcharging to occur along G Street and Yosemite.

6.3.1.2 Bear Creek Crossing/North Merced West Ave Trunk

The main hydraulic constraint that limits flow from the North Merced service area from reaching the WWTF is at the Bear Creek sewer crossing near N. Bear Creek Court and W. 16th Street. The 36-inch sewer crossing has a limiting capacity of approximately 13.6 MGD and is predicted to flow at an HLR of 111 percent under interim conditions.

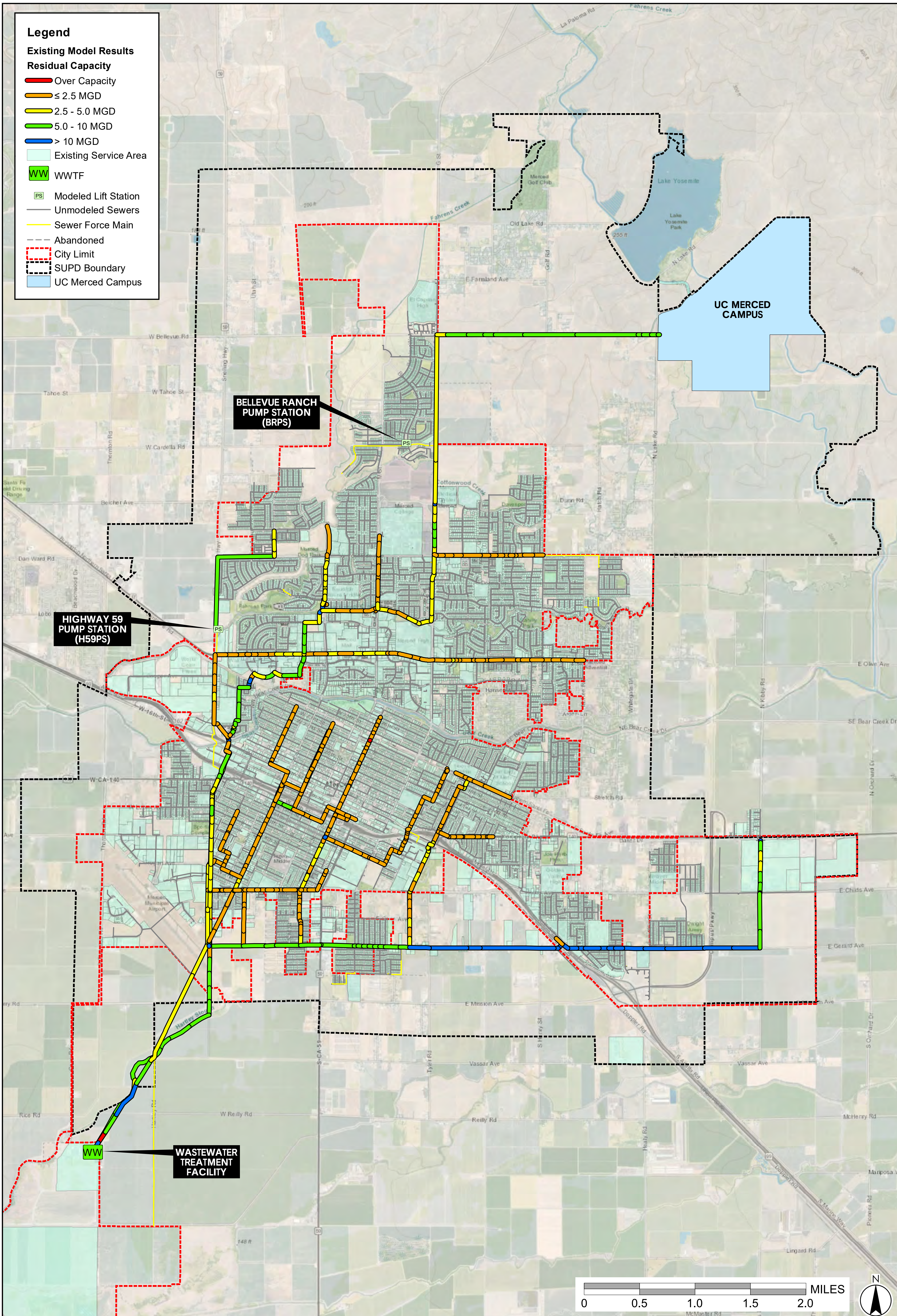

Figure 6-1
Existing Collection System Model Results and Residual Capacity

6.3.1.3 48-Inch Interceptor

The existing condition of the 48-inch interceptor is poor, and the concrete sewer is showing signs of hydrogen sulfide accumulation and pipeline deterioration due to its extremely shallow slope (0.0003 feet/feet). The condition of this sewer corresponds to a high roughness value, which reduces the available flow capacity of the pipe. Large amounts of sediment were noted during installation of flow monitoring equipment, which indicates sewers are likely to flow less than full, have shallow slopes, and/or high roughness. The pipe condition and roughness coefficients were validated upon review of pipe condition photos provided by V&A, pipe material data, and discussions with City staff. The shallowest segments of the 48-inch interceptor are predicted to flow at an HLR of 100–150 percent under interim conditions. The 48-inch sewer needs to convey approximately 15.0 MGD in this scenario.

6.3.1.4 42-inch WWTF Trunk

The 42-inch WWTF Trunk is also predicted to exceed its available capacity, flowing at an HLR of approximately 162 percent in its shallowest segment. Although this trunk has a more variable slope when compared to the parallel 48-inch interceptor, minor surcharging is predicted at the upstream junction with the Gerard Avenue sewer due to mismatched crown elevations. The Gerard Avenue trunk has sufficient capacity to convey the predicted flows under interim conditions.

6.3.2 SURCHARGING AND LEVEL OF SERVICE

The LOS criterion used for identification of recommended improvements is level of surcharge as described in **Section 6.1**. Under interim conditions, the City’s system fails this recommended LOS along G Street and Yosemite Avenue, where surcharging is predicted to exceed 1 foot above the pipe crown. Surcharge depth is predicted to reach approximately 1.4 feet where Yosemite Avenue meets the G Street trunk. Mismatched crown elevations at this junction causes surcharging along Yosemite Avenue to exceed 2.2 feet.

Surcharging of just under a foot is predicted to occur along the North Merced West Avenue trunk. Despite having sufficient depth, the addition of any additional flow upstream will cause surcharging to exceed this threshold and fail to meet the recommended LOS.

There is not enough available freeboard to allow any surcharging to occur where the 42-inch WWTF trunk meets the Gerard Avenue trunk. Under interim conditions less than 2-inches of surcharging is predicted at this location and as discussed, this surcharge is due to mismatched pipe crown elevations and would not warrant improvements, as additional improvements are recommended at build-out.

To help identify the extent of the predicted surcharging, HGL profiles have been included in Appendix C for these areas of concern. The interim system model results, showing residual capacity are depicted in **Figure 6-2**.

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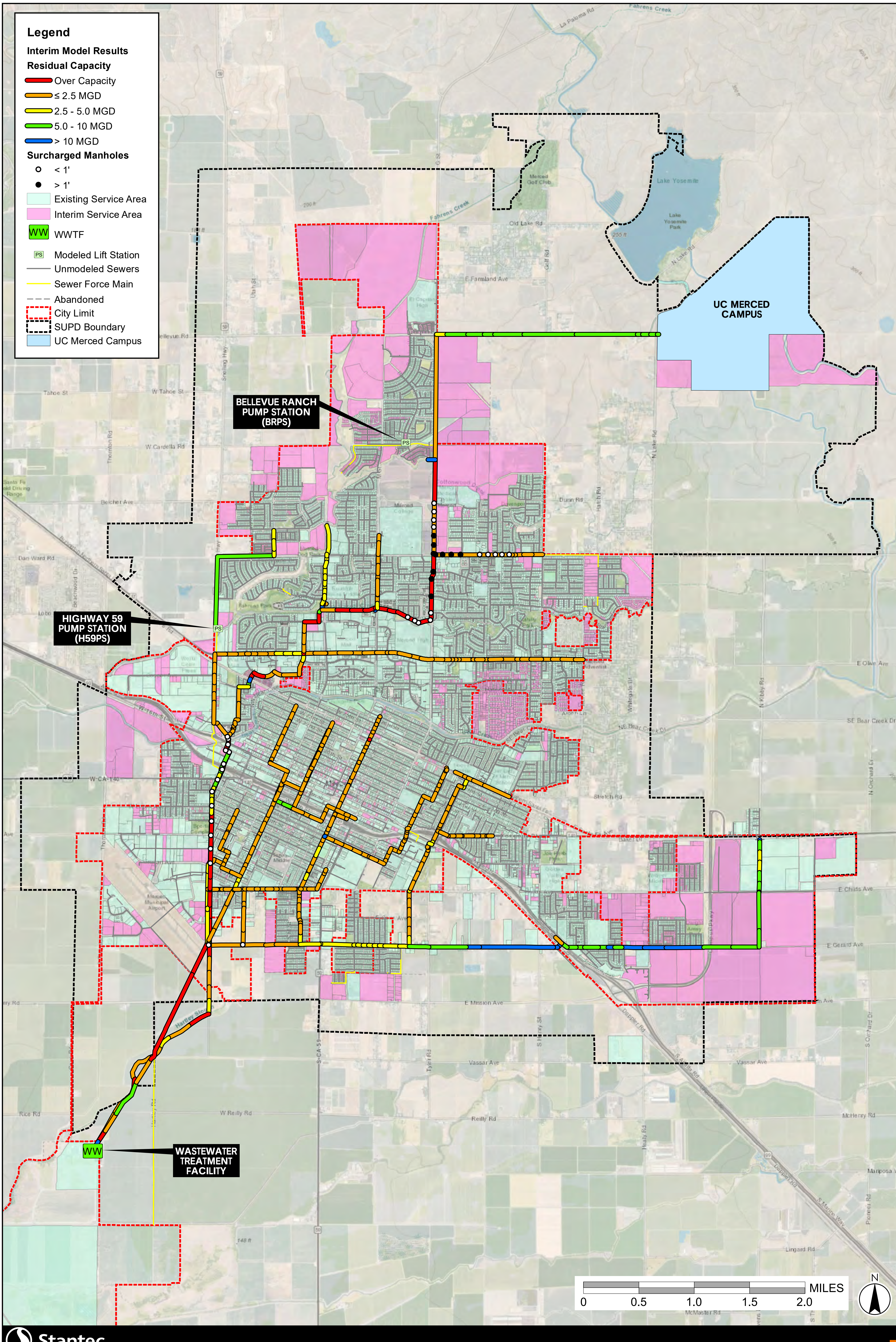

Figure 6-2
Interim Collection System Model Results and Residual Capacity

6.3.3 RECOMMENDED INTERIM IMPROVEMENTS

Five primary improvement projects are recommended to bring the City's existing collection system within the recommended LOS criteria under interim conditions.

6.3.3.1 Capital Improvement Project 1 – Bellevue Ranch Pump Station Discharge

The BRPS currently uses an interim 14-inch force main which has been designed to pump a peak flow of 1.95 MGD to the G Street trunk. The BRPS also includes a permanent 16-inch force main (already installed) to convey all flow from Bellevue Ranch to the R Street trunk. The force main to the G Street trunk from the BRPS is planned to be abandoned when the force main capacity is reached.

It is recommended that the City switch the discharge of the BRPS prior to reaching this capacity threshold to bypass flow around predicted hydraulic constraints downstream. This includes switching the discharge from the existing 14-inch connection to G Street to its alternative 16-inch connection to R Street. This will route flow around the capacity constraint identified in the G Street trunk and where it turns west following the Rascal Bike Path. Bypassing flow around this capacity constraint eliminates surcharging in G Street but due to mismatched conduit crowns, minor surcharging is still predicted in the downstream end of the Yosemite Avenue trunk.

6.3.3.2 Capital Improvement Project 2 – Parallel Sewer and Bear Creek Crossing

This project addresses capacity constraints identified in the Bear Creek sewer crossing and North Merced West Avenue trunk. A new parallel sewer and creek crossing is proposed to expand the capacity of the existing system to convey flow from North Merced. Under interim conditions, a 36-inch diameter sewer would be required, but a 48-inch diameter sewer is required for build-out capacity as discussed in **Section 6.4.1**. The parallel sewer is proposed to be routed along W 16th Steet and V Street before meeting back up with the North Merced West Avenue trunk to avoid conflicts with existing utilities.

6.3.3.3 Capital Improvement Projects 3 and 4 – Replace 48-inch Interceptor and West Avenue Sewer

Replacing and expanding the 48-inch Interceptor and West Avenue sewer are recommended on the basis of their current physical condition and the need for additional capacity to serve future development. The 2007 City of Merced Sewer Master Plan Draft described the age and condition of portions of the West Avenue trunk as essentially poor and the 48-inch interceptor sewer is also known to be in poor condition. These are critical trunks in the existing collection system and will only allow for servicing of a limited number of entitled or future connections without significant upgrades.

As previously discussed, the shallow slope and roughness coefficient of these existing sewers limits the available capacity. Therefore, replacing the 48-inch interceptor with a new sewer pipeline is recommended to provide sufficient capacity under interim and build-out conditions, as opposed to simply lining the sewer which reduces the pipe's inner diameter and does not address the risk of pipe collapse due to corrosion. It is also recommended that the remaining portion of the 42-inch North Merced West

Avenue trunk be upsized along with the 48-inch interceptor to facilitate the conjunction of the new Bear Creek crossing parallel sewer and existing North Merced West Avenue trunk.

6.3.3.4 Capital Improvement Project 5 – Yosemite Avenue Extension

Extending the Yosemite Avenue sewer west, connecting G Street and R Street, will provide added capacity under interim conditions. A 27-inch sewer is recommended to allow interim flows and expand this portion of the system. Extending this improvement beyond R street to the H59PS service area allows additional flow capacity to be added to the upstream system. The proposed 27-inch sewer along Yosemite Avenue should be extended to connect to the existing manhole at El Redondo Drive. This improvement extension will allow the addition of 5,480 pre-annexation EDUs along Yosemite Avenue and Bellevue Drive, expanding available capacity by 1.15 MGD ADWF. This extension, which includes a new Fahren’s Creek sewer crossing, should include a weir or flow-limiting device added to the H59PS, to help ensure that it does not exceed its reliable pumping capacity of 3.17 MGD.

6.3.3.5 Capital Improvement Project 6 – Parallel G Street Sewer

Adding a parallel 27-inch sewer in G Street between Bellevue Road and Community College Drive, will provide added capacity under interim conditions. A 27-inch sewer is recommended to allow interim flows and expand this portion of the system. This sewer will connect to the future sewer in Cardella Road under build-out conditions. This will allow the addition of 9,000 pre-annexation EDUs, updating the total from those allowed under CIP 5.

6.3.4 STRATEGY FOR FUTURE SERVICING

These interim improvement recommendations primarily serve the North Merced service area. CIPs 1, 2, 3, and 4 are congruent and extend from the WWTF to a new Bear Creek sewer crossing near W. 16th Street. This effectively provides an improved pathway for flow from the North Merced service area. Sizing these improvements to accommodate ultimate build-out development flows provides a favorable phasing approach to other alternatives investigated for the build-out system. This approach addresses the immediate interim need for sewer capacity to serve committed areas and provides the backbone of the build-out system. Prioritizing and implementing these improvements facilitates ongoing development in North Merced and the construction of other major system improvements that will be needed at build-out. As discussed, extending CIP 5 across Fahren’s Creek to the H59PS sewer shed will allow additional capacity for a portion of the pre-annexation areas.

These improvements are summarized in the following section of this master plan, where they are also alternatively sized to accommodate build-out development flows. The recommended interim improvement projects have been shown in **Figure 6-3**.

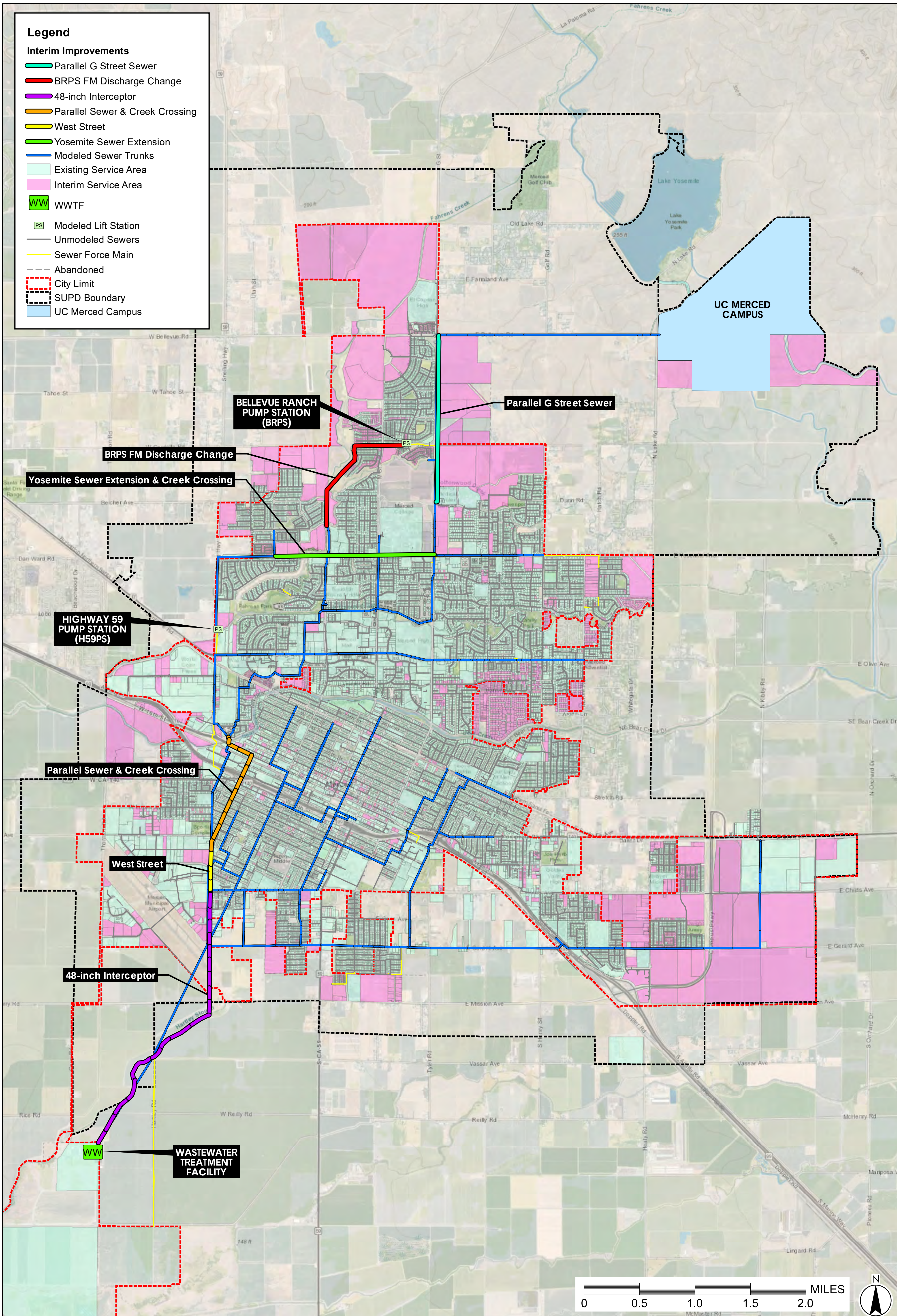

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Figure 6-3
Recommended Interim Improvements

6.4 Build-out System Results

The build-out system model simulates flow conditions in the City's collection system upon full development of the City's General Plan service area. The flow projected to be generated from remaining parcels within the City SUDP will add approximately 14.9 MGD to the interim ADWF, bringing the total ADWF up to 27.3 MGD under build-out conditions.

The build-out model was used to identify the best approach to expanding the system to provide service to the ultimate service area under PWWF conditions. PWWF contributions from build-out development (minus existing and interim development) is determined within the model using the City's standard wastewater PF of 2.3, as opposed to using model calibrated parameters to simulate future flow conditions as are used for existing and interim development. The build-out model predicts a flow of 66.7 MGD to occur at the WWTF under PWWF conditions.

As described in **Chapter 2.0**, several alternatives have been developed to consider how to best serve the far reaches of the City's build-out service area. Previous planning efforts have been primarily focused on routing all future flow through new interceptor to the City's WWTF to avoid the need for capacity improvements to the existing system. This approach resulted in the need to construct new infrastructure outside of the existing SUDP to serve these remote areas. After identifying that the City's existing sewer condition issues and interim capacity needs require significant improvements to the existing collection system, a build-out service area approach considering improvements to the existing system was reconsidered.

This WCSMP update develops a future service area layout that uses any available capacity within the existing collection system and allows a phased build-out approach while considering interim system improvement needs. Large new sewer infrastructure and improvements will still be needed to accommodate build-out development within the SUDP, but previously recommended infrastructure can be downsized and rerouted to consolidate improvements recommended under interim and build-out conditions.

6.4.1 INTERIM IMPROVEMENTS SIZED FOR BUILD-OUT

The build-out system model includes the existing collection system and the future trunk network that will be needed to serve the extended service area. The interim system model was used as the starting point for developing the build-out system model and included recommended near-term system improvements to provide the existing system sufficient capacity to serve interim development. These near-term improvements are further described in Section 6.3 of this WCSMP. After adding flow from build-out development areas, these interim improvement recommendations were resized to provide sufficient build-out capacity. A table summarizing the recommended improvements at each level of development is provided as **Table 6-2**.

To accommodate build-out flows, CIPs 3 and 4 are recommended to be installed at a steeper slope to limit the required pipe size to 60 inches. The existing influent junction structure at the WWTF should be modified to facilitate the change in slope, dropping the existing invert approximately 4.5 feet.

Table 6-2. Interim Improvements Sized for Build-out

CIP No	Name	Existing Pipe Size (inches)	Slope (feet/feet)	Length (feet)	Interim Pipe Size (in)	Build-out Pipe Size (in)
1	BRPS FM Discharge Change[1]	NA	NA	NA	NA	NA
2	Parallel Sewer and Creek Crossing	NA	0.00067	6,491	36	48
3 [3]	West Street	42	Current: 0.0007 New: 0.0006	1,900	48	Current Slope: 60 New Slope: 60
4 [3]	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
6	Parallel G Street Sewer	27	0.0008	8,000	27	27

Notes:
[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

Key:
BRPS = Bellevue Ranch Pump Station
CIP = capital improvement project
FM = force main
NA = not applicable
WWTF = wastewater treatment facility

6.4.2 BUILD-OUT SERVICE AREA INFRASTRUCTURE

The layout of future infrastructure presented in this master plan was developed using high resolution surface elevation data to minimize the need for pump stations and maximize the extents of the gravity collection system needed to serve the SUDP. Surface elevation data consists of LiDAR data from the National Elevation Dataset, which is a primary elevation data product that has been produced and distributed by the U.S. Geological Survey.

6.4.2.1 North Merced

The main constraint limiting development in North Merced is the West Avenue Trunk and the 48-inch interceptor. Resizing the recommended interim improvements expanding these trunks to accommodate build-out flows allows for a new approach to serving build-out of North Merced through the H59PS, the lowest point in the existing North Merced collection system.

The backbone of the future North Merced collection system will consist of a new west-flowing trunk in Cardella Road and south flowing trunk in Highway 59 connecting to the H59PS. The interim CIP 6 recommending a parallel sewer along G Street will ultimately connect the existing Bellevue trunk to the new Cardella trunk to provide sufficient capacity and divert flow from the northeast SUDP. The new Highway 59 and G Street trunks will need to be extended north to the northern boundary of the SUDP, with new west-flowing sewer extending from each.

The current capacity of the H59PS is 3.17 MGD, with the option to expand capacity to 6.34 MGD. However, to realize full capacity, a second parallel force main is needed in addition to new pumps, and the existing downstream gravity sewer along Highway 59 will also need to be expanded.

The H59PS will ultimately need to be expanded or replaced to accommodate build-out flow of 27.5 MGD, and two new 24-inch force mains will be required from the lift station to either a new trunk south of Fahren's Creek or to connect with the proposed new Bear Creek Crossing at W. 16th Street.

A summary of the recommended North Merced build-out infrastructure is presented in **Table 6-3** and shown in **Figure 6-4**.

Table 6-3. North Merced Recommended Build-out Improvements

CIP No	Name	Current Size (inches)	Slope (feet/feet)	Length (feet)	Build-out (in)
7	H59PS Expansion	3.2 MGD			27.5 MGD
8	H59PS Force main	10	NA	4,641	2x24
9	South Hwy 59 Trunk (pump station to Cardella)	NA	0.001	8,688	48
10	West Cardella Trunk (Hwy 59 to G St)	NA	0.0012	10,257	42
11	East Cardella Trunk (G St to VST)	NA	0.0015	10,448	30 to 24
12	G Street Extension 1 (Bellevue to Farmland)	NA	0.0009	2,627	30 to 21
13	G Street Extension 2 (Farmland to Old Lake)	NA	0.00151	2,657	18
14	G Street Extension 3 (Old Lake to SUDP)	NA	0.0015	2,647	15
15	Old Lake Road Sewer (G St to Golf Rd)	NA	follow grade	5,267	12
16	N. SUDP Sewer (G St to Golf Course)	NA	0.0015	3,222	12
17	Farmland Avenue Sewer (G St to Golf Rd)	NA	0.0019/ follow grade	5,257	12 to 8
18	Hwy 59 North Trunk 1 (Bellevue to Cardella)	NA	0.0012	5,307	24
19	Hwy 59 North Trunk 2 (Breeze to Bellevue)	NA	0.0015	2,691	18
20	Hwy 59 North Trunk 3 (Nevada to Breeze)	NA	0.002	2,575	15
21	West Bellevue (Hwy 59 to Fahren's Creek)	NA	0.0012	6,064	18 to 12
22	West Bellevue Collector (ROW)	NA	0.002	2,674	12
23	Breeze Rd West (Hwy 59 to Utah St)	NA	0.002	1,404	12
24	Nevada St West (Hwy 59 to Creek)	NA	0.002	7,009	15 to 10
25	Future Yosemite (El Capitan Canal to Hwy 59)	NA	0.002	3,510	12
26	Future ROW (Santa Fe to Hwy 59)	NA	0.0022	2,618	12

Key:
MGD = million gallons per day
NA = Not Applicable
ROW = right-of-way
SUDP = Specific Urban Development Plan
VST = Virginia Smith Trust

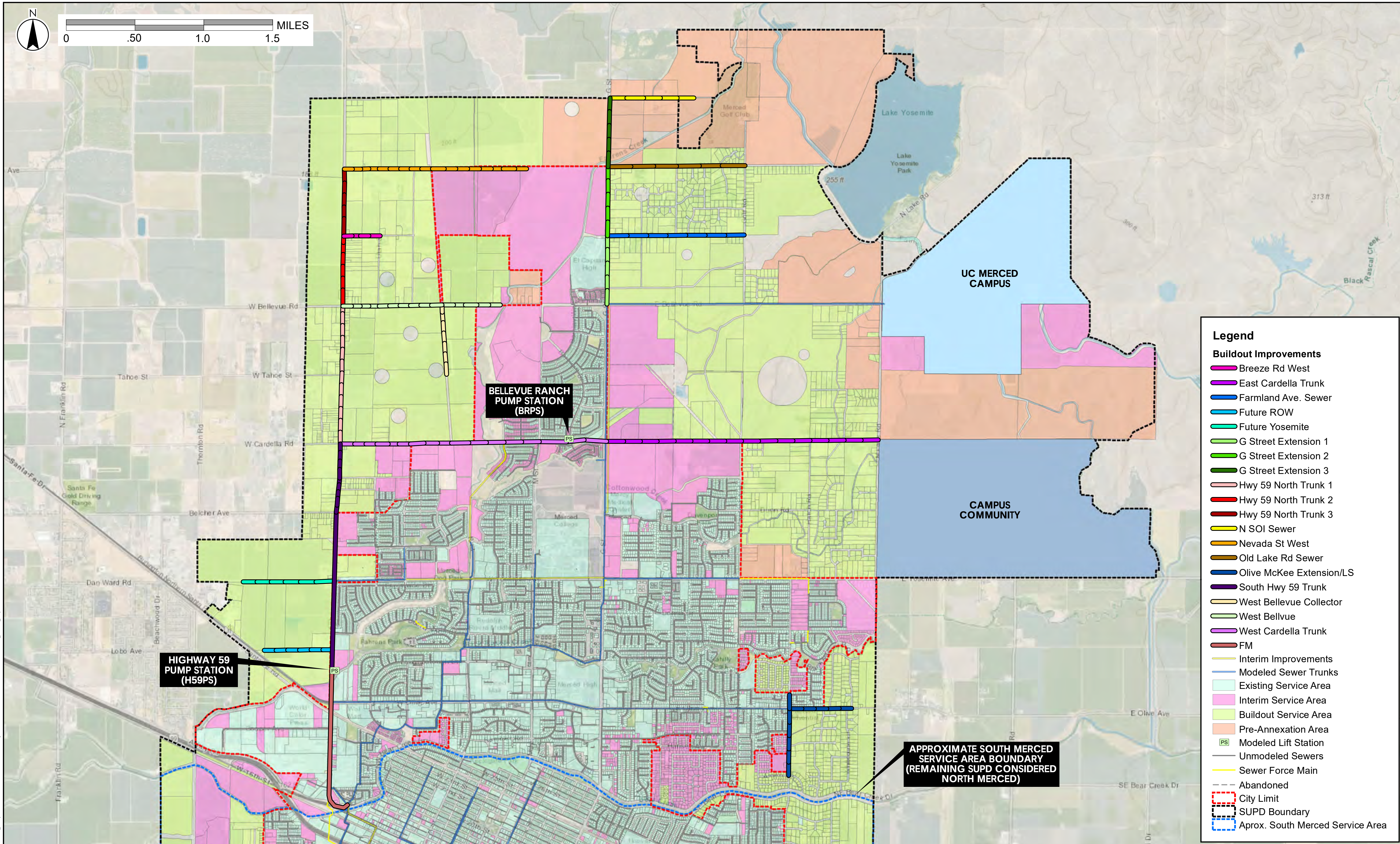

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Figure 6-4
North Merced Recommended Buildout Improvements

6.4.2.2 South Merced

The recommended South Merced build-out service area improvements from the Draft 2017 WCSMP were reevaluated as part of the 2020 Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis report. The conclusions of this alternatives analysis report are carried through here as the best apparent alternative for serving the South Merced service area.

The primary elements of this service layout include a new Mission Avenue trunk, referred to as the south trunk, and relief sewer along Tyler Avenue connecting the existing Gerard Avenue trunk to the Mission Avenue Trunk. Other improvements needed in South Merced include a new main trunkline along Gove Road and Thornton Road. This trunk sewer may require a lift station due to the relatively low elevation of this area.

The Olive McKee extension, Stretch Road, and Cone Avenue sewers are extensions of the existing system. The Olive McKee extension may also require a small lift station to facilitate service to this low-lying area. Upsizing the exiting 12-inch sewer along Santa Fe Drive is required to facilitate the addition of flow from the Stretch Road sewer. This is the only recommended improvement to the existing system in South Merced.

The south trunk extension would extend the south trunk sewer east, parallel to Gerard Avenue. The 2020 Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis Report identified that this area could alternatively be served through the existing Gerard Avenue trunk, but elevation data indicates that a lift station would likely be required to facilitate this alternative.

A summary of the recommended South Merced build-out infrastructure is presented in **Table 6-4** and shown in **Figure 6-5**.

Table 6-4. South Merced Recommended Build-out Improvements

CIP No	Name	Current Size (inches)	Slope (feet/feet)	Length (feet)	Build-out (in)
27	Olive McKee Extension/LS [1]	NA	follow grade	5,480	12
28	South Mission Trunk Connection	NA	0.0008-0.0005	2,749	48 to 30
29	South Mission Trunk	NA	0.0011	7,788	27
30	Gerard Relief Sewer	NA	0.00114	2,675	24
31	South Trunk Extension/LS to Gerard [1]	NA	follow grade	7,230	18 to 12
32	Upsize Santa Fe Dr Sewer	12	0.001	1,302	15
33	Stretch Rd Sewer	NA	0.00104 (min)	6,126	12
34	Cone Avenue Sewer	NA	follow grade, 0.00078, 0.00177	5,326	12
35	Gove Rd Sewer [1]	NA	0.0006	9,347	30
36	Thornton Rd Sewer 1 (Dickenson Ferry to Wardrobe) [1]	NA	0.0009	8,112	21 to 18
37	Thornton Rd Sewer 2 (Wardrobe to McSwain) [1]	NA	0.00137	2,648	12

Note:
[1] Elevation data indicates that a lift station may be required to provide service to this area.
Key:
CIP = Capital Improvement Project; LS = lift station; min = minimum; NA = not applicable

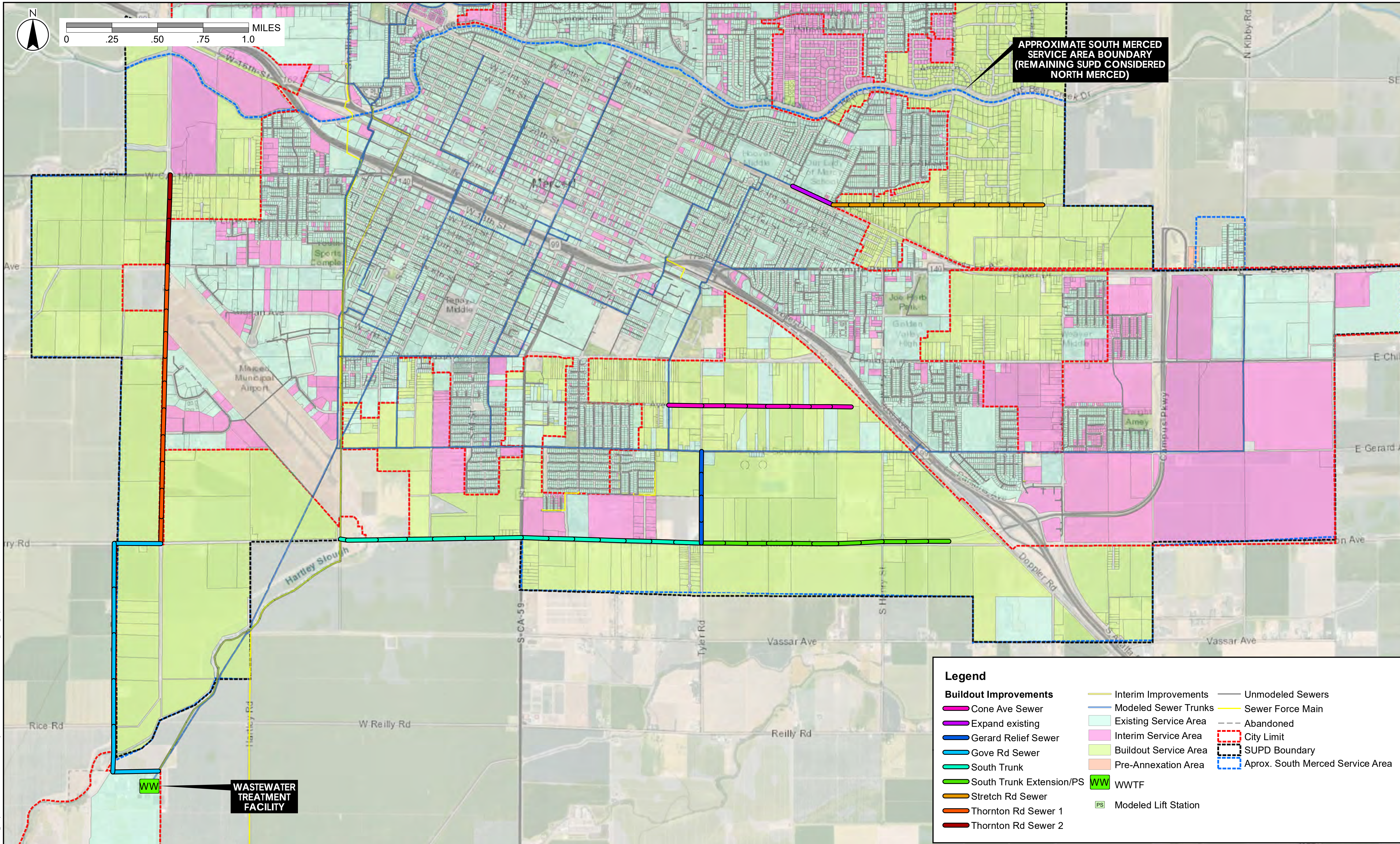

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Figure 6-5
South Merced Recommended Buildout Improvements

7.0 Capital Improvement Program

The purpose of this chapter is to provide recommendations for capital improvements to the City's collection system that eliminate capacity constraints and provide sufficient capacity to accommodate the predicted PWWFs described in Chapter 6.0. Planning level opinions of probable costs have been developed for the proposed CIPs and future trunk network needed to serve SUDP.

These planning level estimates include a 30 percent contingency for unforeseen conditions, and a 20 percent allowance for engineering and environmental documentation. These costs have been estimated using the current 20 Cities Engineering News Record Construction Cost Index (ENRCCI) of 13,175 (October 2022). Unit costs used in the 2017 WCSMP were inflated using this ENRCCI value and validated using recent sewer project bid results provided by the City.

This chapter is divided into the following sections:

- 7.1 Existing System Capital Improvement Project Costs
- 7.2 Interim System Capital Improvement Project Costs
- 7.3 Recommended New Trunk Sewers to Serve City Growth
- 7.4 Summary of Improvement Costs

7.1 Existing System Capital Improvement Project Costs

No system restrictions or constraints were predicted by hydraulic model of the City's collection system for existing development conditions. No deficiencies were identified in the existing system under PWWF conditions, and no capacity improvements are recommended to address deficiencies under current flow conditions. Despite there being no current capacity related improvement needs, it has been noted by City staff that the condition of the City's sewer system is deteriorating in older areas of the collection system. The City's geographic information system database has limited pipeline age information but does indicate some sewers are approaching 100 years old (e.g., Radsdale's Subdivision). It is recommended that the City perform a condition assessment to evaluate the system for condition-based deficiencies that may exist within the existing system to develop a prioritized, ongoing repair and replacement program. An ongoing I/I improvement program is also recommended. Existing system constraints identified in the 2017 WCSMP were not a concern in the updated model. Additional detail is provided in the 2020 Collection System Model Update report in Appendix A.

7.1.1 REPAIR AND REPLACEMENT PROGRAM

A robust repair and replacement (R&R) program is a key element of any properly managed public infrastructure system. The City's R&R program for the sewer utility includes an annual expenditure for the replacement of older, aging infrastructure. To replace all the facilities in the City's sewer enterprise would require a significant sum of money. The annual R&R allocation is intended to reduce the impact of repairing and replacing critical portions of the City's sewer collection system by stretching them out over time.

As a result, to help ensure the elements of these systems which are in place today remain in service for perpetuity, the City has elected to fund their R&R program sufficiently to allow replacement of all collection system mechanical components (i.e., valves, pumps, appurtenances) on a schedule which is consistent with industry standard expectations for service life. The City is budgeting for replacement of all pipelines by assuming an 80-year service life. Pump stations are assumed to have 20-year service life for mechanical components (i.e., pumps and emergency power generation), with wet wells and control buildings assumed to have 80-year service lives. At this time, the City is planning to budget $300,000 annually for repair and replacement of system assets. Prioritization of R&R projects will be done within the typical five-year CIP timeframe, updated accordingly, but the City also recognizes that unforeseen incidents may require adjustments in the specific projects identified in any particular year.

7.2 Interim System Capital Improvement Project Costs

As discussed in preceding chapters, a new trunk network that ultimately depends on improvements to the existing system is needed to provide service to the future SUDP and to relieve system constraints identified under interim development conditions. Five primary improvement projects have been recommended; these interim improvements are sized for build-out of the SUDP. These projects and their associated opinions of probable costs are presented in **Table 7-1**.

Table 7-1. Interim Improvement Project Costs

Item	Description	Opinion of Capital Cost [1]
1	BRPS FM Discharge Change [2]	$0
2	Parallel Sewer and Creek Crossing	$4,634,333
3	West Street [3]	$1,207,000
4	48-inch Interceptor [3]	$10,868,667
5	Yosemite Sewer Extension	$1,793,000
6	Parallel G Street Sewer	$1,979,000
	Subtotal	***$20,482,000***
	5% Mobilization/Demobilization	$1,025,000
	Construction Cost Subtotal	***$21,507,000***
	30% Contingency	$6,453,000
	Estimated Construction Cost	***$27,960,000***
	20% Engineering, Environmental, and Admin	$5,592,000
	Total Project Cost	**$33,552,000**

Notes:
[1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.
[2] Bellevue Ranch Pump Station has two existing force mains, this project changes operations of the pump station to discharge through the larger force main conveying flow to R Street.
[3] It is recommended that the West Street sewer project and the 48-inch interceptor project are done together. Both improvements should be constructed at a slope of 0.0006 feet/feet, lowering the existing invert at the downstream end of the existing 48-inch trunk at the influent junction box near the WWTF.
Key:
BRPS FM = Bellevue Ranch Pump Station Force main
WWTF = wastewater treatment facility

A breakdown of the construction costs of each trunk sewer is provided in Appendix D. The recommended interim improvement projects have been shown in **Figure 6-3**.

7.3 Recommended New Trunk Sewers to Serve City Growth

As previously discussed, several trunk sewer alternatives to serve City growth have been considered. The future infrastructure proposed in this WCSMP update is based on implementation of the improvements identified to relieve interim hydraulic constraints presented in **Table 7-1**.

This WCSMP update considers sewers needed to serve future development at a more refined level than previously considered, including trunks 12 inches and greater in diameter. The 2017 WCSMP considered trunk sewers needed a minimum size of 18 inches, but it did not consider infrastructure that may be needed north of Bellevue Road or extensions to the existing system required for infill development. Therefore, this WCSMP update breaks projects down into major and minor system improvements. Major system improvements mirror those considered in the 2017 Master Plan and generally include future trunks 18 inches in diameter or larger, while minor system improvements include budgets for smaller sewers and extensions to the existing system.

7.3.1 NORTH MERCED BUILD-OUT IMPROVEMENTS

7.3.1.1 Major Improvements

The opinions of probable cost for the major improvements needed to serve the North Merced service area at build-out are summarized in **Table 7-2**.

Table 7-2. North Merced Major Improvement Project Costs

Item	Description	Opinion of Capital Cost [1]
1	H59PS Upgrades and Force main	$14,703,000
2	South Hwy 59 Trunk (pump station to Cardella)	$5,724,000
3	West Cardella Trunk (Hwy 59 to G St)	$5,872,667
4	East Cardella Trunk (G St to VST)	$4,243,333
5	G Street Extension 1 (Bellevue to Farmland)	$482,000
6	G Street Extension 2 (Farmland to Old Lake)	$383,000
7	Hwy 59 North Trunk 1 (Bellevue to Cardella)	$1,576,000
8	Hwy 59 North Trunk 2 (Breese to Bellevue)	$599,000
9	West Bellevue (Hwy 59 to Fahren's Creek)	$1,114,000
	Subtotal	***$34,697,000***
	5% Mobilization/Demobilization	$1,735,000
	Construction Cost Subtotal	***$36,432,000***
	30% Contingency	$10,930,000
	Estimated Construction Cost	***$47,362,000***
	20% Engineering, Environmental, and Admin	$9,473,000
	Total Project Cost	**$56,835,000**

Note:
[1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.

Key:
VST = Virginia Smith Trust

7.3.1.2 Minor Improvements

The opinions of probable cost for the minor improvements needed to serve the North Merced service area at build-out are summarized in **Table 7-3**.

Table 7-3. North Merced Minor Improvement Project Costs

Item	Description	Opinion of Capital Cost [1]
1	G Street Extension 3 (Old Lake to SUDP)	$933,500
2	Old Lake Road Sewer (G St to Golf Rd)	$692,000
3	N. SUDP Sewer (G St to Golf Course)	$448,000
4	Farmland Avenue Sewer (G St to Golf Rd)	$669,000
5	Hwy 59 North Trunk 3 (Nevada to Breese)	$476,000
6	West Bellevue Collector (ROW)	$958,500
7	Breeze Rd West (Hwy 59 to Utah St)	$221,000
8	Nevada St West (Hwy 59 to Creek)	$1,048,000
9	Future Yosemite (El Capitan Canal to Hwy 59)	$1,163,000
10	Future ROW (Santa Fe to Hwy 59)	$416,000
11	Olive McKee Extension/LS	$627,000
	Subtotal	***$7,652,000***
	5% Mobilization/Demobilization	$383,000
	Construction Cost Subtotal	***$8,035,000***
	30% Contingency	$2,411,000
	Estimated Construction Cost	***$10,446,000***
	20% Engineering, Environmental, and Admin	$2,090,000
	Total Project Cost	**$12,536,000**

Note:
[1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.

Key:
ROW = right-of-way
SUDP = Specific Urban Development Plan

7.3.2 SOUTH MERCED BUILD-OUT IMPROVEMENTS

7.3.2.1 Major Improvements

The opinions of probable cost for the major improvements needed to serve the South Merced service area at build-out are summarized in **Table 7-4**.

Table 7-4. South Merced Major Improvement Project Costs

Item	Description	Opinion of Capital Cost [1]
1	South Mission Trunk	$4,050,000
2	Gerard Relief Sewer	$1,171,000
3	Gove Rd Sewer	$4,577,000
4	Thornton Rd Sewer 1 (Dickenson Ferry to Wardrobe)	$1,301,000
	Subtotal	***$11,099,000***
	5% Mobilization/Demobilization	$555,000
	Construction Cost Subtotal	***$11,654,000***
	30% Contingency	$3,497,000
	Estimated Construction Cost	***$15,151,000***
	20% Engineering, Environmental, and Admin	$3,031,000
	Total Project Cost	**$18,182,000**

Note: [1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.

7.3.2.2 Minor Improvements

The opinions of probable cost for the minor improvements needed to serve the South Merced service area at build-out are summarized in **Table 7-5**.

Table 7-5. South Merced Minor Improvement Project Costs

Item	Description	Opinion of Capital Cost [1]
1	South Trunk Extension/pump station to Gerard	$931,000
2	Upsize Santa Fe Dr Sewer	$175,000
3	Stretch Rd Sewer	$701,000
4	Cone Avenue Sewer	$610,000
5	Thornton Rd Sewer 2 (Wardrobe to McSwain)	$303,000
	Subtotal	***$2,720,000***
	5% Mobilization/Demobilization	$136,000
	Construction Cost Subtotal	***$2,856,000***
	30% Contingency	$857,000
	Estimated Construction Cost	***$3,713,000***
	20% Engineering, Environmental, and Admin	$743,000
	Total Project Cost	**$4,456,000**

Note:
[1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.

7.4 Summary of Improvement Costs

A summary of the opinions of probable cost developed for new trunk sewers and pump station improvements needed to serve build-out of the SUDP is presented in **Table 7-6**. As discussed, the recommended interim improvements are sized to facilitate build-out development. Major improvements generally include those 18 inches and larger in diameter, are considered backbone infrastructure, and are generally comparable to those presented in the 2017 WCSMP. Minor improvements are further extensions of the system that will ultimately be required to serve the furthest extents of the SUDP.

Table 7-6. Summary of Proposed Improvement Costs

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**

Note:
[1] Costs based on ENRCCI (20 Cities Index) = 13,175, October 2022.

A figure showing the proposed interim, major, and minor improvements is provided as **Figure 7-1**.

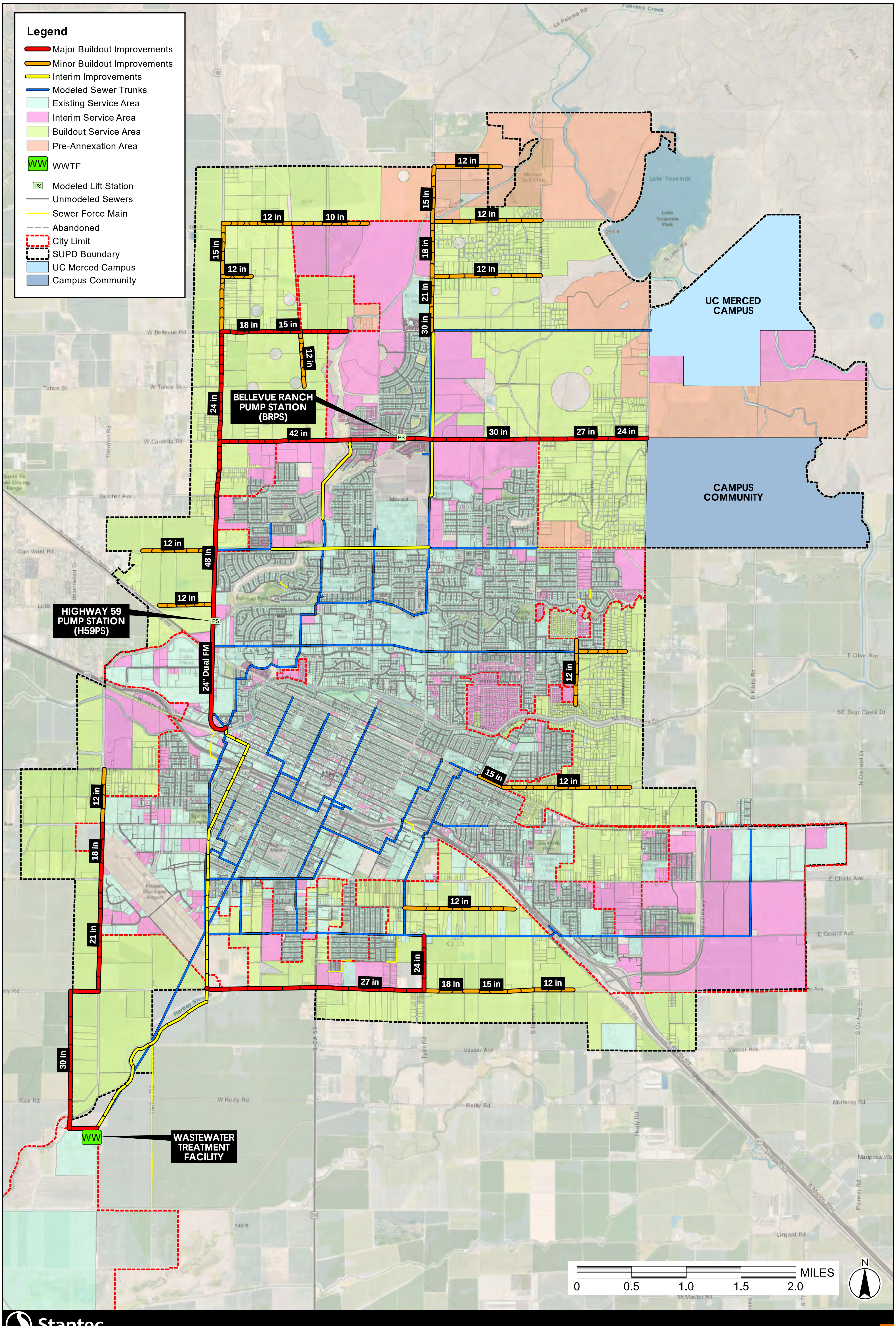

Figure 7-1
2022 Merced Master Plan Recommended Improvements

8.0 Conclusions and Recommendations

The updated hydraulic modeling and capacity analysis completed for this master plan update confirms that the existing wastewater collection system does not have the capacity to convey the projected flows from interim development projects without exceeding the City's LOS criteria in several reaches of the trunk system. Without improvements, the existing system does not have the capacity to service the build-out of the pre-annexation areas and the City's remaining SUDP. These conclusions are generally consistent with the previous 2017 WCSMP findings.

Several improvements focused on increasing the capacity of the existing trunk system were discussed with the City and noted in the 2017 WCSMP but were determined to be less cost-effective than constructing new trunk sewers around the perimeter of the City to service future growth. The previous study also contemplated reserving the limited capacity within the existing 48-inch interceptor to fully utilize the G Street trunk and that no flow beyond that would be added until future large trunks are constructed to convey the ultimate SUDP flows from North Merced to the existing WWTF. This meant that many projects ready for development would have to wait until the new infrastructure was completed due to the significant length and cost of these trunk extensions.

However, the condition of the existing concrete 48-inch interceptor is severely corroded and should be replaced as soon as possible given its criticality in the system. Taking this into consideration, and the desire to provide near-term capacity for interim development projects, it is recommended that the City implement the improvement projects presented in **Table 7-1** (sized for build-out capacity) and choose the proposed major and minor future trunk network as a preferred strategy versus the alternatives initially identified in the 2017 WCSMP. This strategy will provide a phased approach for capacity improvements that address both near-term and build-out developments that can be constructed and funded in manageable projects to better accommodate the rate of development.

APPENDIX A

Previous System Planning Reports

- A.1 City of Merced Collection System Hydraulic Model Conversion and South Trunk Sewer Service Alternatives Analysis (Stantec, June 2020)
- A.2 Executive Summary of City of Merced Wastewater Collection System Draft (Stantec, December 2017)

APPENDIX B

V&A Flow Monitoring Reports

- B.1 V&A Flow Monitoring Site Reports: Data, Graphs, Information (Appendix A) November 22 – December 26, 2019
- B.2 V&A City of Merced – Sanitary Sewer Flow Monitoring Study Report (February 2022)

APPENDIX C

Hydraulic Grade Line Profiles

APPENDIX D

Detailed Cost Estimates